



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Pollachi Main Road, Eachanari Post, Coimbatore - 641 021, Tamilnadu, India.

Phone : 0422 - 2980011 - 14 | Fax : 0422 - 2980022 | Email : info@kahedu.edu.in

KARPAGAM
ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

This is to certify that the enclosed pages (2 to 5155) consists of the Syllabi followed for various programmes offered between the academic years 2015-2016.


REGISTRAR
Karpagam Academy of Higher Education
(Deemed to be University Under Section 3 of UGC Act 1956)
Pollachi Main Road, Eachanari Post,
Coimbatore - 641 021.



ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

KARPAGAM ACADEMY OF HIGHER EDUCATION

Deemed to be University
(Established Under Section 3 of UGC Act 1956)
Eachanari Post, Pollachi Main Road, Coimbatore -641021

M.Sc.APPLIED ASTROLOGY COURSE (2015-2016)



REGULATION 2015 COURSE OF STUDY AND SCHEME OF EXAMINATION & SYLLABUS

DEPARTMENT OF ASTROLOGY
FACULTY OF ARTS, SCIENCE AND HUMANITIES
PG PROGRAMME CBCS M.Sc APPLIED ASTROLOGY

Course Code	Name of the Course	Objectives & Out Comes		Instruction hours / week			Credit(s)	Mamimum Marks		
		PEOs	POs	L	T	P		CIA	ESE	TOTAL
SEMESTER - I										
15ASP101	அடிப்படை ஜோதிடவியல் - I Fundamentals of Astrology-I	1	1	4	0	0	4	40	60	100
15ASP102	ஜோதிடவியலில் கோள்கள் - I Planets in Astrology-I	1	1,8	4	0	0	4	40	60	100
15ASP103	பிரஸன்ன ஜோதிட முறைகள் - I Horary Astrological methods I	3	5	4	0	0	4	40	60	100
15ASP104	ராசிகள் பாவகங்கள் நட்சத்திரங்கள்-I Rasi – Bhava – Star Constelations -I	1	2	4	0	0	4	40	60	100
15ASP105B	அடிப்படை வாஸ்து – I Fundamental Vasthu -I	2	4	4	0	0	4	40	60	100
15ASP111	பலன் சொல்லும் முறைகள் - I Predictive methods in Astrology-I	1,2	4,1 0	0	0	4	2	40	60	100
15ASP112	Practical - I	1,2	11	0	0	4	2	40	60	100
	Total						24	280	420	700
SEMESTER II										
15ASP201	அடிப்படை ஜோதிடவியல் -II Fundamentals of Astrology-II	1	1	4	0	0	4	40	60	100
15ASP202	ஜோதிடவியலில் கோள்கள் -II Planets in Astrology-II	1	1	4	0	0	4	40	60	100
15ASP203	பிரஸன்ன ஜோதிட முறைகள் - II Horary Astrological methods-II	2	5	4	0	0	4	40	60	100
15ASP204	ராசிகள் பாவகங்கள் நட்சத்திரங்கள்II Rasi – Bhava – Star Constelations-II	1	2	4	0	0	4	40	60	100
15ASP205B	Modern vasthu II	2	4	4	0	0	4	40	60	100
15ASP211	பலன் சொல்லும் முறைகள் - II Predictive methods in Astrology-II	2	2,6	0	0	4	2	40	60	100
15ASP212	Prediction - II	3	6,1 1	4	0	4	2	40	60	100
	Total						24	280	420	700

SEMESTER III										
15ASP301	புதிய ஜோதிட முறைகள் Modern Astrological Methods	2	3,6	4	0	0	4	40	60	
15ASP302	ஜோதிடவிதிகளில் முகூர்த்தங்கள் - Muhurtha in Astrology	3	7	4	0	0	4	40	60	100
15ASP303	மருத்துவ ஜோதிடம் Medical Astrology	3	8	4	0	0	4	40	60	100
15ASP304	ஜோதிட கணித முறைகள் Casting Horoscope	1	9	4	0	0	4	40	60	100
15ASP305	Dasabukthi Predictions	1	11	4	0	0	4	40	60	100
15ASP306B	Ashtavargam	2	10	4	0	0	4	40	60	100
15ASP312	Practical - III	1,8	11	0	0	4	4	40	60	100
							28	280	420	700
SEMESTER IV										
15ASP491	Project	2,3	2,1 1	0	0	0	15	80	120	200

The following are the Elective papers

List of Elective Papers		
S.No	Course Code	Subjects
1.	15ASP105(A)	எண்கணிதம் (Numerology)
2.	15ASP105(B)	ஆடிப்படை வாஸ்து – I (Fundamentals of Vasthu – I)
3.	15ASP105(C)	அங்கலட்சணம் மற்றும் மச்சங்கள் (Samuthrika Lakshanam)
4.	15ASP205(A)	நவரத்தினங்கள் (Gemology)
5.	15ASP205(B)	நவீன வாஸ்து – II (Modern Vasthu – II)
6.	15ASP205(C)	கைரேகை சாஸ்திரம் (Palmistry)
7.	15ASP306(A)	தாஜிகம் (Thajigam)
8.	15ASP306(B)	அஷ்டவர்க்கம் (Astavargam)
9.	15ASP306(C)	16 வர்க்க சக்கரங்களும் பலன்களும் (Predictions through 16 Varga Chakras)

Programme outcomes

- 1) சோதிட முதுகலை மாணவர்கள் வானவியல் பற்றிய, சோதிடவியல் பற்றிய வரலாற்றை அறிவதால் இத்துறையின் பழமையையும் பெருமையையும் புரிந்து கொள்வார்கள்
- 2) சோதிடவியலின் அடிப்படைத்தன்மைகள் இராசி காரகத்துவங்கள், கோள்களின் காரகத்துவங்கள், பாவக காரகத்துவங்கள் ஆகியவற்றை பற்றிய ஆழ்ந்த அறிவு சாதக பலன்கள் நிர்ணயிப்பத்தில் முக்கிய பங்கு வகிக்கும்.
- 3) சோதிடவியலுக்கு பெரும் புகழ் சேர்த்த சோதிட அறிஞர்களின் பலன் கூறும் முறைகளை தெரிந்து கொள்வதினால் இத்துறையில் பல சாதனைகள் பல செய்ய ஆர்வம் ஏற்படும்
- 4) எண்கணிதம், வாஸ்து, கைரேகை, நவரத்தினங்கள், அங்கலட்சணங்கள் ஆகிய துணைப்பாடங்களுக்கு சோதிடவியலே ஆதாரம் என்பது புலப்படும்.
- 5) சாதகம் இல்லாதவர்களுக்கு பலன்கள் சொல்லும் வகையில் பிரசன்ன முறைகள் மூலம் பலன்கள் அறிந்து கொள்ளலாம்.
- 6) நாடி முறை, ஜெயமினி முறை, கிருஷ்ணமூர்த்தி பத்ததி முறை, மேலைநாட்டு முறை ஆகிய முறைகளில் பலன்கள் சொல்லப்படுவது சோதிட துறையின் வளர்ச்சிக்கு ஆதாரங்கள் ஆகும்.

- 7) நல்ல முகூர்த்தங்களில் ஆரம்பிக்கும் செயல்கள் நல்ல பலன்களைத் தரும், தீய முகூர்த்தங்களில் ஆரம்பிக்கப்படும் செயல்கள் துன்பத்தை விளைவிக்கும் என்பதை உணரமுடியும்.
- 8) மருத்துவ சோதிடத்தின் மூலம் நோய் ஏற்படும் உடல் பாவகம், நோயின் தன்மை, நோய் ஏற்படும் காலம், நோய் தீர்க்கும் முறைகள் ஆகியவற்றை தெளிவாக அறிய முடியும்.
- 9) சோதிட கணித முறைகளை அறிந்து கொள்வதின் மூலம் இக்கால விஞ்ஞானம், கணினி முதலியன அழிந்தாலும் சோதிட கணித முறைகள் அழியாமல் பாதுகாக்க முடியும்.
- 10) அஷ்டவர்க்கங்கள், தாஜிகம், பதினாறு வர்க்க சக்கரங்கள் பற்றிய அறிவு, சாதக பலன்களை சொல்லுவதில் துல்லியத்தை நிர்ணயிக்க உதவும்.
- 11) கல்வி, திருமணம், தொழில், புத்திரபேறு முதலியவை பற்றிய கேள்விகளுக்கு தெளிவான பலன்களை சொல்ல முடியும்.

Programme Specific outcomes

- 12) தனிமனிதனின் பிரச்சனைகளுக்கு சோதிட ரீதியில் சரியான தீர்வை கொடுக்க முடியும்.
- 13) எதிர்காலத்தில் நடக்கக்கூடிய நன்மை, தீமைகளை முன் கூட்டியே அறிந்து, அதற்காக முன் எச்சரிக்கை நடவடிக்கைகளை எடுத்துக் கொள்ள முடியும்.
- 14) சோதிட சாஸ்திரம் தனிமனிதனின் வளர்ச்சிக்கும், நாட்டின் வளர்ச்சிக்கும் ஒரு வழிகாட்டியாக அமையும்.

Programme Educational Objectives (PEOs)

PEO 1 : சோதிடவியல் முதுகலைப்பட்ட தாரிகளுக்கு வானவியல் அறிவு, சோதிடவியலின் வரலாறு, சோதிடவியலின் அடிப்படைத் தன்மைகள், கோள்கள், இராசிகள், பாவகங்கள் பற்றிய அறிவு உள்ளதால் கால தேச வர்த்தமானங்களுக்கு ஏற்ற வகையில் பலன்கள் கூறுவதற்கான திறமைகள் வளரும்.

PEO 2 : சாதக பலன்கள் சொல்லுவதற்கு சோதிட சாஸ்திரத்தில் பல முறைகள் உண்டு. அனைத்து முறைகளிலும் நன்கு பயிற்சி அளித்து, இத்துறையில் வலிமை உள்ளவர்களாக மாற்ற முடியும். இவர்கள் இத்துறையில் புதிய கண்டுபிடிப்புகளை கண்டுபிடிக்க முடியும். சோதிடத்தின் துணை சாஸ்த்திரங்களான கைரேகை, வாஸ்து, எண்கணிதம் முதலியவற்றிலும் அறிவு வளரும்.

PEO 3 : இது ஒரு தெய்வீக கலை என்பதால் சோதிட முதுகலை பட்டதாரிகள் ஒழுக்கத்தில் சிறந்தவர்களாகவும், சோதிட அறிவில் தன்னிகரற்றவர்களாகவும் மாற்றம் ஏற்படும். தற்காலத்தில் சமுதாயத்தில் ஏற்படும் அனைத்து தனி மனித பிரச்சனைகளுக்கும் தீர்வு காணமுடியும்.

POs	1	2	3	4	5	6	7	8	9	10	11	12	13	14
PEO 1	X	X			X		X							
PEO 2		X	X	X	X				X	X	X			X
PEO 3						X	X	X			X	X	X	X

KARPAGAM ACADEMY OF HIGHER EDUCATION

DEPARTMENT OF ASTROLOGY

Marks Allocation

Continuous Internal Assessment (CIA):

The performance of students in each will be continuously assessed by the respective faculty as per the guidelines given below:

Theory Courses

S.No	Category	Maximum Marks
1.	Attendance	5
2.	Test-I#	10
3.	Test-II#	10
4.	Journal Paper Analysis & Presentation	15
Continuous Internal Assessment : Total		40

- The Mark obtained in the seminar should be entered in automation software on or before 60th working day of the semester.
- # Test answer scripts in should be evaluated and marks awarded should be entered in automation software on or before 4th working day after the last date

Practical Courses (Astrology):

S.No	Category	Maximum Marks
1.	Attendance	5
2.	Observation Work	5
3.	Record Work	5
4.	Model Examination (Related with astrology)	15
5.	Viva –Voce [Comprehensive]	10
Continuous Internal Assessment : Total		40

- Includes Viva-voce Conducted during every regular practical class and the model exam practical.
Every practical exercise/experiment and records should be maintained.

UNIVERSITY EXAMINATIONS

End Semester Examination(ESE): ESE will be held at the end of each semester for each course. The question paper is for a maximum of 60 marks.

Pattern of ESE Question Paper:

Instruction	Remarks
Maximum Marks	60 marks for all Semester Examination
Duration	3 Hours
Part –A	10 out of 15 two mark Questions (10x2=20 Marks) (Not exceeding 3 questions from each unit)
Part-B	5 Eight mark Questions(5x8=40 Marks) <ul style="list-style-type: none"> • One Question from any one of the units is compulsory. It shall be oriented to analysis/design/application/case studies. • 4 Questions are in ‘either –or’ choice. • (One Question each from the remaining 4 units)

Admission eligibility: Any degree passed in a recognized university

15ASP101

Fundamentals of Astrology – 1

Semester – I
4H – 4C

Instruction Hours / Week: L : 4 T : 0 P : 0

Marks Internal : 40, External : 60 Total : 100
End Semester Exam : 3 hrs**நோக்கங்கள் :**

- 1) ஜோதிடத்தின் தோற்றம் எந்த நாட்டில் ஏற்பட்டது என்பதில் தெளிவு உண்டாகும்.
- 2) வானசாஸ்திர வளர்ச்சியை வரலாற்று ரீதியாகக் கற்றுக் கொள்வதால் ஆய்வு மனபான்மை உண்டாகும்.
- 3) இந்திய ஜோதிடத்தை அறிந்து கொள்வதால் இந்தியர்களின் ஜோதிடத்திறமை எவ்வாறு இருந்துள்ளது என்று உணரலாம்.
- 4) வேதாங்க ஜோதிடம், அதர்வன ஜோதிடம் ஆகியவற்றில் சொல்லப்பட்டுள்ள கருத்துக்களை தெரிந்துக் கொள்ளலாம்.
- 5) அயல் நாட்டு ஜோதிடவியலின் வரலாற்றை தெரிந்துக் கொள்வது.
- 6) நாஸ்ட்ரடாமஸ் போன்ற தீர்க்க தரிசிகளை பற்றி தெரிந்துக் கொள்வது.

பயன்கள்

- 1) இந்திய ஜோதிடத்தின் வரலாற்றை அறிந்து கொள்வதால் நமது கலாச்சாரத்தின் தொன்மையை அறியலாம்.
- 2) இந்தியர்களின் வானசாஸ்திர புலமை, ஜோதிடவியல் புலமை ஆகியவற்றை அறிந்துக் கொள்வதால் ஆய்வு மேற்படிப்புகளில் பயனுள்ள முடிவுகளை எடுக்க முடியும்.
- 3) ஜாதகத்தை கணிப்பதற்கு பஞ்சாங்க நூல் வேண்டும், பஞ்சாங்க நூல்கள் வானசாஸ்திரத்தின் அடிப்படையில் உருவாக்கப்பட்டவைகளாகும்: எனவே பஞ்சாங்க நூல்கள் யாரால் எப்படி உருவாக்கப்பட்டவை என்ற அறிவு அவசியமாகிறது.
- 4) பராசரர் போன்ற ரிஷிகளின் பெருமைகள் நமக்கு புரியும்.
- 5) வேதங்கள், புராணங்கள், இதிகாசங்களின் பெருமை புரியும்.
- 6) இந்திய ஜோதிட வரலாற்றை அயல் நாட்டு ஜோதிட வரலாற்றோடு ஒப்பு நோக்க முடியும்.

UNITS:

1. **வானியலும் ஜோதிடமும்**
வானசாஸ்திரம் - கோள்களின் அமைப்புகள்
சூரிய குடும்பம் - பூ கோளமும் வான் கோளமும்
2. **ஜோதிடத்துடன் தொடர்புகள்**
பூமியின் இயக்கமும் ஜோதிடமும். இராசி சக்கரம் என்னும் மகா அற்புதம். இராசி மண்டலமும், நட்சத்திரப் பிரிவுகளும்.
3. **ஜோதிட வரலாறு - பாபிலோனியா - எகிப்து – கிரேக்கம்**

ஈரல் ஜோதிடம் - ஜோதிடவியலின் தோற்றம் - வானவியல் ஜோதிடம் - பூவுலகில் கோள்களின் தாக்கம் தனிமனித ஜாதகம் - சகுனங்கள்.

4. **மேலை நாடுகளின் சோதிட வரலாறு**

சுமேரியர் - மெசபடோமியர் - பாபிலோனியா - சால்தியா. எகிப்து - கிரேக்கம் - வானசாஸ்திர மறுமலர்ச்சி - நிக்கோலஸ் கோபர் நிகஸ் - கலிலியே கலில் - ஜோகன்னஸ் கெப்ளர் - ஐசக் நியூட்டன்.

5. **ஜோதிட வரலாறு - இந்தியா**

வேதாங்க ஜோதிடம் - வேதகால மாதங்கள் - வேதகால திதிகள் - முகூர்த்தங்கள் - பதினெட்டு சித்தாந்தங்கள் - இந்திய வானசாஸ்திர அறிஞர்கள். வராகமிகிரார்.

குறிப்புதவி நூல்கள்

- | | |
|---|-----------------------|
| 1. Hindu Astrology and the West | B.V.Raman. |
| 2. கிருக்ஷணமூர்த்தி பத்ததி முறை | K.S. கிருக்ஷணமூர்த்தி |
| 3. வானசாஸ்திரம் | M.L. ராஜா |
| 4. வானியலும் ஜோதிடமும் | M.K. தாமோதரன் |
| 5. Ancient Hindu Astrology for the Modern Western Astrologer (1986) | James T.Braha |

நோக்கங்கள்

- 1) கோள்களின் வடிவங்கள், நிறங்கள், குணங்கள், தன்மைகள் இவைகளை தெரிந்துக் கொள்வது அவசியமாகும்.
- 2) கோள்கள் குறிப்பிடும் உடல் உறுப்புக்கள் மற்றும் நோய்கள் பலன்கள் கூறுவதில் முக்கிய பங்குவகிக்கின்றன.
- 3) கோள்கள் குறிப்பிடும் தொழிகள் எவை என்பதை தெரிந்துக் கொண்டு, ஜாதகர்களை சரியான வழியில் வழிகாட்ட முடியும்.
- 4) நாம் கூறும் பலன்கள் எக்காலகட்டத்தில் நடைபெறும் என்பதை அறிய தசா, புத்தி, கோசாரம் பற்றிய அறிவு நமக்கு தேவைப்படுகிறது.
- 5) கோள்களின் இணைவு மூலம் ஜாதகரின் வாழ்க்கையில் ஏற்படும் பலன்களை அறிவது.
- 6) கோள்களின் காரகத்துவங்கள் பார்வைகள் மூலம் ஜாதக பலன்களை மிக துல்லியமாக கணிக்க முடியும்.

பயன்கள்

- 1) ஜாதக பலன்கள் நிர்ணயிப்பதில் கோள்களின் காரகத்துவங்களுக்கு முக்கிய பங்குண்டு.
- 2) கோள்களின் தன்மைகள், குணங்களின் அடிப்படையில் ஜாதகங்களின் தன்மையும், குணங்களும் இருக்கும் என்பதில் சந்தேகம் இல்லாமல் பலன்கள் கூறமுடியும்.
- 3) கோள்கள் குறிப்பிடும் உடல் உறுப்புகளில் மிக துல்லியமாக நோய்களை கணித்து கூறமுடியும்.
- 4) கோள்களின் சேர்க்கையை கொண்டு விதவிதமான தொழில்களை ஜாதகர்களுக்கு சுட்டி காட்ட முடியும். தசா, புத்தி, கோசத்தை கொண்டு நிகழ்ச்சிகள் நடக்கும் காலத்தை நிர்ணயிக்கலாம்.
- 5) கோள்களின் பலத்தைக் கொண்டு ஜாதக பலன்களை முடிவு செய்ய முடியும்.
- 6) 2,10க்கு அதிபதியான கோள்களை கொண்டு ஜாதகர் எந்த தொழில் மூலம் பணம் சம்பாதிப்பார் என்பதை அறிய முடியும்.

UNITS**1. கோள்களின் குணங்கள்**

கோள்கள் - வடிவங்கள் - நிறங்கள் - இருப்பிடம் - கோள்களின் உருவம் - பாலினம் - சமித்து - திக்கு, மலர் - ரத்தினம் - தானியம் - உலோகம் - சுவை நீச்ச ராசி - மூலத்திரிகோண ராசிகளட - உச்ச ராசிகள் - கோள்களின் நட்சத்திரங்கள்.

2. கோள்களின் காரகங்கள்

குணங்கள் - தன்மைகள் - கோள்கள் குறிக்கும் இடங்கள் - வீட்டு உபயோக பொருட்கள் - உறவுகள் - விலங்கினங்கள் - மரங்கள் - மனிதர்களின் குணாதிசயங்கள் - பஞ்சபூத தன்மை - நவரத்தினங்கள்.

3. **கோள்கள் குறிப்பிடும் உடல் உறுப்புக்கள் மற்றும் நோய்கள்.**
காலபுருஷ ராசியும் -உடல் உறுப்புக்களும் - கோள்கள் சுட்டும் உடல் பாகங்கள்-
நோய்கள் - முக அவயங்கள் - உடலின் உட்புற உறுப்புகள்.
4. **கோள்கள் குறிப்பிடும் தொழில்கள்**
பத்தாம் பாவமும் தொழில்களும் - பத்தாம் பாவத்தில் நின்ற கோள்கள் -
சுட்டும் தொழில்கள் - பத்தாம் பாவக - நவாம்ச அதிபதி -குறிப்பிடும் தொழில்கள்-
உதாரண ஜாதகங்களுடன் விளக்கம் - வேலைகள்
5. கோள்கள் குறிப்பிடும் திசாக்கள் - திசாக்களின் வகைகள் - திசா, புத்தி, அந்தரம்
- சூட்சுமாகணிதம் - தசாபுத்தி பலன்கள் . குறிப்பாக சனிதசா – சனி புத்தி தரும் பலன்கள்
- ஏழரைநாட்டுசனி

குறிப்பதவி நூல்கள்

- | | |
|--------------------------------|---|
| 1. உத்திரகாலாமிருதம் | S.A.குமாரஸ்வாமி ஆச்சாரியார். |
| 2. Prasana Marga | B.V.Raman |
| 3. Pointer to Profession | T.P.Trivedi & R.Asthana |
| 4. Brihat Parasara Hora Sastra | G.C.Sharma |
| 5. ப்ருஹத் ஜாதகம் | C.G.ராஜன் |
| 6. குடும்பஜோதிடம் | ஸ்ரீராமய்யங்கார்-ஸ்ரீஸ்ரீனிவாஸாச்சாரியார் |
| 7. Mundane Astrology | B.V.Raman |
| 8. ஜோதிடமும் நவகிரகங்களும் | முருகு இராசேந்திரன் |

நோக்கங்கள்

- 1) ஜாதகம் இல்லாதவர்களுக்கு ஜாதக பலன்கள் சொல்வதற்காகவும், பிறப்பு ஜாதகத்தில் பிறந்த நேரம் சரியாக இல்லாத போது பலன்கள் மாறுவதை, பிரஸன்னம் தடுக்கும்.
- 2) பிரசன்ன ஜோதிடமுறையில் கேள்வியாளரின் நிலை, ஆடை தொடும் உறுப்பு முதலியவை கொண்டு பலன் அறியலாம்.
- 3) பலவகையான ஆருட லக்னங்கள் கண்டுபிடித்தல், சகுனம், நிமித்தங்கள், அஷ்டமங்கல பிரஸன்னம் ஆகியவற்றின் மூலம் ஜோதிடத்தின் ஆழத்தை புரிந்துக் கொள்ள முடியும்.
- 4) சகுனம், நிமித்தங்களின் மூலம் ஜாதகரின் கேள்விகளும் பதில் கூற முடியும்.
- 5) வெற்றிலை ஜோதிடம் மூலம் ஜாதகரின் கடந்த காலம், நிகழ்கால பலன்களை தெளிவாக கூற முடியும்.
- 6) அஷ்ட மங்கல பிரசன்னம் மூலம் ஜாதகரின் குறிப்பிட்ட கேள்விகளுக்கு பதில்கள் கூற முடியும்.

பயன்கள்

- 1) பலன்கள் கூறுவதில் மிக துல்லியத்தை கொடுப்பது பிரசன்ன ஜோதிடமாகும்.
- 2) பிறப்பு ஜாதகம் இல்லாமலும், கேட்கப்பட்ட கேள்விகளுக்கு பதில் சொல்ல முடியும்.
- 3) பிரஸன்னத்தின் மூலம் நம் முன்னோர்களின் நிலையையும், நம்முடைய பூர்வ கர்மங்களின் நன்மை, தீமைகளை பற்றிய தன்மையையும் தெளிவாக புரிந்துக் கொள்ளலாம்.
- 4) இப்பிறப்பில் செய்யப்பட்ட நல்வினை, தீவினை ஆகியவை பற்றியும் பிரஸன்னத்தின் மூலம் அறியலாம்.
- 5) அஷ்ட மங்கல பிரசன்னம் மூலம் கேள்வியாளர் பிரச்சினைகளை எளிதாக கண்டு பிடிக்க முடியும்.
- 6) விவாஹ பிரசன்னம், நஷ்ட பிரசன்னம், ஆயுள் பிரசன்னம், ரோக பிரசன்னம் மூலம் கேள்வியாளரின் கேள்விகளுக்கு பதில்கள் கூற முடியும்.

UNITS**1. பிரசன்னத்தில் ஜோதிடர் கேள்வியாளர் பங்கு.**

ஜோதிடருக்கான கோட்பாடுகள் - கேள்வியாளர் கொண்டுவரும் பொருட்கள் - கேள்வி கேட்பவர் நிற்கும் திசைகள் - தொடும் அங்கங்கள் - அதற்கான பலன்கள் - ஜோதிடரின் சுவாசம்.

2. கேள்வியாளரின் நிலை- ஆடை மற்றும் லட்சணங்கள்.

கால்களை எடுத்து வைத்தல் - கால்களை ஆட்டுதல் - தயக்கம் - மூன்றாம் நபர் கடந்து செல்லுதல் - கைகளை பிசைதல் - தன்னை அடித்துக் கொள்ளுதல் - மரண தொடர்பு கர்மங்கள்- நிற்கும் போது, உட்காரும் போது உள்ள நிலைகள்.

3. பிரசன்னத்தில் லக்னம் நிர்ணயித்தல்

ஆறு வித ஆருட லக்னங்கள் ஸ்வர்ணாருடம் - உதயாருடம் - உதய வர்ன அம்ஸ ஆருடம் - சாத்திர ஆருடம் - அங்கஸ் பரஷ்ட ஆருடம் - சந்திர ராசி.

4. பிரசன்ன வகைகள் - அக்ஷ்டமங்கலம்

தெய்வானுக்கிரகம் - குலதெய்வானுக்கிரகம் - பிதூர் சாபம் - மாதர் சாபம் - சர்ப்ப தோஷம் - வாக்க்தோஷம் - திருஷ்ட தோஷம் - சத்ரு தோஷம்- பிராமண தோஷம் - குரு, குருபத்னி சாபம் - விஷபோஜனம் - வாஸ்து தோஷம்.

5. சோழிப்பிரசன்னம்- தேங்காய்- ஆருடம்- பலகரைசோதிடம் - பஞ்ச பட்சி முறை நட்சத்திரங்களுக்குரிய பட்சிகள் - பஞ்ச பட்சிகளின் தொழில் முறை, படுபட்சிபலன் கூறும் முறைகள் ஆறு விதிகள்

குறிப்புதவி நூல்கள்

- | | |
|------------------------------------|-------------------------|
| 1. Prasana marga(1999) | B.V.Raman |
| 2. பிரசன்ன ஜோதிடம் (2006) | K.S. கிருஷ்ணமூர்த்தி |
| 3. அக்ஷ்டமங்கல தேவபிரசன்னம் (2011) | அ.அமிர்தலிங்கம் |
| 4. சோழிப்பிரசன்ன ஆருடம் | எம். நடராஜன் |
| 5. Prasanna Tantra (2001) | B.V.Raman |
| 6. பிரசன்ன ஆருடம் | சுப. சுப்ரமணியன் |
| 7. ஷட் பஞ்சாசிகா (2002) | எஸ்.ஏ.குமாரசாமி ஆச்சாரி |

நோக்கங்கள்

- 1) பன்னிரு ராசிகளின் காரகத்துவங்களை தெரிந்துக் கொள்வதால் பலன்களை தெளிவாக முடிவு செய்ய முடியும்.
- 2) ராசிகளின் தன்மை, வடிவம், இருப்பிடம், மரங்கள், மிருகங்கள் என்பவை பலன் சொல்வதில் முக்கிய பங்கு வகிக்கின்றன.
- 3) பன்னிரு பாவகங்களின் காரகத்துவங்களும் தெளிவாக புரிந்துக் கொண்டால் மட்டுமே ஜாதகப் பலன்களை வரையறுத்து கூற முடியும்.
- 4) 27 நட்சத்திரங்களின் தன்மை, குணம், வடிவம் இவைகளும் பலன் கூறுவதில் முக்கிய பங்கு வகிக்கின்றன.
- 5) ராசியில் நிற்கும் கிரகம் பாவகத்தில் மாறி நின்றால் பலன்கள் மாறுவதை அறிய முடியும்.
- 6) பாவாதிபதிகள் மாறி நிற்பதால் ஏற்படும் ஜாதக பலன் மாற்றங்களை அறிவது.

பயன்கள்

- 1) சூர்யாதி, சந்திராதி, பஞ்ச மஹா புருஷ யோகங்கள் பற்றி தெரிந்துக் கொள்வதால் ஜாதகருக்கு எப்படிப்பட்ட யோகத்தின் அடிப்படையில் பலன்கள் நடைபெறும் என்பதை கூறமுடியும்.
- 2) கேள்வியாளர்களின் கேள்விக்கு ஏற்ற பதிலை சொல்வதற்கு மேலும் முதல் மீனம் வரையுள்ள இராசிகளின் தன்மை மற்றும் காரகத்துவங்களும், 12 பாவகங்கள் எதை குறிப்பிடுகின்றன என்பனவற்றை பற்றிய அறிவு வேண்டும்.
- 3) கோள்கள் நிற்கின்ற நட்சத்திரங்களின் அடிப்படையில் பலன்கள் மாறுவதை காணமுடியும்.
- 4) ஒரு கோள் எந்த ராசியில், எந்த பாவகத்தில் எந்த நட்சத்திரத்தில் அமர்கின்றது என்பதை பொருத்து பலன்கள் சொல்ல முடியும்.
- 5) லக்னம், லக்னாதிபதி எந்த நட்சத்திரத்தில் நிற்கின்றதோ அதை பொருத்து ஜாதகரின் பலன்கள் நிர்ணயிக்க முடியும்.
- 6) கோள்களின் நிலை தெரியாமலேயே லக்னத்தை கொண்டு பலன்களை வரையறுக்க முடியும்.

UNITS**1. பன்னிரு ராசிகள் காரகத்துவம்**

மேகூஷம் முதல் மீனம் வரை பன்னிரு ராசிகளின் இருப்பிடம் -வடிவம் - சிறப்பு அம்சங்கள். பன்னிரு ராசிகளுக்கும் ஆதிபத்ய முறையில் பலன்கள். ஒவ்வொரு ராசியில் உள்ள நட்சத்திர அடிப்படையில் பயன்கள். ஒவ்வொரு ராசியிலும் ஆட்சி, உச்சம், நீச்சம் அடையும் கிரகங்களை கொண்டு பலன்கள்.

2. பாவகங்களின் காரகத்துவம்

பன்னிரு பாவகங்கள் குறிப்பிடும் நிலைகள். பன்னிரு பாவகங்கள் குறிக்கும் - உயிர்காரத்துவங்கள். உடல் உறுப்புகள் - நன்மை, தீமைகள். ஒவ்வொரு பாவகமும்

குறிப்பாக உணர்த்தும் காரத்துவங்கள். மறைவு ஸ்தனங்கள்- தனஸ்தானம் - லாபஸ்தானம் - களத்திர ஸ்தானம்.

3. **பல வகையான யோகங்கள் சூர்யாதி, சந்திராதி, பஞ்ச மஹா புருச யோகங்கள்**
பத்ரயோகம் - மாளவியா யோகம் - சச யோகம் - ஹம்சயோகம் - ருஷ்யோகம்.
4. **இருபத்தியேழு நட்சத்திரங்களின் அமைப்பு**
அசுவனி முதல் ரேவதி வரை இருபத்தியேழு நட்சத்திரங்களின் வடிவம்- நட்சத்திரங்கள் ராசியின் தன்மை, ராசி அதிபதியின் தன்மைக்கு ஏற்ற வகையில் பலன்கள் தரும் முறைகள்.
5. **இருபத்தியேழு நட்சத்திரங்களின் குணம் மற்றும் தன்மைகள்**
பாவாதிபதிகள் நட்சத்திரங்களில் நிற்பதால் ஏற்படும் பலன்கள். கோள்கள் நட்சத்திரங்களில் உச்ச நீச்சம் அடைவதால் ஏற்படும் பலன்கள்.

குறிப்புதவி நூல்கள்.

- | | |
|------------------------------------|--------------------------------|
| 1. உத்திரகாலாமிர்தம் | S.A.குமாரஸ்வாமி ஆச்சாரியார் |
| 2. பிருஹத் பராசரா ஹோரா சாஸ்திரா | G.C.Sharma |
| 3. நட்சத்திர சிந்தாமணி I, II, III | சரஸ்வதி மகால் நூலகம் தஞ்சாவூர் |
| 4. Book of Natkshatras | Prash Trivdi |
| 5. இருபத்தியேழு நட்சத்திரகோவில்கள் | K.P. வித்யாதரன் |

நோக்கங்கள்:

- 1) எண் கணிதம் பற்றிய அடிப்படையான கருத்துக்களை தெரிந்துக் கொள்ள வேண்டும்.
- 2) 1 முதல் 9 வரையுள்ள எண்கள் எந்தெந்த கிரகங்களை குறிக்கின்றது என்ற அறிவை பெற வேண்டும்.
- 3) 1 முதல் 30 தேதிகளில் பிறந்தவர்கள் எப்படிப்பட்ட குணாதிசயங்களுடன் வாழ்கிறார்கள் என்பதை இந்த எண்கணித சாஸ்திரம் நமக்கு தெளிவாக விளக்கும்.
- 4) பிறவி எண், விதி எண், பெயர் எண்களின் கூட்டு தொகை இவைகளை கொண்டு பலன் கூறும் முறையை தெரிந்துக் கொள்ளலாம்.
- 5) எண் கணிதம், ஜோதிட சாஸ்திரம் ஆகிய இரண்டிற்கும் உள்ள தொடர்பை அறிதல்.
- 6) ஒருவரின் பெயரை கொண்டு வாழ்நாள் முழுவதும் பலன்களை அறிதல்.

பயன்கள்:

- 1) எண் கணித சாஸ்திரத்திற்கு ஜோதிட சாஸ்திரமே அடிப்படை என்ற கருத்தை தெளிவாக புரிந்துக் கொள்ளுதல்.
- 2) பெயர்களின் சப்தங்களுக்கு எவ்வளவு வலிமை உண்டு என்பதை உதாரணங்களின் மூலம் தெரிந்துக் கொள்ளலாம்.
- 3) விதி எண் நாம் அனுபவித்துக் கொண்டிருக்கின்ற இன்ப துன்பங்களை படம் பிடித்து காட்ட கூடியது.
- 4) எண் கணிதம் மூலம் பெயர் மாற்றம் செய்து ஜாதகர்களின் வாழ்க்கை துன்பங்களை நீங்குவது.
- 5) பெயரில் திருத்தங்கள் செய்வதன் மூலம் பல அறிய பலன்களை அடைய முடியும்.
- 6) ஜாதகர் பிறந்த தேதியையும், கூட்டு எண்ணையும் கொண்டு வாழ்நாள் பலன்கள் சொல்ல முடியும்.

UNITS

1. **எண்கணிதம் பற்றிய முக்கிய குறிப்பு, எண்களின் பொருள்**
எண்கள் குறிக்கும் கோள்கள் - ஆங்கில எழுத்துக்கள் எண்களின் குணாதிசயங்கள். பெயர் வைக்கும் முறை பெயர்களின் எண்கள் கூட்டு எண்.
2. **எண்களில் விளக்கங்கள் (எண்களின் ஆற்றல்)**
பெயர்களின் கூட்டு எண்களின் பலன்கள் - வாழ்வில் ஏற்றம் தரும் எண்கள், கஷ்டத்தை தரும் எண்கள் - உயர்வை தரும் எண்கள்.
3. **எண்களின் செயல்பாடு – எண் நிறம், தன்மை, அதிபதி**
1,2,3 ஆகிய எண்களை பிறவி எண்களாக கொண்டவர்களின் பலன்கள். பிறப்பு ஜாதகத்தை கொண்டு பெயர் அறியும் முறை.
4. **பிறவி எண், விதி எண் பெயர் என அறியும் முறை**

பிறவி எண், விதி எண் இரண்டையும் சேர்த்து பலன்கள் நிர்ணயம் முறைகள். ஒரு எண்ணுக்கு நன்மையும், தீமையும் ஏற்படுத்தும் எண்கள்.

5. 9 கோள்களின் வக்கர எண்கள் பலவீன எண்கள்

எண்களிடத்தில் பரிகாரங்கள். நோய்கள் மற்றும் பல பிரச்சினைகளை தீர்க்கும் முறை. வாழ்வின் ஏற்ற தாழ்வுகளை மாற்றும் பெயர் மாற்றம்.

குறிப்புதவி நூல்கள்

- | | |
|---------------------|-------------------|
| 1. அதிஷ்டவிஞ்ஞானம் | பண்டிட் ஸேதுராமன் |
| 2. Lucky Numerology | Veejay Raj |
| 3. எண்கணித ஜோதிடம் | ஸ்வாமி |
| 4. எண் ஜோதிடம் | சிவராசா |

நோக்கங்கள் :

- 1) வீடு கட்டுவதற்கும், கட்டிடம் கட்டுவதற்கும் நிலம் தேர்வு செய்தல் அவசியமாகும். இப்பாடப் பகுதியில் தெளிவாக தெரிந்துக் கொள்ளலாம்.
- 2) நிலத்தின் வடிவம், கோணங்கள், சல்லியம் கண்டு பிடித்தல் முதலியவை இடத்தை தேர்வு செய்வதில் முக்கிய பங்கு வகிக்கின்றது.
- 3) வீடு அல்லது கட்டிடம் கட்டுவதற்கு ஒவ்வொரு அளவுகளும் எவ்வளவு அளவு இருக்க வேண்டும் என்பதை பற்றிய அறிவும் இதன் மூலம் கிடைக்கும்.
- 4) ஜோதிட சாஸ்திரமே வாஸ்து சாஸ்திர அடிப்படையாகும்.
- 5) வீட்டில் ஒவ்வொரு அறையும் அமையக் கூடிய இடங்களை முடிவு செய்ய முடியும்.
- 6) அறைகள் அமைப்பு, ஜன்னல் அமைப்பு மூலம் பலன்கள் அறிய முடியும்.

பயன்கள் :

- 1) வீடுகள், கட்டிடங்கள் எந்த திசையை பார்த்த வண்ணம் இருக்க வேண்டும், தலைவாசல், பின்வாசல் ஆகியவற்றின் திசைகள் வீட்டில் தங்கியுள்ளவர்களுக்கு எவ்வித பலனை தரும் என்பதை இப்பாட பகுதியில் தெரிந்துக் கொள்ளலாம்.
- 2) வீட்டிற்குள் நடப்பதையும், நடக்க போவதையும் அக்கட்டிடத்தின் வாஸ்துவின் மூலம் தெரிந்துக் கொள்ள முடியும்.
- 3) வாஸ்து சாஸ்திரம் நமது தலை எழுத்தை மாற்றும் சக்தி படைத்தது.
- 4) ஆரோக்கியமான வாழ்விற்கு துணைபுரியும்
- 5) செல்வம் நிறைந்த வாழ்விற்கு துணைபுரியும்
- 6) கல்வி, ஒழுக்கம் நிறைந்த வாழ்விற்கு துணை புரியும்.

UNITS**1. நிலம் தேர்வு செய்தல்**

வாஸ்து என்பதன் பொருள் - நிலத்தின் தன்மை – நிறம் - மணம் - சுவை – அமைப்பு - வசிக்கத்தக்க விலக்கத்தக்க நிலம் சல்லியம். வாஸ்து புருஷனின் புராணகால வரலாறு. வீடுகட்ட சிறந்த மனைகள் - வீடுகட்ட விலக்கத்தக்க மனைகள்.

2. நிலத்தின் வடிவம்

நிலத்தின் வடிவம் - சதுரம் - செவ்வகம் - வட்டம் - முக்கோணம் - நீள் சதுரம் - சக்கரம் - கிண்ணம் பாணை – பலவித கோணங்கள் - தன்மைகள் - மனைகளின் அமைப்பு – மனைகளின் வடிவங்களால் ஏற்படும் பலன்கள் - மனைகளின் வடிவத்தை சீர்திருத்தம் செய்தல்.

3. நிலத்தடி சோதனை

சல்லியம் கண்டுபிடித்தல் - பிரச்சனம் - சகுனம் - நிமித்தம் - நட்சத்திரம் - வாயிலாகச் சல்லியம் கண்டுபிடித்தல் - நீக்குதல் - கஜ பிருஷ்டம் - கூர்ம பிருஷ்டம் - தைத்ய பிருஷ்டம் - நாக பிருஷ்டம்.

4. நிலத்தை அளத்தல் ஆயம் கணித்தல்

அங்குல அளவு - கை அளவு - பொதுவான அளவு முறைகள் - ஆயம் கணித்தல் - பலன் - பார்வை – கதவு நிலம் அதிபதி – கால்நடைகள் - ஒன்பது வாக்கம் கணக்கிடுதல் - திசைகளை நிர்ணயித்தல் - வீடு கட்டத் தகுதியான பாகங்கள்

5. கட்டுமானம்

வீடு – உயரம் - தலைவாசல் - ஒற்றை அறை - இரட்டை அறை – பதினாறு
வகையான கட்டுமானம் - நிலத்தின் தோஷம் - திசை – மரம் - அஸ்திவாரம் - கதவு -
சன்னல் - மனையடி சாஸ்திரம்.

குறிப்புதவி நூல்கள்

1. கே.எஸ். சுப்பிரமணிய சாஸ்திரிகள், மய மதம், சரசுவதி மகால் நூலகம், தஞ்சாவூர்
2. உரை எஸ். கிருஷ்ணமூர்த்தி சாஸ்திரிகள், வாஸ்து வித்யை, சரசுவதி மகால்
நூலகம்
தஞ்சாவூர்
3. கோவிந்தசாமி ரெட்டியார், காக்கையர் சிற்பம், சண்முகனந்தா புக் டிப்போ, சென்னை
4. ஆர். பாஸ்கரன் குருஷி, _ காச புஜண்டர் சித்தர் வாஸ்து சாஸ்திரம், காஞ்சிபுரம்
5. என். தாமோதரன், வாஸ்து வளம், _ மீனா பப்ளிஷர்ஸ், திருச்சி
6. பல வகையான சோதிட இணைய தளங்கள்

நோக்கங்கள்

- 1) பொதுவான முகத்தின் லட்சணத்தை கொண்டு ஜாதகரின் குணாதிசயங்களை சொல்ல முடியும்.
- 2) ஜோதிடத்திற்கும் அங்கலட்சணத்திற்கும் நெருங்கிய தொடர்பு உள்ளது. ஒரு மனிதனை பார்த்து அவனுடைய ஜாதக கட்டங்களை எழுதுகின்ற அளவிற்கு அறிவை வளர்க்க முடியும்.
- 3) உடலின் வலிமை, நிறம், உயரம், மச்சங்களின் பலன்கள் அந்த ஜாதகரின் வாழ்கையில் நடக்கும் நிகழ்ச்சிகளை தெரிவிக்கும்.
- 4) ஒருவரை பார்த்த மாத்திரத்தில் அவருடைய குணங்களை சொல்வது நோக்கமாகும்.
- 5) சமுதாயத்தில் எச்சரிக்கை உணர்வோடு வாழ்வது.
- 6) நம்மை பற்றிய, மற்றவர்கள் பற்றிய எதிர்கால பலன்களை தெரிந்துக் கொள்வது.

பயன்கள்:

- 1) ஒரு மனிதனை பார்த்த மாத்திரத்தில் அவனுடைய குணம், இறந்த கால வாழ்க்கை, நிகழ்கால வாழ்க்கை எதிர்கால வாழ்க்கை பற்றி தெரிந்துக் கொள்ளலாம்.
- 2) மனித உடலின் அங்கங்களின் வடிவம், அமைப்பு, நிறம், அளவு, தன்மை முதலியவற்றை தெளிவாக புரிந்துக் கொண்டால் அம்மனிதனை பற்றிய அனைத்து மறைக்கப்பட்ட உண்மைகளையும் நம்மால் சொல்ல முடியும்.
- 3) மனிதர்கள் மட்டும் இன்றி வளர்ப்பு பிராணிகளுக்கு அங்கலட்சணம் பார்க்கப்பட்டன. அவைகள் எஜமானனுக்கு எவ்வகையில் உதவும் என்பதும் சொல்ல முடியும்.
- 4) ஒரு மனிதனின் ஆயுள் ஆரோக்யத்தை சொல்ல முடியும்.
- 5) திருமண வாழ்க்கையை புரிந்துக் கொள்ளலாம்.
- 6) வேலை, தொழில் அமைப்பு, புத்ர பாக்யங்களை தெரிந்துக் கொள்ளலாம்.

UNITS**1. பொதுவான முக லட்சணம்**

மூக்கின் லட்சணங்கள் - வாயின் லட்சணங்கள் - உதடுகளின் லட்சணம் - பற்களின் லட்சணங்கள் - காதுகளின் அமைப்பு.

2. அங்கத்துடிப்புகள்

நாக்கின் லட்சணங்கள் - காதுகளின் அமைப்பு. கன்னங்கள் - சிரிப்பும் அழுகையும் - முகவாய்க்கட்டு - கழுத்தின் லட்சணங்கள்.

3. தலை முடியின் லட்சணம்

தாடி மீசைகளின் லட்சணங்கள் - முதுகின் லட்சணங்கள் - தோள்களின் லட்சணங்கள் கைகளின் லட்சணங்கள் - மணிக் கட்டுகள் உள்ளங்கைகள் - புறங்கைகள்.

4. நெற்றியின் லட்சணம், கண்களின் லட்சணங்கள்

கைரேகை லட்சணங்கள் - விரல்கள் லட்சணங்கள் - நகங்களின் லட்சணங்கள் - இடும்பும் வயிறும் - தொடைகளின் லட்சணங்கள் - ஆண்குறியும் விதைகளும் - கால்களின் லட்சணங்கள் - கணுக்கால்கள்.

5. **உடல் மச்சங்களும் பலன்களும் , மச்சங்களின் வடிவ லட்சணங்களும் பலன்களும்**
 சாமுதிரிகா லட்சணமும் ஜோதிடவியல் சம்பந்தமும் - மச்சங்களின் வகைகள் - ராசி சக்கரத்தை கொண்டு மச்சங்களின் இருப்பிடத்தை நிர்ணயித்தல்.
 குறிப்புதவி நூல்கள்

1. C.M.Srivastava, Samudrik shastra, Manoj publications
2. K.C. Sen, Hast samudrika shastra, D.B. Taraporevala sons
3. கே.என். சரஸ்வதி, பிருஹத் ஸம்ஹிதை, கடலங்குடி பப்ளிகேஷன்ஸ்

15ASP111
Practical

Predictive methods in Astrology - 1

Semester – I
4H – 4C

Instruction Hours / Week: L : 0 T : 0 P : 4

Marks Internal : 40, External : 60 Total : 100

End Semester Exam : 3 hrs

நோக்கங்கள் :

- 1) பல்வேறு சிறப்பு லக்னங்களை கொண்டு பலன் சொல்லும் முறைகள் இங்கே செய்முறை பயிற்சியின் மூலம் தெளிவாகிறது.
- 2) நாம் சொல்லும் பலன்கள் எக்கால கட்டங்களில் நடக்கும் என்பதை தசாபுத்தி கோட்சார அடிப்படையில் கால நிர்ணயம் செய்வதை இப்பாடப்பகுதி தூண்டும்.
- 3) பல்வேறு முறைகளில் பலன் சொல்வது நோக்கமாகும்.
- 4) ஜாதகம் இல்லாதவர்களுக்கு பலன்கள் சொல்வது.
- 5) இன்றைய ஜோதிட வளர்ச்சியை, புதிய கண்டுபிடிப்புகளை ஏற்றுக் கொள்வது.
- 6) ஜெய்மினி முறையில் பலன்கள் கண்டுபிடிப்பது.

பலன்கள்

- 1) பலன்கள் கூறுவதற்கு பல முறைகள் உண்டு என்பதை தெரிந்துக் கொண்டு அவைகளை பயன்படுத்தி பார்ப்பது இங்கே அனுபவத்தை அதிகரிக்கும்.
- 2) அஷ்ட வர்க்க முறையிலும், ஷட்பல முறையிலும், எண்கணித முறையிலும் பலன்களை சொல்லுவதற்கு நம்மால் முடியும்.
- 3) ஏதேனும் ஒரு முறையில் நாம் சொல்லும் பலன்களை வேறுமுறையில் சோதித்து அறியலாம்.
- 4) நமக்கு தெரிந்த முறையில் பலன் கூறி பழகலாம்.
- 5) எந்த முறையில் பலன் கூறினாலும் பலன் ஒன்றாக தான் இருக்கும் என்பதை நிரூபிக்கலாம்.
- 6) எளிமையான முறையில் பலன்கள் நிர்ணயம் செய்யலாம்.

UNITS

1. லக்ன பலன் கூறுதல்
பல்வேறு சிறப்பு லக்னங்களைக் கொண்டு பலன் சொல்லுதல் - கேந்திர திரிகோண அதிபதிகளின் தொடர்புகளைக் கொண்டு பலன் சொல்லுதல்.
2. தசாபுத்தி - கோட்சார முறைகளைப் பயன்படுத்தி பலன் கூறல்.
தசாக்கோள் - புத்திகோள் நிலைகள் - நின்ற நட்சத்திரம் - கோட்சார சனி - குரு நிலைகளைக் கொண்டு பலன் கூறுதல்
3. எண்கணித முறையில் பலன் கூறுதல் - பிறப்பு எண் - விதி எண் அடிப்படையில் பலன்கள் கூறுதல்.
4. அஷ்டவர்க்க முறையில் பலன் கூறுதல் - நவகிரக அஷ்டவர்க பலன்கள் - நவகிரக கச்சயா பலன்கள்.
5. ஷட்பலம் முறையில் பலன் கூறுதல் - நவகிரகங்களின் பலம் பலஹீனத்தை கொண்டு பலன் கூறுதல்.

குறிப்புதவி நூல்கள்

- | | |
|--|---------------------------------|
| 1. பிருஹத் பராசர ஹோரா சாஸ்திரம் | G.C.Sharma |
| 2. பஞ்ச பட்சி | புலிப்பாணி சுந்தரவரதாச்சாரியார் |
| 3. Bhirugu Nandi Nadi | R.G.Rao |
| 4. Predictive stellar Astrology | K.S.Krishnamurthi |
| 5. ஜோதிடத்தில் பலன் கூறும் முறைகளும்
கோட்சார சூட்சுமங்களும் | நக்கீரர் எஸ். நடராசன் |
| 6. சாதகாலங்காரம் | கீரனார் நடராசன் |
| 7. குமாரசாமியம் | ஸ்ரீகுமாரசுவாமி |
| 8. ஸர்வார்த்த சிந்தாமணி | கடலங்குடி நடேச சாஸ்திரிகள் |
| 9. மேலைநாட்டு சோதிடர்கள் சொல்லும்
ஜோதிடம் | எஸ்.பி. சுப்ரமணியன் |
| 10. How to predict your future (1995) | James Braha |
| 11. பஞ்ச பட்சி சாத்திரம் | ஜாண் பி.நாயகம் |

நோக்கங்கள்:

- 1) தாரா பலனை நிர்ணயிப்பதின் மூலம் ஜாதகத்தின் பலனை மிகவும் துல்லியமாக கூற முடியும்.
- 2) சிறுவயது ஜாதகர்களின் எதிர்கால படிப்பை பற்றிய தெளிவு நன்கு புலனாகும்.
- 3) திருமண வாழ்க்கையின் தாரதரத்தை நிர்ணயிக்க முடியும்.
- 4) ஒரு லக்னம்(அ) சந்திரன் நின்ற ராசிக்கு கேந்திர திருகோண அதிபதிகளின் நிலை கொண்டு பலன்கள் கூறலாம்.
- 5) கோள்களின் பலத்தை அறிந்துக் கொள்ள திக்பலம் பயன்படும்.
- 6) பல்வேறு முறைகளில் பலன் சொல்வது நோக்கமாகும்.

பயன்கள்

- 1) நிலம், நீர், நெருப்பு இராசிகளை இராசி கட்டங்களில் பிரித்து அறிவதன் மூலம் பலன் சொல்லும் முறையில் பல அரிய விஷயங்களை வெளி கொண்டுவர முடியும்.
- 2) ஷட் பலங்களில் திக் பலத்தின் முக்கியத்துவம் புரியும்.
- 3) கோள்கள் நிற்கும் நட்சத்திரத்தை கொண்டு தாரா பலன்கள் நிர்ணயித்து கோள்களின் வலிமையை அறியலாம்.
- 4) மனிதர்களுக்கு மிக இன்றியமையாதது கல்வியும், திருமண வாழ்க்கையும், தொழிலும் ஆகும். இவைகளை இந்த செய்முறை பாட பகுதியின் மூலம் நன்கு அறிந்தும் கொள்ளலாம்.
- 5) எந்த முறையில் பலன் கூறினாலும் பலன் ஒன்றாக தான் இருக்கும் என்பதை நிரூபிக்கலாம்.
- 6) எளிமையான முறையில் பலன்கள் நிர்ணயம் செய்யலாம்.

UNITS

1. தாரா பலனை வரையறுத்தல் - ஜென்மதாரை - சம்பத் தாரை - விபத் தாரை -சௌம்ய தாரை- பிரத்வர தாரை - சாதக தாரை - நைதன தாரை - மைத்ர தாரை.
2. கல்வி பலனை வரையறுத்தல் - பள்ளி கல்வி - கல்லூரி படிப்பு - மேற்படிப்பு- ஆராய்ச்சி படிப்பு- மருத்துவபடிப்பு - பொறியியல் படிப்பு.
3. வாழ்க்கை முறையும் குடும்ப நலனும் - குடும்ப வாழ்க்கை அமையும்முறை - பணம் வரும் முறை.
4. நிலம், நீர், நெருப்பு, காற்று, இராசிகளை இராசிக்கட்டத்தில் பிரித்து காட்டுதல் - தன்மைகள்.
5. கேந்திர கோண ராசிகளின் பலன்களை வரையறுத்தல் - 1,4,7,10 ராசிகள். 5.9 ராசிகள் இவைகள் இணைந்த பலன்கள்.

குறிப்புதவி நூல்கள்

- | | |
|--------------------------------|------------|
| 1. My Experiences in Astrology | B.V. Raman |
| 2. Important Combinations | B.V. Raman |
| 3. Hindu predictive Astrology | B.V. Raman |

நோக்கங்கள் :

- 1) தமிழ் இலக்கியங்களில் உள்ள ஜோதிட குறிப்புக்கள் ஜாதக அலங்காரம், குமாரசுவாமியும், புலிப்பாணி 300, நாடி ஜோதிட நூல்கள் முதலிய நூல்களை பற்றி தெரிந்துக் கொள்வதால் தமிழகத்தில் ஜோதிடவியலின் ஆழத்தை பிரிந்துக் கொள்ள முடியும்.
- 2) பராசரர், ஜெயமினி, பிருகு முதலிய ரிஷிகளின் ஜோதிட கொள்கைகளை பற்றி அறிந்துக் கொள்வது மாணவர்களின் அறிவை வளர்ச்சியடைய செய்யும்.
- 3) கிருஷ்ணமூர்த்தி பத்ததி அவர்களின் புதிய ஜோதிட முறையின் மூலம் துல்லியமான பலன்களை கூறலாம்.
- 4) கல்யாணவர்மா, ஸ்ரீபதி, வராகமிஹிரர் போன்ற வடமொழியில் ஜோதிட நூற்கள் எழுதியவர்களின் ஜோதிட புலமைகளை அறிவது.
- 5) சி.ஜி. ராஜன் போன்ற தமிழக ஜோதிடர்களின் புலமைகளை அறிவது.
- 6) பி.வி.ராமன் போன்றவர்களின் அனுபவ ஜோதிட அறிவை புரிந்துக் கொள்வது.

பலன்கள்:

- 1) கல்யாணவர்மா, ஸ்ரீபதி, வராகமிஹிரர் ஆகிய ஜோதிட மேதைகளின் ஜோதிட நூற்களை படிப்பதன் மூலம் ஜோதிடத்தில் ஆழ்ந்த அறிவு உண்டாகும்.
- 2) ஜெயமினி, பராசரர் முதலிய ரிஷிகளின் ஜோதிடவியல் பங்களிப்புகள் ஜோதிடவியலின் தெய்வீக தன்மையையும், நம்பக தன்மையையும் அதிகப்படுத்துகின்றன.
- 3) நாஸ்ட்டாம், அகஸ்தியர் முதலிய ஜோதிட மேதைகளின் பலன் கூறும் முறைகள் இன்றளவிலும் ஒரு ஆச்சர்யமாகவே பார்க்கப்படுகின்றன.
- 4) கர்கர், பிருகு போன்ற ரிஷிகளின் ஜோதிட அறிவை அவர்களின் நூற்களின் மூலம் அறிந்துக் கொள்ள முடியும்.
- 5) சாதக சந்திரிகை போன்ற பழம் பெரும் நூற்களின் பெருமைகள் புரியும்.
- 6) ஜோதிட வல்லுனர்களின் ஜோதிட புலமை என்பது மாணவர்களுக்கு ஒரு வரபிரசாதமாக அமையும்.

UNITS

1. **தமிழ்ச் சோதிட நூல்கள்**
பழந்தமிழ் இலக்கியங்களில் ஜோதிட குறிப்புக்கள் - சாதக அலங்காரம்- குமாரசுவாமியம்- புலிப்பாணி 300 - நாடிஜோதிட நூல்கள் - பிருகு நந்தி நாடி- சப்த ரிஷி நாடி - ஜிணேந்திர மாலை- ஜோதிடப் பேரகராதி - ஜாதக சூடாமணி- சந்திரகாவியம்.
2. **இந்திய ஜோதிடர்களின் சோதிடக் கொள்கைகள்**
பராசரர் - ஜெயமினி - கர்கர் - பிருகு - சாதக சந்திரிகை - பராசர ஹோரா சாஸ்திரம் - ஜெயமினி சூத்திரங்கள் - கர்க ஹோரை - பிருகு சம்ஹிதை - நந்திவாக்யம்.
3. **கல்யாணவர்மர் - ஸ்ரீபதி - வராகமிஹிரர்- சாராவளி - சுகர்நாடி - சர்வார்த்த சிந்தாமணி - ஜாதக பாரி ஜாதகம் - சித்தாந்த திருக்கணிதம்.**

4. **தற்கால ஜோதிடவளர்ச்சி**
கிருஷ்ணமூர்த்தி பத்ததி – பி.வி. ராமன் - கிருஷ்ணமூர்த்தி பத்ததி நூற்கள் - பிஇவி.ராமன் நூற்கள்.
5. **சி.ஜி. ராஜன் நூற்கள்** - இந்தியா – ரஷ்யா – அமெரிக்கா பற்றிய நாஸ்டர்டாம் கூற்றுக்கள்.

குறிப்புதவி நூல்கள்

- | | | |
|----|---|---|
| 1. | Hindu Astrology and the west | B.V.Raman. |
| 2. | கிருஷ்ணமூர்த்தி பத்ததி முறை | கே.எஸ். கிருஷ்ணமூர்த்தி |
| 3. | வான சாஸ்திரம் | எம். எல். ராஜா. |
| 4. | வானியலும் ஜோதிடமும் | எம். கே. தாமோதரன் |
| 5. | Ancient Hindu Astrology for the
Modern Western Astrologer (1986) | James T.Brahe |
| 6. | Tryst with Astronomy | V.Jayabal
சோதிட ஆய்வு திரட்டு -1(2013)
கற்பகம் பல்கலைக்கழகம்
கோயம்புத்தூர் |

நோக்கங்கள் :

- 1) பன்னிரு ராசிகளில் கோள்கள் அடையும் ஆட்சி, உச்சம், நீச்சம், பகை, மூலத்திரிகோணம் ஆகிய பலன்கள் கோள்களின் பலத்தை அறிவதில் முக்கிய பங்கு வகிக்கின்றன.
- 2) பாவகத்தில் கோள்கள் நின்ற பலன்களும் ஜாதகத்திற்கு பலன் சொல்வதற்கு துணையாக இருக்கும்.
- 3) கோள்களின் இணைவு பலன்கள் ஜாதகபலன் நிர்ணயத்திற்கு பெரும் பங்காற்றுகின்றது.
- 4) திசா புத்தி கோட்சார பலன்கள் நிகழ்ச்சிகள் நடக்கும் காலகட்டத்தை துல்லியமாக எடுத்துரைப்பதாகும்.
- 5) கோள்களின் இணைவு மூலம் ஜாதகரின் வாழ்க்கையில் ஏற்படும் பலன்களை அறிவது.
- 6) கோள்களின் காரகத்துவங்கள் பார்வைகள் மூலம் ஜாதக பலன்களை மிக துல்லியமாக கணிக்க முடியும்.

பயன்கள் :

- 1) கோள்களின் பார்வைகள், சிறப்பு பார்வைகள் ஜாதகரின் வாழ்க்கையில் எப்படிப் பட்ட தாக்கத்தை ஏற்படுத்துகின்றன என்பதை தெரிந்துக் கொள்ள முடியும்.
- 2) கோள்களின் வலிமையை கொண்டு அக்கோள் ஜாதகருக்கு எவ்வளவு பலனை தரும் என்பதை கணிக்கலாம்.
- 3) பாவகங்களில் நிற்கும் கோள்களின் தன்மைகளுக்கு ஏற்ற வகையில் ஜாதகரின் வாழ்க்கை அமைகிறது.
- 4) தர்ம, அர்த்த, காம, மோட்ச திரிகோணங்களில் நிற்கும் கிரகங்களை கொண்டு ஜாதகரின் பிறவியின் நோக்கம் தெரிந்துக் கொள்ளலாம்.
- 5) கோள்களின் பலத்தைக் கொண்டு ஜாதக பலன்களை முடிவு செய்ய முடியும்.
- 6) 2,10க்கு அதிபதியான கோள்களை கொண்டு ஜாதகர் எந்த தொழில் மூலம் பணம் சம்பாதிப்பார் என்பதை அறிய முடியும்.

UNITS**1. கோள்களின் பலன்கள்**

ஆட்சி, உச்சம், நீச்சம், திரிகோணம், கேந்திரம் வர்க்கப்பலன்கள் - பன்னிரு ராசிகளில் கோள்கள் அடையும் ஆட்சி – உச்ச- நீச்ச- பகை- மூலத்திரிகோண பலன்கள்

2. பாவகத்தில் கோள்களின் பலன்கள்

தர்ம - அர்த்த - காம - மோட்ச - கேந்திர - கோண பலன்கள் - நட்சத்திரங்களின் கோள்கள் நின்ற பலன்கள்.

3. கோள்களின் பார்வை பலன்கள் மற்றும் கோட்சார பலன்கள்

கோள்களின் பொதுப் பார்வைகள் - சிறப்பு பார்வைகள் குரு – சனி – செவ்வாய் - ராகு - கேதுக்களின் பார்வைகள் - கோள்களின் கோட்சாரப் பலன்கள்.

4. கோள்கள் இணைவு பலன்கள்

இரண்டு அல்லது அதற்கு மேற்பட்ட கோள்கள் இணைதல் மற்றும் பலன்கள்-யோகி கோள் - அவயோகி கோள்.

5. கோள்களின் திசா புத்தி பலன்கள்

போதகர் - காரகன் - பாசகன் - வேதகன்.

குறிப்புதவி நூல்கள்

- | | |
|--|---|
| 1. உத்திரகாலாமிருதம் | S.A.குமாரஸ்வாமி ஆச்சாரியார். |
| 2. Prasana Marga | B.V.Raman |
| 3. Pointer to Profession | T.P.Trivedi & R.Asthana |
| 4. Brihat Parasara Hora Sastra | G.C.Sharma |
| 5. ப்ருஹத் ஜாதகம் | C.G. ராஜன் |
| 6. குடும்பஜோதிடம் | ஸ்ரீராமய்யங்கார்-
ஸ்ரீஸ்ரீனிவாஸாச்சாரியார் |
| 7. Mundane Astrology | B.V.Raman |
| 8. ஜோதிடமும் நவகிரகங்களும் | முருகு இராசேந்திரன் |
| 9. How to Judge a Horoscope –
Vol –I & II | B.V. Raman |

நோக்கங்கள்

- 1) கேள்வியாளர்களின் தூரப் பயணங்களை பற்றியும், தனது தொழிலில் ஏற்படும் ஏற்ற தாழ்வுகள் பற்றியும் பிரஸன்ன முறையில் பலன்கள் கூறப்படும்.
- 2) புத்திர பேறு அறிதல் பற்றிய கேள்விகளுக்கு பிரஸன்ன முறையில் பதில்கள் சொல்வதற்கு பயிற்சியளித்தல்.
- 3) விவாஹ பிரஸன்ன முறையில் திருமணத்தை பற்றிய அனைத்து கேள்விகளுக்கும் பதில் கூற முடியும்.
- 4) ரோக பிரஸன்ன முறையில் ஜாதகருக்கு ஏற்பட்ட நோயை அறிந்து அதற்கு பரிகாரமும் சொல்ல முடியும்.
- 5) சகுனம், நிமித்தங்களின் மூலம் ஜாதகரின் கேள்விகளும் பதில் கூற முடியும்.
- 6) வெற்றிலை ஜோதிடம் மூலம் ஜாதகரின் கடந்த காலம், நிகழ்கால பலன்களை தெளிவாக கூற முடியும்.

பயன்கள் :

- 1) ஜாதகம் இல்லாதவர்களும் ஜோதிடத்தின் மூலம் பலன்களும் பரிகாரங்களும் தெரிந்துக் கொள்ளலாம்.
- 2) நிகழ் காலத்தில் ஏற்படுகின்ற தொழில் தடை, திருமண தடை முதலியவைகளை முன்கூட்டியே அறிந்து அவைகளுக்கு தீர்வும் அளிக்கலாம்.
- 3) குழந்தை ஆணா? பெண்ணா? எக்கால கட்டத்தில் பிறக்கும், அக்குழந்தையால் பெற்றோர்களில் வாழ்க்கையில் ஏற்படும் மாற்றங்கள் ஆகியவை தெரிவுப்படுத்தப்படும்.
- 4) நோய் வருவதற்கு காரணம், அதை தீர்க்கும் முறையும் சொல்லப்படும்.
- 5) அஷ்ட மங்கல பிரசன்னம் மூலம் கேள்வியாளர் பிரச்சினைகளை எளிதாக கண்டு பிடிக்க முடியும்.
- 6) விவாஹ பிரசன்னம், நஷ்ட பிரசன்னம், ஆயுள் பிரசன்னம், ரோக பிரசன்னம் மூலம் கேள்வியாளரின் கேள்விகளுக்கு பதில்கள் கூற முடியும்.

UNITS

1. **பிரசன்ன முறையில் நீண்ட தூரப் பயணங்களை அறிதல்**
பிராணத்திற்கு ஏற்ற காலம் - பிரயாணத்தில் ஏற்படும் தடைகள் - கஷ்டங்கள் - கண்டங்கள்- நோய்கள்.
2. **பிரசன்ன முறையில் தொழில் அறிதல்**
வேலை கிடைக்குமா? கிடைக்காதா? வேலை கிடைக்கும் காலம் - எத்துறை சார்ந்த வேலை அமையும்.
3. **பிரசன்ன முறையில் திருமண விவரம் அறிதல்**
ஏழாம் பாவகத்தைக் கொண்டு மனைவியை அறிதல் - சுக்கிரனின் பங்கு

திருமண காலம் -மனைவியின் குணங்களை அறிதல்- பல்வேறு பொருத்த நிலைகள்-

4. **பிரசன்ன முறையில் புத்திர பேறு அறிதல்**
குழந்தைப்பேறு அறிதல் - சந்தானவிருத்தி அறிதல்.
நிசேகம் லக்னம் குறித்தல் - குழந்தைப் பேறு அறிதல் - சந்தான விருத்தி
5. **பிரசன்ன முறையில் நோய் மற்றும் வழக்கு அறிதல்**
பிரசன்னத்தில் நோய்கள் அறிதல் - பல்வேறு வகையான நோய்களுக்கு-
கோள்களின் நிலைகள் - கர்ம விபாக முறையில் பரிகாரங்கள் - நோய்
வருங்காலம் - தீர்தல்

குறிப்புதவி நூல்கள்.

- | | |
|----------------------------------|-----------------------------|
| 1. Prasana Marga (1999) | B.V.Raman |
| 2. பிரசன்ன ஜோதிடம் (2006) | K.S. கிருஷ்ணமூர்த்தி |
| 3. அஷ்டமங்கல தேவபிரசன்னம் (2011) | அ.அமிர்தலிங்கம் |
| 4. சோழிப்பிரசன்ன ஆரூடம் | எம். நடராஜன் |
| 5. Prasna Tantra (2001) | B.V.Raman |
| 6. இலகு ஜாதகம் | எஸ். ஏ. குமாரசுவாமி ஆச்சாரி |
| 7. பிரசன்ன ஆரூடம் | சுப. சுப்ரமணியன் |

நோக்கங்கள்:

- 1) கோள்கள் பன்னிரு ராசிகளில் ஏற்படுத்தும் பலன்கள் ஜாதகனை எவ்வகையில் பாதிக்கிறது.
- 2) கோள்கள் பன்னிரு பாவகங்களில் நிற்பதால் ஏற்படும் பலன்கள் ஜாதகனை எப்படி செயல்பட வைக்கின்றன.
- 3) லக்னம் முதல் பன்னிரு பாவாதிபதிகள் பாவகங்களில் மாறி நிற்பதால் ஏற்படும் பலாபலன்கள் ஜாதகனுக்கு எப்படிப்பட்ட தாக்கத்தை உண்டு செய்கின்றது.
- 4) நட்சத்திரங்களில் கோள்கள் நிற்பதால் ஏற்படும் பலன்கள், ஜாதக பலன்களில் ஒரு முக்கிய திருப்பு முனையாகும்.
- 5) ராசியில் நிற்கும் கிரகம் பாவகத்தில் மாறி நின்றால் பலன்கள் மாறுவதை அறிய முடியும்.
- 6) பாவாதிபதிகள் மாறி நிற்பதால் ஏற்படும் ஜாதக பலன் மாற்றங்களை அறிவது.

பயன்கள்:

- 1) பன்னிரு பாவகங்களில் பாவாதிபதிகள் மாறி நிற்பதால் ஏற்படும் பலன்கள், ஜாதகனை அடையும் முறைகள் தெளிவாக எடுத்து சொல்ல முடியும்.
- 2) பாவாதிபதிகள் தான் நிற்கும் நட்சத்திரங்களை பொருத்து பலன்களை மாற்றியமைக்கும் தன்மை பெற்றவை. இவைகளை தெளிவாக பார்க்க முடியும்.
- 3) கோள்களின் இலக்ன ஆதிபத்திய பலன்கள், எதிர்பாராத மாற்றங்களை ஏற்படுத்துவதை உணர முடியும்.
- 4) ஒரு கோள் எந்த ராசியில், எந்த பாவகத்தில் எந்த நட்சத்திரத்தில் அமர்கின்றது என்பதை பொருத்து பலன்கள் சொல்ல முடியும்.
- 5) லக்னம், லக்னாதிபதி எந்த நட்சத்திரத்தில் நிற்கின்றதோ அதை பொருத்து ஜாதகரின் பலன்கள் நிர்ணயிக்க முடியும்.
- 6) கோள்களின் நிலை தெரியாமலேயே லக்னத்தை கொண்டு பலன்களை வரையறுக்க முடியும்.

UNITS

1. பன்னிரு ராசிகளில் கோள்கள் நிற்கும் பலன்கள்.
பன்னிரு ராசிகளில் சூரியன் முதல் ஒன்பது கோள்கள் நிற்பதால் ஏற்படும் பலன்கள்- கோள்களின் சேர்கையால் ஏற்படும் பலன்கள்.
2. பன்னிரு பாவகங்களில் ஒன்பது கோள்கள் நிற்பதால் ஏற்படும் பலன்களை வரையறுத்தல் - விளக்கம் கூறுதல்.
சூரியன் - சந்திரன் - செவ்வாய்- புதன் - குரு- சுக்கிரன் - சனி - ராகு - கேது - தனித்தனியே மற்றும் சேர்க்கை பெற்று ஏற்படுத்தும் பலன்கள்.
3. பன்னிரு பாவகங்களில் பாவாதிபதிகள் மாறி நிற்பதால் ஏற்படும் பலன்களை வரையறுத்தல்
பன்னிரு பாவகங்கள் பாவகங்களின் ஆதிபத்தியம் -லக்னம் முதல் பன்னிரு பாவகங்களில் பாவாதிபதிகள் நிற்பதால் ஏற்படும் பலன்கள் .
4. நட்சத்திரங்களில் கோள்கள் இருப்பதால் ஏற்படும் பலன்கள்.

இருபத்தியேழு நட்சத்திரங்களும் உரிய கோள்களும் -
இருபத்தியேழு நட்சத்திரங்களில் கோள்கள் நிற்பதால் ஏற்படும் பலன்கள்..

5. நட்சத்திரங்களில் நின்ற கோள்களின் இலக்ன ஆதிபத்தியப் பலன்கள்
ஒவ்வொரு லக்னத்திலும் பிறந்தவர்களின் பலன்களை ஆதிபத்ய முறையில்
வரையறை செய்தல்.

குறிப்புதவி நூல்கள்

- | | |
|-------------------------------------|--------------------------------|
| 1. உத்திரகாலாமிர்தம் | S.A.குமாரஸ்வாமி ஆச்சாரியார் |
| 2. பிருஹத் பராசரா ஹோரா சாஸ்திரா | G.C.Sharma |
| 3. நட்சத்திர சிந்தாமணி I ,II, III | சரஸ்வதி மகால் நூலகம் தஞ்சாவூர் |
| 4. Book of Natkshatras | Prash Trivedi |
| 5. இருபத்தி ஏழு நட்சத்திர கோயில்கள் | கே.பி. வித்யாதரன் |

நோக்கங்கள் :

- 1) நவ இரத்தினங்கள் பற்றி பல நூல்களில் கூறியுள்ள செய்திகளை தெரிந்துக் கொள்வதால், இவைகளை பற்றிய முக்கியத்துவமும், அத்தியாவசியமும் நமக்கு விளங்கும்.
- 2) இரத்தின கற்களிலிருந்து ஏற்படும் பல விதமான கதிர் வீச்சுக்கள் எவ்வகை தாக்கத்தை மனிதர்களிடத்தில் ஏற்படுத்துகின்றன.
- 3) ஒவ்வொருவருடைய ஜாதக பலனை கொண்டு யோககாரகனின் இரத்தினத்தை அணிவதால் ஏற்படும் மாற்றங்கள் பற்றி அறியலாம்.
- 4) நவகிரகங்களுக்கும் நவ ரத்தினங்களுக்கும் உள்ள தொடர்பை அறியலாம்.
- 5) நவமணியின் வகைகளை, வைரங்களின் வகைகளை அறிவது.
- 6) நவரத்தின வியாபரத்தின் மூலம் பொருளீட்டுவது.

பயன்கள் :

- 1) மாணிக்கம், முத்து, பவளம், மரகதம் ஆகிய கற்களின் குணாதிசயங்களை தெரிந்துக் கொள்வது.
- 2) இவைகளை எந்த ஜாதகர் அணிந்துக் கொண்டால் எப்படிப்பட்ட பலன்களை அவர் பெறுவார்.
- 3) வைரம், நீலம், கோமேதகம், வைடுரியம் ஆகிய கற்களின் குணாதிசயங்களை புரிந்துக் கொள்வது.
- 4) இவைகளை பயன்படுத்தும் முறைகளை சோதித்து பார்த்து ஜாதகர்களுக்கு அறிவுரை வழங்குவது.
- 5) எந்த லக்னத்தில் பிறந்தவர் எந்த ரத்தினத்தை அணியலாம் என்பதை கண்டுபிடிப்பது.
- 6) பிறப்பு ஜாதகத்தில் உள்ள தோஷங்களை நீக்க பயன்படும்.

UNITS

1. இரத்தினம் பற்றி பல நூல்கள் கூறியவை – நாகமணியின் வகைகள், இரத்தினக்கற்கள் மற்றும் வைரங்கள் வகைகள்
2. சோதிடமும் இரத்தினக் கற்களும்
யோகக்காரர்களும், இரத்தின கற்களும், விபரீத ரத்தினம், இரத்தினக் கற்களும் தசா காலங்களும், இலக்னாதிபதியும் இலக்ன கற்களும்
3. கிரகங்களின் இயற்கையான நட்பு, பகை, சமம் போன்ற விவரங்கள் பரஸ்பர பகை கிரகங்களுக்கான இரத்திரங்கள், விரல்களும் இரத்தினக் கற்களும், ஆருட லக்னமும் கற்களும்
4. இரத்தினக் கற்கள் பற்றிய விவரங்கள்
மாணிக்கம், முத்து, பவளம், மரகதம்

5. கனகபுஷ்பராகம்
வைரம், நீலம், கோமேதகம், வை?ரியம்

குறிப்புதவி நூல்கள்:

Gemology Cornelius S. Huribut

நோக்கங்கள் :

- 1) வீட்டின் நுழைவாயில், பின்வாயில் அமைக்கும் முறை, ஜன்னல்கள், மாடிபடிக்கட்டுகள் அமைக்கும் முறைகளை தெரிந்துக் கொள்வது.
- 2) வீட்டின் ஒவ்வொரு பகுதியும் எந்தெந்த கோள்களின் ஆதிக்கத்தில் வருகிறது.
- 3) வீட்டில் வசிப்பவர்களின் ஜாதகத்திற்கும் அவ்வீட்டின் வாஸ்துவிற்கும் உள்ள தொடர்பு.
- 4) தெருத்தாக்கம் அவ்வீட்டில் வசிப்பவர்களின் வாழ்க்கையில் ஏற்படுத்தும் விளைவுகள்.
- 5) ஜோதிட சாஸ்திரமே வாஸ்து சாஸ்திர அடிப்படையாகும்.
- 6) வீட்டில் ஒவ்வொரு அறையும் அமையக் கூடிய இடங்களை முடிவு செய்ய முடியும். அறைகள் அமைப்பு, ஜன்னல் அமைப்பு மூலம் பலன்கள் அறிய முடியும்.

பயன்கள்:

- 1) இரண்டு(அ)முன்று மாடி கட்டிடங்கள் அமைப்பதற்கான விதிகளும் அதன் பயன்பாடுகளும்.
- 2) ஆழ்துளைக்கிணறு, படுக்கை அறை, குளியல் அறை, வாசல் , பூஜை அறை, வமையல் அறை இவைகள் அமைக்கும் முறைகளும், இவைகள் வீட்டில் வசிப்பவர்களின் மீது ஏற்படுத்தும் தாக்கங்களும்.
- 3) வாஸ்து குறைபாடுகளுக்கு பரிகாரங்களின் மூலம் தீர்வு.
- 4) ஆரோக்கியமான வாழ்விற்கு துணைபுரியும்
- 5) செல்வம் நிறைந்த வாழ்விற்கு துணைபுரியும்
- 6) கல்வி, ஒழுக்கம் நிறைந்த வாழ்விற்கு துணை புரியும்.

நவீன வாஸ்து – II**UNITS:**

1. காப்பம் - விளக்கம்- சம எடை- நற்பலன்- தலம் - படிக்கட்டுகள்- சமையல் அறை- வரவேற்பு அறை- கழிவரை அமைத்தல் - வாஸ்து பூஜைக்குரிய காலம்.
2. திசையை நிர்ணயிக்கும் முறை, வாஸ்து, பிரமிட் மருத்துவ மனைகள், வீட்டுச் சுற்றுப் புறத்தில் இடம் வாங்குதல்
பிளாக்குகள் - முதல் தரமான மனை, இரண்டாம் தரமான மனை, மூன்றாம் தரமான மனை, நான்காம் தரமான மனை, எட்டுத் திசைகள்
3. வாயில்களின் எண்ணிக்கை- வீட்டிற்கு வாசல் - ஜன்னல்கள்- அலமாரிகள்- உச்ச நீசங்கள் - சம உயர அமைப்பு - கிழக்கு வாசல் வீடுகள் -மேற்கு வாசல் வீடுகள்- தெற்கு வாசல் வீடுகள் - வடக்கு வாசல் வீடுகள்.
4. முதுகுத் தாக்கம், தெருத்தாக்கம் - தெருப்பார்வை பலன்கள் - வடகிழக்கு வாசல் வீடுகள் - வடமேற்கு வாசல் வீடுகள் - தென் கிழக்கு வாசல் வீடுகள் - தென்மேற்கு வாசல் வீடுகள்.

5. இருபக்க, மூன்று பக்க கட்டிடங்கள்- வீட்டிற்கு படிகள் அமைப்பது- கிணறு மற்றும் ஆழ்துளைக் கிணறு- படுக்கை அறை- குளியல் அறை- வாசல் - ஜோதிடத்திற்கும் வாஸ்து சாஸ்திரத்திற்கும் உள்ள தொடர்புகள்.

குறிப்புதவி நூல்கள்:

1. கே.எஸ். சுப்பிரமணிய சாஸ்திரிகள், மய மதம், சரசுவதி மகால் நூலகம், தஞ்சாவூர்
2. உரை எஸ். கிருஷ்ணமூர்த்தி சாஸ்திரிகள், வாஸ்து வித்யை, சரசுவதி மகால் நூலகம் தஞ்சாவூர்
3. கோவிந்தசாமி ரெட்டியார், காக்கையர் சிற்பம், சண்முகனந்தா புக் டிப்போ, சென்னை
4. ஆர். பாஸ்கரன் குருஷி, _ காச புஜண்டர் சித்தர் வாஸ்து சாஸ்திரம், காஞ்சிபுரம்
5. என். தாமோதரன், வாஸ்து வளம், _ மீனா பப்ளிஷர்ஸ், திருச்சி
6. வாஸ்து சாஸ்திர வாஸ்தவங்கள், கௌரு திருப்பதி ரெட்டி, பிரஜாகித்தா பப்ளிசர்ஸ், ஹைதராபாத்
7. பல வகையான சோதிட இணைய தளங்கள்

நோக்கங்கள்:

- 1) கைரேகை சாஸ்திரம் பற்றிய வரலாறு, பழங்கால நூல்களில் உள்ள குறிப்புகளை தெரிந்து கொள்வது.
- 2) கைரேகைகளின் வகைகள், கைகளின் வகைகள், கையில் உள்ள ரேகைகளுக்கும் கோள்களுக்கும் உள்ள சம்பந்தத்தை அறிதல்.
- 3) ஆயுள் ரேகை, புத்தி ரேகை, புதன் ரேகை ஆகியவற்றின் பலன்கள். இந்த ரேகைகளின் அமைப்புகள் ஏற்படுத்தும் தாக்கங்கள்.
- 4) குருமேடு, சூரிய மேடு, சுக்கிர மேடு, சனிமேடு, புதன் மேடு ஆகிய மேடுகளின் அமைப்பும் பலன்களும்.
- 5) கைரேகையை கொண்டு வாழ்நாள் பலன்களை சொல்வது.
- 6) கைகளில் உள்ள குறிகளை கொண்டு பல வியக்க தக்க பலன்களை சொல்வது.

பயன்கள் :

- 1) ஜோதிட சாஸ்திரத்திற்கும் கைரேகை சாஸ்திரத்திற்கும் உள்ள தொடர்பை புரிந்துக் கொள்ளுதல்.
- 2) பிறப்பு ஜாதகம் இல்லாதவர்களுக்கு கைரேகை மூலம் பலன்களை சொல்லுதல்.
- 3) தோஷ பரிகாரங்கள் செய்த பிறகு கைரேகையில் ஏற்படும் மாற்றங்களை கவனித்தல். கையில் உள்ள ஒவ்வொரு குறிகளுக்கும் பலன்களை எடுத்துரைத்தல்.
- 4) கையில் உள்ள ரேகைகளை கோள்களுடன் இணைத்து பலன் சொல்ல முடியும்.
- 5) கைகளில் உள்ள மேடுகளை கோள்களுடன் இணைத்து பலன்கள் கூற முடியும்.
- 6) ரேகைகளின் இணைவு, குறிகளின் இடம் இவைகளின் மூலம் பலன்கள் துல்லியமாக கூற முடியும்.

UNITS

1. கைரேகை சாஸ்திரம் பற்றிய குறிப்புகள் , ரேகைகளின் வகைகள்
2. கைகளின் பிரிவுகளும், குணங்களும்
கைகளில் காணப்படும் சில முக்கிய கோடுகளும் குறிகளும்
3. விரல்கள், விரல் நுனிகள், விரலின் கணுக்கள் பற்றிய விவரங்கள்
4. கைகளின் மேடுகளும், பலன்களும்
சூரியமேடு, குரு மேடு, சுக்கிர மேடு, சனி மேடு, புதன் மேடு
5. ரேகைகளும், பலன்களும்
ஆயுள் ரேகை, புத்தி ரேகை, புதன் ரேகை போன்றவைகள்

குறிப்புதவி நூல்கள்:

- | | |
|---------------------------------|----------------|
| 1. Indian palmistry | Sulabh Jain |
| 2. Palmistry | Renita cheiro |
| 3. All the secrets of palmistry | prof. Dayanand |

நோக்கங்கள்:

- 1) பல்வேறு லக்னங்களை கொண்டு மாணவர்கள் பலன் சொல்லும் முறையை தெரிந்துக் கொள்ள வேண்டும். ராசியைக் கொண்டு பலன் கூறும் முறை.
- 2) பன்னிரு பாவாதிபதிகளின் நிலைகள் கொண்டு பலன் கூறுதல், கோள்களின் சேர்க்கை, பார்வை பலன்களின் தாக்கம் ஆகியவற்றை புரிந்துக் கொள்ளுதல்.
- 3) நாடி முறை, ஜெய்முனி முறை, கிருஷ்ணமூர்த்தி பத்ததி முறை ஆகிய பல முறைகளில் பலன்கள் காணும் விதத்தை தெரிந்துக் கொள்ளுதல்.
- 4) பல்வேறு முறைகளில் பலன் சொல்வது நோக்கமாகும்.
- 5) ஜாதகம் இல்லாதவர்களுக்கு பலன்கள் சொல்வது.
- 6) இன்றைய ஜோதிட வளர்ச்சியை, புதிய கண்டுபிடிப்புகளை ஏற்றுக் கொள்வது.

பயன்கள்:

- 1) எந்தமுறையில் பலன்கள் சொன்னாலும், ஒரே மாதிரியான பலன்கள் ஜாதகருக்கு சொல்ல முடியும். பலன்களில் மாற்றங்கள் ஏற்படாது என்பதை புரிந்துக் கொள்வது.
- 2) பலன்காணுவதற்கு நாமும் புதிய முறைகளை கண்டு பிடிக்கலாம் என்ற எண்ணம் வளரும்.
- 3) ஒரு முறையில் கண்டுபிடித்த பலன்களை மறுமுறையில் உறுதி செய்வது.
- 4) நமக்கு தெரிந்த முறையில் பலன் கூறி பழகலாம்.
- 5) எந்த முறையில் பலன் கூறினாலும் பலன் ஒன்றாக தான் இருக்கும் என்பதை நிரூபிக்கலாம்.
- 6) எளிமையான முறையில் பலன்கள் நிர்ணயம் செய்யலாம்.

UNITS

1. **பராசரர் முறையில் பலன் கூறுதல்**
பல்வேறு லக்னங்களைக் கொண்டு பலன் கூறுதல் - ராசியைக் (சந்திரன்) கொண்டு பலன் கூறுதல் பன்னிரு பாவாதிபதிகளின் நிலைகளைக் கொண்டு பலன் அறிதல் - கோள்களின் பார்வையைக் கொண்டு பலன் கூறுதல்
2. **நாடி முறை**
நாடி விதிகள்- நாடி பார்வை முறைகளை கொண்டு பலன் கூறுதல்
3. **ஜெய்முனி முறை**
ஜெய்முனி பார்வை - சிறப்பு லக்னங்கள்
4. **உத்திரகாலமிர்த முறையில் பலன் கூறுதல்**
5. **கிருஷ்ணமூர்த்தி பத்ததி முறையில் பலன் கூறுதல்.**
உப நட்சத்திரங்கள் - குறிகாட்டிகள்

குறிப்புதவிநூல்கள்

- | | |
|-------------------------------------|---------------------------------|
| 1. பிருஹத் பராசர ஹோரா சாஸ்திரம் | G.C.Sharma |
| 2. பஞ்ச பட்சி | புலிப்பாணி சுந்தரவரதாச்சாரியார் |
| 3. Bhirugu Nandi Nadi | R.G.Rao |
| 4. Predictive stellar Astrology | K.S.Krishnamurthi |
| 5. நாடி ஜோதிட நுணுக்கங்கள் | ஆர். தங்கவேலு |
| 6. நாடியில் தொழிலும் கல்வியும் | ஏ. அமிர்தலிங்கம் |
| 7. நாடி ஜோதிட விளக்கங்கள் | சிவதாசன்ரவி |
| 8. ஜீவன காரகன் சனி | குரு இராமசுப்பு |
| 9. பிரச்னை தீர்க்கும் திருத்தலங்கள் | கே.பி.வித்யாதரன் |

நோக்கங்கள்:

- 1) ஜாதகரின் தொழில் நிர்ணயம் செய்வதில் நாடி ஜோதிட விதிகளின் எளிமையை புரிந்துக் கொள்வது.
- 2) தொழில் முனைவோர் ஜாதகங்களை கொண்டு, அவர்கள் அத்தொழில் செய்வதற்கான காரண காரியங்களை அலசுதல்.
- 3) பொறியாளர், மருத்துவர் ஜாதகங்களை ஆய்வு செய்து, தொழில்களுக்கான விதிகளை புரிந்து கொள்ளுதல்.
- 4) ஜாதகர்களில் கைரேகையின் வலிமையைக் கொண்டு தொழிலின் வலிமையை கண்டறிதல்.
- 5) கோள்களின் பலத்தை அறிந்துக் கொள்ள திக்பலம் பயன்படும்.
- 6) பல்வேறு முறைகளில் பலன் சொல்வது நோக்கமாகும்.

பயன்கள் :

- 1) இளம் வயதினர் ஜோதிடர்களை அணுகும் போது, பிற்காலத்தில் அவர்கள் செய்ய போகும் தொழிலை முன்கூட்டியே வரையறுப்பதற்கு உதவும்.
- 2) ஒரு ஜாதகர் தான் செய்ய போகும் ஒன்றுக்கும் மேற்பட்ட தொழில்களை வரையறுத்துக் கூறலாம்.
- 3) தொழிலில் ஏற்படும் ஏற்ற தாழ்வுகள், தொழில் தன்மை, மாற்றங்கள், சொந்த தொழிலா? அடிமை தொழிலா? தொழிலால் ஏற்படும் பெயரும், புகழும் போன்ற பல கருத்துக்களை சொல்ல முடியும்.
- 4) மனிதர்களுக்கு மிக இன்றியமையாதது கல்வியும், திருமண வாழ்க்கையும், தொழிலும் ஆகும். இவைகளை இந்த செய்முறை பாட பகுதியின் மூலம் நன்கு அறிந்தும் கொள்ளலாம்.
- 5) எந்த முறையில் பலன் கூறினாலும் பலன் ஒன்றாக தான் இருக்கும் என்பதை நிரூபிக்கலாம்.
- 6) எளிமையான முறையில் பலன்கள் நிர்ணயம் செய்யலாம்.

UNITS

- 1) நாடி ஜோதிட அடிப்படையில் தொழில் குறித்து பலனைக் கூறுதல்
- 2) தொழில்முனைவோர் ஜாதகங்களை வரையறுத்தல்
- 3) பொறியாளர் ஜாதகங்களை வரையறுத்தல்
- 4) கைரேகை மூலம் பலன் உரைத்தல்
- 5) மருத்துவர் ஜாதகங்களை வரையறுத்தல்

குறிப்புதவி நூல்கள்**1.My Experiences in Astrology B.V. Raman**

- 2. Important Combinations B.V. Raman
- 3. Hindu predictive Astrology B.V. Raman

நோக்கங்கள் :

- 1) நம் நாட்டு ஜோதிட பலன் கூறும் முறைகள் அல்லாமல் மேல்நாட்டு பலன் கூறும் முறைகளையும் மாணவர்கள் தெரிந்துக் கொள்ளுதல்.
- 2) மழை அறிதல், இயற்கை பேரிடர் ஆகிய இகலோக ஜோதிடத்தின் அடிப்படை தன்மைகளையும் மாணவர்கள் அறிந்துக் கொள்ள வேண்டும்.
- 3) பலன் அறியும் முறைகளில் கிருஷ்ணமூர்த்தி பத்ததியின் புதிய கண்டுபிடிப்புகளை படிக்கும் நோக்கிலும், ஆய்வுமனப்பான்மையை வளர்க்கும் நோக்கிலும் இப்பாட திட்டம் அமைக்கப்பட்டுள்ளது.
- 4) பாவக ஆரம்ப முனைகள் நிற்கும், குறிகாட்டும் பாவகங்களின் மூலம் பலன்கள் முடிவு செய்வது.
- 5) புதிய கண்டுபிடிப்புகளை ஊக்குவிக்க முடியும்.
- 6) புதிய கண்டுபிடிப்புகளின் மூலம் ஜாதக பலன்கள் துல்லியமாக கூறுவது.

பயன்கள்:

- 1) மாணவர்கள் புதிய ஜோதிட பலன் கூறும் முறைகளை படிப்பதினால், புதிய ஜோதிட சார்ந்த கண்டு பிடிப்புகளுக்கு வழிவகுக்கும்.
- 2) மாணவர்கள் காலதேச வர்த்தமானங்களுக்கு ஏற்ற வகையில் பலன் கூறமுடியும்.
- 3) மற்ற துறைகளில் புதிய கண்டு பிடிப்புகளுக்கு ஏற்ற கோள்களின் காரகத்துவ பலன்களை நிர்ணயிக்க உதவும்.
- 4) நாட்டுக்கு பலன்கள் கூற முடியும்.
- 5) நாட்டில் ஆட்சி மாற்றங்கள், இயற்கை பேரிடர்கள் இவைகளை முன் கூட்டியே சொல்ல முடியும்.
- 6) மேல்நாட்டு ஜோதிட முறைகளை நம் நாட்டு ஜோதிடமுறைகளோடு ஒப்பிட முடியும்.

UNITS

1. **மேல்நாட்டு ஜோதிட முறைகள்**
அடிப்படை - பார்வை பலன்கள் - உலகியல் ஜோதிடமுறைகள் - ராசிகளுக்குரிய நாடுகள் - மற்றும் ஊர்கள் - பன்னிரு ராசிகளின் செயல்கள்- மழை அறிதல் - இயற்கை பேரிடர்.
2. **கிருஷ்ணமூர்த்திபத்ததி முறை விளக்கம்**
249 உப நட்சத்திர விளக்கம் -அயனாம்சம்- பாவக கணித முறைகள் - கோள்கள்-
3. **கிருஷ்ணமூர்த்திபத்ததி கணித முறைகள்**
கணித முறைகள் - தசாபுத்தி கணித முறைகள் -கே.பி முறையில் பாவக சக்கரம் வரைதல் - குறிகாட்டிகள்.
4. **பாவக ஆரம்ப முனை விளக்கம்**

பன்னிரு பாவகங்களில் பாவக ஆரம்பமுனை நிற்பது குறித்து விளக்கம்-
ஆளும் கோள்கள் குறித்து விளக்கம் - பார்வை முறைகள் - பன்னிரு
பாவகங்கள் குறிப்பிடுவது - கோள்கள் குறித்து விளக்கம்.

5. ஒன்று முதல் பன்னிரெண்டு பாவகங்கள் வரை பலன்கள் விளக்கம்.
ஒன்று முதல் பன்னிரெண்டு பாவகங்கள் வரை- உதாரண ஜாதகங்கள் மூலம்
விளக்கம்.

குறிப்புதவி நூல்கள்

- | | | |
|----|--|----------------------------|
| 1. | ஜோதிட பொக்கிஷம் 1முதல் 6 தொகுதி | கிருஷ்ணன் அன் கோ
சென்னை |
| 2. | Tables of Houses | கிருஷ்ணன் அன் கோ
சென்னை |
| 3. | ஆளும் கிரகங்களும் அற்புதங்களும் | கிருஷ்ணன் அன் கோ
சென்னை |
| 4. | பிருகத் சம்ஹிதை 1 மற்றும் 2 தொகுதி | கடலங்குடி பப்ளிகேசன்ஸ் |
| 5. | மேலைநாட்டு சோதிடர்கள் சொல்லும் ஜோதிடம் எஸ்.பி. சுப்ரமணியன் | |
| 6. | How to Predict your future (1955) | James Braha |

நோக்கங்கள் :

- 1) நல்ல முகூர்த்தங்களில் ஒரு செயலை ஆரம்பித்தால், அச்செயல் நல்ல பலன்களையே தருகின்றது என்பதை மாணவர்கள் புரிந்துக் கொள்வது.
- 2) வாழ்வியல் சடங்குகளின் முக்கியத்துவமும், அவைகளை சுபமுகூர்த்தங்களில் செய்வதால் ஏற்படும் நற்பலன்களையும் தெரிந்துக் கொள்ளுதல்.
- 3) மூகூர்த்தங்களில் உள்ள தோஷங்கள், தோஷங்கள் குறைந்த முகூர்த்தங்களை தேர்ந்தெடுப்பது. தோஷக்களுக்கான பரிகார கர்மாங்களை தெரிந்துக் கொள்வது.
- 4) பஞ்சாங்க சுத்தி பற்றி அறிந்து கொள்வது.
- 5) முகூர்த்த விதிகளை பற்றி புரிந்துக் கொள்வது.
- 6) மக்கள் செய்யும் காரியம் வெற்றி அடைய உதவுவது.

பயன்கள்:

- 1) தசவிதப் பொருத்தங்களினால் ஏற்படும் விளைவுகளை பட்டியலிட்டு பார்த்து, பொருத்தம் பார்ப்பதின் முக்கியத்துவத்தை உணர்த்தல்.
- 2) முகூர்த்த விதிகளை கையாளும் முறையும் அவைகளை கடைபிடிப்பதால் ஏற்படும் பலன்களை அறிதல்.
- 3) மனித வாழ்வில் நடைபெறும் அனைத்து நிகழ்ச்சிகளுக்கும் கோள்களுக்கு தொடர்பு உண்டு என்பதை மாணவர்கள் உணரமுடியும்.
- 4) திருமண வாழ்வில் பின்னால் வரும் ஆபத்தை முன்கூட்டியே அறிவது.
- 5) சரியான முகூர்த்த நேரங்களை கண்டுபிடித்து நல்ல செயல்களை செய்ய உதவ முடியும்.
- 6) வாழ்வியல் சடங்குகளுக்கு நல்ல நேரம் குறித்தல்.

UNITS

1. **வாழ்வியல் சடங்குகளுக்கான முகூர்த்தங்கள். I**
பதினாறு சடங்குகள் - சடங்குகளின் முக்கியத்துவம்- சடங்குகளின் பயன்கள்
2. **வாழ்வியல் சடங்குகளுக்கான முகூர்த்தங்கள். II**
திருமண முகூர்த்தம் - பயணங்களுக்கான முகூர்த்தம் - கிரகப்பிரவேசத்திற்கு முகூர்த்தம் குறித்தல்.
3. **சுப முகூர்த்தங்கள்**
அமிர்தாதி யோகங்கள் - அதியமிர்தம் - சுப திதிகள்- சுப யோகங்கள்
4. **அசுப முகூர்த்தங்கள்**
தத்த யோகம் - நாச யோகம் - அங்கி யோகம் - வாரகூன்யம் - எரிநாட்கள்- சர்வநாச யோகம் - கிழமை பிறந்த நாள்.
5. **திருமணப்பொருத்தம்**

தசவிதப்பொருத்தங்கள்- கிரஹப்பொருத்தம் கோள்களின் நிலையைப் பொருத்து திருமணப்பொருத்தம். புனர்பூ நிலை - சகஸ்டாகஸ்டகம் - குரு சுக்கிர மூட நிலை - சுக்கிர செவ்வாய்நிலை - சூரியன் செவ்வாய் நிலை - குரு சந்திர நிலை.

குறிப்புதவி நூல்கள்

- | | |
|--------------------------------|----------------------------------|
| 1. முகூர்த்த சிந்தாமணி | கிரிகுடி சந்த் சர்மா |
| 2. காலபிரகாசிகை | சரஸ்வதி மகால் நூலகம். தஞ்சாவூர். |
| 3. காலவிதானம் | சரஸ்வதி மகால் நூலகம். தஞ்சாவூர். |
| 4. திருமணயோக பொருத்த திறவுகோல் | சிவதாசன்ரவி |
| 5. Muhurtha | B.V. Raman |
| 6. முகூர்த்தங்கள் - ஓர் ஆய்வு | Dr. L.ஏழுமலை |

நோக்கங்கள் :

- 1) மனிதர்களுக்கு ஏற்படும் நோய்களுக்கும். கோள்களுக்கும் உள்ள தொடர்புகளை மாணவர்கள் புரிந்துக் கொள்வது.
- 2) உடலில் குறிப்பாக எந்த இடத்தில் நோய்யின் தாக்கம் உண்டு. அந்த நோய்யின் வலிமை, தன்மை ஆகியவற்றை நிர்ணயிப்பது.
- 3) நோய்களுக்கும் பாவகங்களுக்கும் உள்ள தொடர்பு. இராசிகளுக்கும் உடல் உறுப்புகளுக்கும் உள்ள தொடர்பு ஆகியவற்றை அறிதல்.
- 4) நோய் வரும் காலம், நோய்க்கான பரிகாரங்கள் முதலியவற்றை அறிதல்.
- 5) ஜாதகரின் நோயை எந்த மருத்துவ முறையில் குணபடுத்தலாம் என்ற வழியை அறிவது.
- 6) ஜாதகத்தை கொண்டு நோய் எதிர்ப்பு சக்திகளுக்கான வழிமுறையை சொல்வது.

பயன்கள்:

- 1) மனிதனின் உடலில் ஏற்படும் நோயை கண்டுபிடிக்க உதவும், மேலும் உடலில் எந்த பகுதியில், உறுப்பில் நோய் ஏற்பட்டுள்ளது, அதன் தன்மை ஆகியவற்றை தெளிவாக மருத்துவ ஜோதிடம் படம் பிடித்து காட்டும்.
- 2) ஜோதிட ரீதியில் பரிகாரங்களை கூறி நோய்கள் நீங்க வழிவகை செய்வது.
- 3) முன்கூட்டியே நோய்வரும் காலம் அறிதல், நோய் தீர்க்கும் மருத்துவ முறைகளையும் கூறுதல்.
- 4) சிகிச்சையால் ஏற்படும் பக்க விளைவுகளை முன் கூட்டியே எச்சரிக்க முடியும்.
- 5) மருத்துவரின் பெயர் மற்றும், அவரின் மருத்துவ அறிவை விளக்க முடியும்.
- 6) இன்றைய மருத்துவ துறையில் கண்டுபிடிக்க முடியாத நோய்களையும் ஜோதிடத்தின் மூலம் அறிய முடியும்.

UNITS

1. ராசிகளும் கோள்களும் காட்டும் உடல் உறுப்புகள்
காலபுருஷ தத்துவம் - ராசிகள் - கோள்கள் - காட்டும் உடல் உறுப்புக்கள்.
2. ராசிகளும் கோள்களும் காட்டும் நோய்கள்
நோய்களும் அவற்றின் காரணங்களும் - நோய்களின் வகைகள் - ராசிகளும் கோள்களும் காட்டும் நோய்கள்.
3. நோய்வரும் காலம்
கோள்கள் பாவகங்கள் அடிப்படையில் - நோய்வரும் காலம்
4. நோய் குணமாகும் காலம்
நோயும் கன்ம வினையும் - நோய் தீரும் காலம், ஆறு எட்டு பன்னிரெண்டு பாவகங்களும் நோய்களும், பன்னிரு பாவகங்களில் ஆறு எட்டு பன்னிரெண்டு பாவகங்களில் தன்மைகள்-
ஆறு எட்டு பன்னிரெண்டு பாவகங்களில் நிற்கும் கோள்களும் நோய்களும்-

ஆறு எட்டு பன்னிரெண்டு பாவாதிபதிகள் நிற்கும் பாவகங்களில் ஏற்படும் நோய்கள்.

5. நோய் தீர்க்கும் வழி முறைகள்

அலோபதி - சித்த மருத்துவம் - ஹோமியோபதி- அக்குபஞ்சர் - வர்மம்
உள்ளிட்ட

மருத்துவ முறைகள்.-இறைவழி மருத்துவம் - ஊர் மாற்றம் - இறைவழிபாடு

குறிப்புதவி நூல்கள்

- | | |
|----------------------------------|-----------------------|
| 1. PRASNA MARGA; Vol 1 & 2 | B.V. Raman |
| 2. MEDICAL ASTROLOGY | Sankar Adwal |
| 3. Medical Astrology | J.N. Bhasin/ Alan Leo |
| 4. ஆரோக்கியம் நாடி | நவமணி சண்முகவேலு |
| 5. ஜோதிடமும் நோய் அறிதலும் | எஸ்.பி. சுப்ரமணியன் |
| 6. கே. பி. மருத்துவ ஜோதிடம் - I | கே. சுப்ரமணியம் |
| 7. கே. பி. மருத்துவ ஜோதிடம் - II | கே. சுப்ரமணியம் |

நோக்கங்கள் :

- 1) தனிமனிதனுக்கு ஜாதகம் கணிக்கும் முறைகள் மாணவர்கள் தெரிந்துக் கொள்ளும் நோக்கத்தோடு இப்பாட பகுதி அமைந்துள்ளது.
- 2) கணினிகள் இல்லாத நிலையிலும், மாணவர்கள் ஜாதகம் கணிக்க முடியும்.
- 3) ஜாதக கணிதத்திற்கு பஞ்சாங்கத்தின் பயன்பாடுகள் குறித்து விழிப்புணர்வு ஏற்படும்.
- 4) பஞ்சாங்க வகைகளில் உள்ள ஏற்ற தாழ்வுகளையும், அடிப்படைகளையும் மாணவர்கள் புரிந்துக் கொள்ளுதல்
- 5) சட்பலத்தின் மூலம் கோள்களின் பலத்தை அறிதல்.
- 6) அஷ்ட வர்க்கத்தின் மூலம் துல்லியமான பலன்களை அறிதல்.

பயன்கள் :

- 1) பலன் சொல்லுவதற்கு ஜாதக கணிதம் அவசியமாகும், ஜாதக கணிதத்திற்கு பஞ்சாங்கம் அவசியமாகும், பஞ்சாங்கத்திற்கு வானசாஸ்திரம் அவசியமாகும்.
- 2) ஜோதிடத்தில் ஜாதக கணிதத்திற்கு மென்பொருள் உருவாக்குவதற்கு இக்கணித முறைகள் பயன்படும்.
- 3) இக்கால விக்ஞானம் அழிந்தாலும், ஜோதிட சாஸ்திரம் அழியாமல் இருக்க ஜோதிட கணித முறைகளை மாணவர்கள் படிப்பதினால் காப்பாற்ற முடியும்.
- 4) கோள்களின் பலத்தை சட்பலத்தின் மூலம் அறிவதால் பலன்களை துல்லியமாக சொல்ல முடியும்.
- 5) அஷ்ட வர்க்க முறையின் மூலம் ஜாதகத்தின் பலன்களை நிர்ணயிப்பதில் புதுமை வெளிப்படும்.
- 6) வர்க்க சக்கர கணிதமுறைகள் ஜாதக பலன்களை சொல்வதற்கு மேலும் வலுவேர்க்கும்.

UNITS

1. **பஞ்சாங்க வகைகள்**
வாக்கிய – திருக்கணிதம் - எபிமெரிஸ்
2. **லக்னம் கணித்தல் மற்றும் திசா புத்தி கணித்தல்**
 1. வாக்கிய முறை
 2. திருக்கணித முறை
3. **கோள்களின் ஸ்புடம் கணித்தல்**
லக்ன ஸ்புடம் - ஒன்பது கோள்களின் ஸ்புடம்
4. **தினகதி**
தினகதி அளவீடுகள்
5. **அஷ்டவர்க்கம்**
அஷ்டவர்க்கம் அறிமுகம் - பரல்கள் -
அஷ்டவர்க்க கணிதம்
அஷ்டவர்க்க கணிதமுறை

குறிப்புதவி நூல்கள்:

- | | | |
|----|---|------------------------|
| 1. | Brikat Parasara Hora Sastra | G.C. Sharma |
| 2. | Ashta Varga System of Prediction | B.V.Raman / C.S. Patel |
| 3. | ஜாதக கணிதம் | C.G.ராஜன் |
| 4. | அஷ்டவர்க்கக் கணிதமும் பலன்களும் | சிவதாசன் ரவி |
| 5. | Essential of Hindu Predictive Astrology | R.Santhanam |

Instruction Hours / Week: L : 4 T : 0 P : 0

Marks Internal : 40, External : 60 Total : 100

End Semester Exam : 3 hrs

நோக்கங்கள் :

- 1) தசாபுத்தி பலன்கள் கணிக்கும் முறைகள் மாணவர்கள் தெரிந்துக் கொள்ளும் நோக்கத்தோடு இப்பாட பகுதி அமைந்துள்ளது.
- 2) கணினிகள் இல்லாத நிலையிலும், மாணவர்கள் தசாபுத்தி பலன்கள் கணிக்க முடியும்.
- 3) தசாபுத்தி பலன்கள் கணிக்கும் முறைகள் பயன்பாடுகள் குறித்து விழிப்புணர்வு ஏற்படும்.
- 4) ஜாதகத்தில் கணிக்கப்பட்ட பலன்கள் எக்காலகட்டத்தில் நடக்கும் என்பதை அறிவது.
- 5) கோசார கிரக நிலைகளை கொண்டு ஜாதக பலன்கள் நடக்கும் காலத்தை அறிதல்.
- 6) தசாபுத்தி, கோசாரத்தை இணைத்து பலன்கள் நடக்கும் கால நிர்ணயத்தை அறிதல்.

பயன்கள் :

1. பலன் சொல்லுவதற்கு தசாபுத்தி பலன்கள், ஜாதக கணிதம் அவசியமாகும், ஜாதக கணிதத்திற்கு பஞ்சாங்கம் அவசியமாகும், பஞ்சாங்கத்திற்கு வானசாஸ்திரம் அவசியமாகும்.
2. ஜோதிடத்தில் தசாபுத்தி பலன்கள், ஜாதக கணிதத்திற்கு மென்பொருள் உருவாக்குவதற்கு இக்கணித முறைகள் பயன்படும்.
3. இக்கால விஞ்ஞானம் அழிந்தாலும், ஜோதிட சாஸ்திரம் அழியாமல் இருக்க தசாபுத்தி பலன்கள் கணிக்கும் முறைகளை மாணவர்கள் படிப்பதினால் காப்பாற்ற முடியும்.
4. ஜாதகத்தில் கணிக்கப்பட்ட எந்த நிகழ்ச்சிகளையும் கால நிர்ணயம் செய்யப் பயன்படும்.
5. எதிர்காலத்தில் நடைபெறும் நிகழ்ச்சிகளை தசாபுத்தியை கொண்டு தேதி வரை துல்லியமாக சொல்லப் பயன்படும்.
6. கோசாரமும், தசாபுத்தியும் இணைந்து ஜாதக பலன்கள் நடக்கும் காலத்தை முடிவு செய்யும்.

தசாபுத்தி பலன்கள்**UNITS:**

1. **தசாபுத்தி கணிதம்**
தசா புத்திகள் வகைகள் - விம்சோத்திரி தசா ஆண்டுகள் - நவகோளங்களுக்கும் தசாபுத்தி ஆண்டுகளை வகுத்து கொடுத்த முறை
2. **தசாபுத்தி கணக்கிடும் முறை**
தசாபுத்தி கணக்கிடும் முறையை வரையறுத்தல் - அந்தரம் கணக்கிடும் முறை.
3. **தசாபுத்தி பலன்கள்**
தசை - புத்தி - நட்சத்திர சாரம் இவைகளைக் கொண்டு பலன் கூறுதல் தசாபுத்தி அந்தரங்களை கொண்டு ஜாதகபலன்கள் நடக்கும் காலத்தை நிர்ணயம் செய்தல்.

4. கோச்சார பலன்கள்

அன்றைய கோள்களின் நிலை – பலன்களை வரையறுத்தல் - கோச்சார கோள்களை கொண்டு கால நிர்ணயம் செய்தல்.

5. தசாபுத்திபலன்களையும் கோச்சார பலன்களையும் இணைத்தல்

கேள்விக்குரிய பலன்களை தசாபுத்தி அடைப்படையிலும் கோச்சார அடிப்படையிலும் இணைத்து பலன் கூறுதல் - கோள்கள் வழியாக பலன்கள் சனி குரு ராகு கேது கோள்கள் வழியாக பொதுப்பலன்களையும் கோச்சார பலன்களையும் கூறுதல்

குறிப்புதவி நூல்கள்

- | | | |
|----|--|--------------------------------------|
| 1. | BRIKAT PARASARA HORA SASTRA | Grish Chand Sharma |
| 2. | ASHTA VARGA SYSTEM OF PREDICTION | B.V.Raman |
| 3. | ஜாதக கணிதம் | C.G.ராஜன் |
| 4. | துல்லியமாக கோட்சாரப் பலனறிதல்
கிருகூஷ்ணன் | எஸ். கோபால |
| 5. | குடும்ப ஜோதிடம் | ஸ்ரீராமய்யங்கா ஸ்ரீஸ்ரீனிவாஸாசாரியர் |
| 6. | Hindu Predictive Astrology | B.V. Raman |

நோக்கங்கள்:

- 1) பலன் கூறுவதற்கு பலமுறைகள் இருந்தாலும், மாணவர்கள் பழங்கால முறையான தாஜிக முறையில் பலன் கூறுவதற்கு உதவியாக இருக்கும்.
- 2) தாஜிக முறையில் யோகங்களுக்கு பலன்கள் கூறுவது ஒரு வித்யாசமான முறை என்றே புரிந்துக் கொள்ளலாம்.
- 3) ஒவ்வொரு வருடத்திற்கும் ஒரு ஜாதகம் கணித்து பலன் சொல்லும் முறையை மாணவர்கள் அறியும் நோக்கில் இப்பாட பகுதி அமைந்துள்ளது.
- 4) ஜாதகர்களின் வருங்கால ஜோதிட பலன்களை கூறுவது.
- 5) கோள்களின் நிலைகளை மிக துல்லியமாக கணித்தல்
- 6) பலன்கள் நடைபெறும் காலங்களை முன்கூட்டியே எடுத்துரைத்தல்.

பயன்கள்:

- 1) பழமையான முறைகளில் ஒன்றான இத்தாஜிக முறை. ஒரு வித்யாசமான கோணத்தில் பலன்களை கூற வைக்கும்.
- 2) ஒரு வருடத்தில் ஏற்படும் நன்மை, தீமைகளை வரையறுத்து கூறுவதில் வல்லமைவுடையது தாஜிக முறையாகும்.
- 3) வாழ்நாள் முழுவதும் ஜாதகரின் வாழ்க்கையில் ஏற்படும் இன்பதுன்பங்களை சொல்ல முடியும்.
- 4) கோள்களின் பலம், பலஹீனம் ஆகியவற்றை தெளிவாக அறிய முடியும்.
- 5) ஒவ்வொரு வருடத்திலும் ஏற்படும் பலன்களை கோட்சார கிரகங்களை கொண்டு முடிவு செய்ய முடியும்.
- 6) பாவகங்களில் நிற்கும் கோள்களால் ஏற்படும் பலன்களை துல்லியமாக கணிக்க முடியும்.

UNITS

1. **வருட சாதகம் கணித்தல்**
வருட பிறந்த நாள் - வருட அதிபதி- இலக்கினம் - கோள்களின் நிலை, திதி – முந்தா – முந்தா இராசி அதிபதி – மந்தா இராசியல் நிற்கும் கோள்கள் - வருட அதிபதியைக் காணுதல்
2. **சகமங்கள்**
தாஜிக முறைப்படி சகம ஸ்புடங்கள் கணித்தல் - பலன் அறியும் விதம்
3. **யோகங்கள்**
தாஜிக முறையில் கூறப்படும் யோகங்களும் அதன் பலன்களும்
4. **வருட தசை கணித்தல்**
தாஜிக முறைப்படி – வருட தசை கணித்தல், தசையில் புத்தியைக் கணித்தல் - பொது தசா பலன்கள்

5. சாதக பலன் நிர்ணயித்தல்

வருட சாதகத்தில் - பாவங்களின் நிற்கும் கோள்களால் ஏற்படும் பலன்கள் - அந்த வருடத்தில் ஏற்படக்கூடிய தீயபலன்கள் - தீய பலன்கள் நீக்கும் விதம்.

குறிப்பு நூல்கள்

1. பி.எஸ். அய்யர், தஜக நீலகண்டியம், கேரள சோதிட பதிப்பகம், மதுரை
2. பி.வி. ராமன் வாஷ்பல், யு.பி.எஸ்.பி.டி பப்ளிகேசன்ஸ், புது தில்லி
3. சுமித் ஷா வாஷ்பல், சாகர் பப்ளிகேசன்ஸ், புது தில்லி
4. நீலகண்டர், உரை டி.பி. சாக்சேனா, தஜிக் நீலகாந்தி, ரஞ்சன் பப்ளிகேசன்ஸ், புது தில்லி
5. கே.எஸ். சரக் பிரடெக்டிவ் டெக்னிக் இன் வாஷ் பலா, சிஸ்டம் விஷன், புது தில்லி
6. பலவகையான சோதிட இணை தளங்கள்

நோக்கங்கள்:

- 1) அஷ்டவர்க்க முறையில் பலன்கள் சொல்ல தேவையான அடிப்படை செய்திகளை இப்பாட பகுதி மூலம் தெரிந்துக் கொள்ளலாம்.
- 2) கோள்கள் அஷ்ட வர்க்கத்தில் கொடுக்கும் பரல்களுக்கு ஏற்ற வகையில் பலன்களில் ஏற்படும் தாரதம்யத்தை மாணவர்கள் புரிந்துக் கொள்ளலாம்.
- 3) கோச்சார கிரகங்கள் அஷ்டவர்க்கங்களில் ஏற்படுத்தும் பலன்களை நிர்ணயம் செய்யலாம்.
- 4) சூரிய, சந்திர அஷ்டக வர்க்கங்களில் கோசார சூரியனை கொண்டு சுப முகூர்த்தங்கள் முடிவு செய்யலாம்.
- 5) செவ்வாய் பின் பின்னாஷ்டக வர்க்கத்தில் கோசார செவ்வாய் வரும் காலத்தை கொண்டு சகோதர, சகோதரிகளை பற்றி அறியலாம்.
- 6) அஷ்டக வர்க்க கணிதம் மூலம் ஆயுள் கணிதம் துல்லியமாக கணிக்கலாம்.

பயன்கள் :

- 1) அஷ்ட வர்க்கங்களை கொண்டு முகூர்த்த நிர்ணயம் செய்யலாம், தொழில் நிர்ணயம் செய்யலாம்.
- 2) ஜாதகர்களுக்கு ஏற்படும் நோய், திருமண வாழ்க்கை, புத்ர பாக்யம் போன்ற அனைத்து விதமான பலன்களையும் மிக துல்லியமாக வரையறுத்து கூற முடியும்.
- 3) பலன் கூறுவதில் ரிஷிகளின் அறிவு கூர்மையை புரிந்துக் கொள்ள முடியும்.
- 4) அஷ்டக வர்க்க கணிதம் மூலம் திருமணப் பொருத்தம் நிர்ணயம் செய்ய முடியும்.
- 5) மகிழ்ச்சிகரமான திருமண வாழ்க்கைக்கு சுக்கிர பின்னாஷ்ட வர்க்கத்தின் மூலம் அறியலாம்.
- 6) புனித யாத்திரை, புதிய முயற்சிகள், தொழில் தொடங்குதல் ஆகியவற்றை சூரிய சஞ்சாரத்தின் மூலம் முடிவு செய்யலாம்.

UNITS**அஷ்டவர்க்கம்**

1. **அஷ்டவர்க்கம் கணித்தல்**
அஷ்டவர்க்கம் அறிமுகம் - முக்கியத்துவம் - கோள்கள் பரல் தரம் ஸ்தானங்கள் - சமுதாய – பிரஸ்தார அஷ்டவர்க்கம்
2. **அஷ்டவர்க்க சோதனைகள் மற்றும் சுத்த பிண்டம் கணித்தல் - திரிகோண சோதனை –**
ஏகாதிபத்திய சோதனை – கிரக குணாகரம், இராசி குணாகரம் - சுத்த பிண்டம்
3. **அஷ்டவர்க்க பொது பலன்கள்**

பன்னிரண்டு பாவங்களில் உள்ள பரல்களின் பலன் - கோள்கள் தரும் பரல்களின் பலன் - பாவகம் மற்றும் கோள்களின் பொதுப் பலன்கள்

4. அஷ்டவர்க்க சிறப்புப் பலன்கள்

சுத்த பிண்டம் கணித அடிப்படையிலும் - கோள்கள் ஒரு பாவத்தில் கொடுத்துள்ள பரல்களின் அடிப்படையிலும் - பலன் நிர்ணயித்தல் - ஆயுள் கணித்தல் - பாவக பலன் நடைபெறும் காலம் கணித்தல்

5. அஷ்டவர்க்க கோசார பலன்கள்

கோள்களின் தற்கால நிலை - பரல்களுக்கு ஏற்றவாறு தரும் பலன்கள் - கச்சயா கணக்கிடுதல் - கோள்கள் கச்சயாவை கடக்கும் கால அளவு - பலன்கள்

குறிப்பு நூல்கள்

1. பராசரா - உரை, கிரிஸ் சந்த் சர்மா, பிருகத் பராசரா ஜோரா சாஸ்திரம், சாகர் பப்ளிகேசன்ஸ், புது தில்லி
2. சி.எஸ் பட்டேல் மற்றும் சி.ஏ. சுப்பிரமணிய சாஸ்திரிகள். அஷ்டவர்க்கம், சாகர் பப்ளிகேசன்ஸ், புது தில்லி
3. பி.எஸ். சாஸ்திரி, சீக்ரேட்ஸ் ஆஃப் அஷ்டவர்க்கம், ரஞ்சன் பப்ளிகேசன்ஸ், புது தில்லி
4. பீ.வி ராமன், அஷ்டவர்க்கம் சிஸ்டம் ஆஃப் பிரடிக்கசன், பு.பி எஸ்.பி.டி. பப்ளிகேசன்ஸ். புது தில்லி
5. பல வகையான சோதிட இணை தளங்கள்

நோக்கங்கள் :

- 1) ஒவ்வொரு கேள்விக்கும் ஒவ்வொரு வர்க்க சக்கரங்களை ஏற்படுத்தி அதன் மூலம் பலன்கள் துல்லியமாக சொல்ல முடியும்.
- 2) கோள்களின் உண்மையான வலிமை வர்க்க சக்கரங்களில் மட்டுமே வெளிப்படும்.
- 3) இராசி சக்கரத்தை கொண்டு மேலோட்டமான பொது பலன்களை மட்டுமே சொல்ல முடியும் ஆனால் வர்க்கங்கள் கொண்டு துல்லியமான, ஆழமான, விளக்கமான பலன்களை சொல்ல முடியும்.
- 4) நவாம்சத்தை கொண்டு ஜாதகரின் திருமண வாழ்க்கையின் சாராம்சத்தை புரிந்துக் கொள்ள முடியும்.
- 5) சதுர்விம்சாம்சத்தை கொண்டு ஜாதகரின் கல்வியின் தரத்தை நிர்ணயம் செய்ய முடியும்.
- 6) சப்தாம்சத்தை கொண்டு, புத்ர பாக்யத்தை அறிய முடியும்.

பயன்கள்:

- 1) வர்க்க சக்கர முறையில் பலன் சொல்வது என்பது ஒரு உயர்தர முறையில் பலன்கள் சொல்வதாகும்.
- 2) ஜாதகரின் வாழ்க்கையில் மறைந்து கிடக்கின்ற பலபல உண்மைகளை வெளி உலகத்திற்கு காட்டும் ஒரு பல பலன் சொல்லும் முறை என்றால் அது மிகையல்ல.
- 3) நமது வாழ்வில் நடக்கும் அனைத்து நிகழ்ச்சிகளுக்கும் காரண காரியங்களோடு, கோள்கள் சம்பந்தம் உள்ளது என்பதை புரிந்துக் கொள்ள முடியும்.
- 4) சதுர்த்தாம்சத்தை கொண்டு அசையா சொத்துகளின் நிலையை அறிய முடியும்.
- 5) தசாம்சத்தை கொண்டு ஜாதகரின் வேலையின் நிலையை முடிவு செய்யலாம்.
- 6) ஏகாதாம்சத்தை கொண்டு ஒருவரின் சொந்த தொழில் நலனை அறியலாம்.

UNITS**16 வர்க்கச் சக்கரங்களும் பலன்களும்****1. ஸ்தான பலம் மற்றும் திக்பலம்**

ஸ்தான பலம் - உச்ச - சப்த வர்கிய - ஓஜ உக்ம் - கேந்திர திரிகோண பலம் - திக்பலம் - திசைகள் - கோள்களின் பலம் - பலவீனம் - பலன் D2, D3 கட்டமைப்புகள், பலன்கள்

2. காலபலம் மற்றும் சேஷ்டாபலம்

கோள்களின் தற்காலிக பலம் - பகல் - இரவு - திரிபாகம் - வருடம் - மாதம் - நாள் - நேர அதிபதி - கோள்களின் கோசார பலம் - உள்வட்டம் - வெளிவட்டம் - விரைவாக - மெதுவாகச்

செல்லும் -

கோள்களின் பலம் - பலவீனம் - பலன் D4, D16, D24 கட்டமைப்புகள், பலன்கள்

3. நைசர்க்கிய பலம் மற்றும் திருக் பலம்

கோள்களின் இயற்கை பலம் - கோள்களின் பார்வை பலம் - பலவீனம் - பலன் D5, D6, D7 கட்டமைப்புகள், பலன்கள்

4. பாவக பலம்

பாவக பலம் - பால காரகம் - பகல் - இரவு - பிறப்பு பலம் - இஷ்ட பலம் - கஷ்ட பலம் நிகர பலம் D8, D9, D10, D11, D12, D20, D30 கட்டமைப்புகள், பலன்கள்

5. சாதக பலன் நிர்ணயித்தல்

பல அடிப்படையில் கோள்கள் - பாவகம் - தசா புத்தி கோசார - பலன் நிர்ணயித்தல்

குறிப்புதவி நூல்கள்

1. பராசரர், உரையாசிரியர் - கிரிஸ் சந்த் சர்மா, பிருகத் பராசரா ஜோரா சாஸ்திரம், சாகர் பப்ளிகேசன்ஸ், புது தில்லி
2. மந்திரேஸ்வரர், உரையாசிரியர், சு.எ. குமார சுவாமி ஆச்சாரியார், பல தீபிகை, ஆனந்த நிலையம் சென்னை
3. கல்யாணவர்மர், உரையாசிரியர் சு.ஏ. குமாரசுவாமி ஆச்சாரியார். சாராவளி. ஆனந்த நிலையம் சென்னை
4. கிருஷ்ண குமார், சட்பல ரகசியம், ஆல்.பா பப்ளிகேசன்ஸ், புது தில்லி
5. எஸ்.எம். சதாசிவம், சட்பலம், இந்து பப்ளிகேசன்ஸ், சென்னை
6. பல வகையான சோதிட இணைய தளங்கள்
7. Sanjay Rath, varga chakra, Saagar publication.
8. P.V.R. Narasimha Rao, Vedic Astrology an intergrated Approach. Sagar publication.
9. Crux of vedic Astrology- timing of events by Sanjay Rath, Sagar publication.
10. V.P.Goel, Comprehensive prediction by Division charts, Sagar publication.

நோக்கங்கள்

- 1) பராசரர் முறையில் பன்னிரு இலக்ன சாதகங்களுக்கு ஆதிபத்திய முறையில் பலன் கூறுதல் மாணவர்களின் சோதிட அறிவை பரைசாற்றுவதாக அமையும்
- 2) மேலும் பன்னிரு இலக்ன சாதகங்களுக்கு நட்சத்திர சார ஆதிபத்திய முறையில் பலன்கள் கூறுதல் மாணவர்களின் நுட்பமான சோதிட அறிவு இந்த செய்முறைத் தேர்வின் மூலம் வெளிப்படும்
- 3) பலன்களாக சொல்லப்படும் நிகழ்வுகள் எக்காலகட்டத்தில் ஏற்படும் என்பதை விம்சோத்திரி தசா புத்தியின் மூலம் கூறுவது இந்த செய்முறைத் தேர்வின் நோக்கமாகும்.
- 4) அஷ்டவர்க்க பலன்கள் மூலம் கோட்சார பலன்களை சொல்வதும்,
- 5) மேலை நாட்டுமுறையில் பலன்கள் கூறுவதும் மாணவர்களை பல முறைகளில் பலன் கூறவைப்பதற்கான முயற்சியாகும்.
- 6) கோள்களின் நிலைகள் இல்லாமலேயே ஜாதகப் பலன்களை லக்னம், ராசியை கொண்டு அறிதல்.

பயன்கள்

- 1) இந்த செய்முறை பயிற்சியின் மூலம் மாணவர்கள் உயர்தரமான சோதிட அறிவை பெறுவார்கள்
- 2) தங்களிடம் வருகின்ற சாதகங்களின் வாழ்வில் வழிகாட்டியாகவும் நன்மை செய்பவர்களாகவும் இருப்பார்கள்
- 3) மற்றவர்களுக்கு சோதிட சாஸ்திரதின் மூலம் வழிபாட்டுவதால் தெய்வீக நிலையை அடைய வழி ஏற்படும்.
- 4) மேலை நாட்டு முறையில் பலன்களை கண்டறிதல் மாணவர்களுக்கு புதிய உத்வேகத்தை தரும்.
- 5) விம்சோத்திரி தசா மூலம் ஜாதக பலன்கள் நடக்க போகும் காலக்கட்டத்தை அறிய உதவும்.
- 6) அஷ்டக வர்க்கத்தின் மூலம் மிகவும் துல்லியமான பலன்களை சொல்ல முடியும்.

செய்முறைத்தேர்வு (Practical) :III**UNITS**

1. பன்னிரு லக்ன சாதகங்களுக்கு ஆதிபத்திய முறையில் பலன் கூறுதல்.
2. பன்னிரு லக்ன சாதகங்களுக்கு நட்சத்திர சார ஆதிபத்திய முறையில் பலன் கூறுதல்.
3. விம்சோத்திரி தசா புத்தி கணித்துப் பலன் கூறுதல்.
4. அஷ்டவர்க்க ஜனன பரல்கள் மூலம் கோட்சார பலன்களைக் கூறுதல்.
5. மேலை நாட்டு முறையில் பலன் கூறுதல்.

15ASP401

Project – VIVA VOCE

Semester – IV
15C

Instruction Hours / Week: L : 0 T : 0 P : 0 Marks Internal : 80, External : 120 Total : 200

DEPARTMENT OF BIOCHEMISTRY
FACULTY OF ARTS, SCIENCE AND HUMANITIES
KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established Under Section 3 of UGC Act 1956)
Eachanari PO, Coimbatore – 641 021, India.

B.Sc., BIOCHEMISTRY

PREAMBLE

- Biochemistry is the study of chemistry and relating to, biological organisms.
- Biochemistry is sometimes viewed as a hybrid branch of organic chemistry which specializes in the chemical processes and chemical transformations that take place inside of living organisms.
- All life forms alive today are generally believed to have descend from a single proto-biotic ancestor, which could explain why all known living things naturally have similar biochemistries.
- Biochemistry essentially remains the study of the structure and functions of cellular components (such as enzymes and cellular organelles) and the processes carry out both on and by organic macromolecules - especially proteins, but also carbohydrates, lipids, nucleic acids and other biomolecules.
- Biochemistry is most simply put, the chemistry of life.

KARPAGAM ACADEMY OF HIGHER EDUCATION
Coimbatore – 641 021
DEPARTMENT OF BIOCHEMISTRY
FACULTY OF ARTS, SCIENCE AND HUMANITIES
UG PROGRAM (CBCS)-B.Sc., Biochemistry
(2015–2018 and onwards)

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
SEMESTER – I										
15LAU101	Language – I	I	a	5	-	-	5	40	60	100
15ENU101	English – I	I	a	4	-	-	4	40	60	100
15BCU101	Chemistry of Biomolecules	I	b	5	-	-	5	40	60	100
15BCU111	Practical – I Qualitative Analysis of Biomolecules	III	d	-	-	5	3	40	60	100
15BCU102	Allied Chemistry – I	I	d	4	-	-	4	40	60	100
15BCU112	Allied Chemistry Practical - I	III	d	-	-	3	2	40	60	100
15FCA101	Foundation course A –Value Education			2	-	-	1	100	-	100
15SSD101	Soft skill Development- I			2	-	-	-	-	-	-
Semester Total				22	-	8	24	340	360	700
SEMESTER – II										
15LAU201	Language – II	I	a	5	-	-	5	40	60	100
15ENU201	English – II	I	a	4	-	-	4	40	60	100
15BCU201	Analytical Biochemistry	III	e	5	-	-	5	40	60	100
15BCU211	Practical – II Quantitaive Estimation and Separation Techniques	III	e	-	-	5	3	40	60	100
15BCU202	Allied Chemistry- II	I	e	4	-	-	4	40	60	100
15BCU212	Allied Chemistry Practical – II	I	e	-	-	3	2	40	60	100
15FCB201	Foundation course B- Environmental Studies	IV	h	2			1	100	-	100
15SSD101	Soft Skill Development- I			2	-	-	1	100	-	100
Semester Total				22	-	08	25	440	360	800
SEMESTER – III										
15ENU301	English – III	I	f	4	-	-	4	40	60	100
15BCU301	Protein Biochemistry and Enzymology	I	f	4	-	-	4	40	60	100
15BCU302	Cell Biology	I	f	4	-	-	4	40	60	100
15BCU311	Practical -III Enzyme Kinetics	III	c, f		-	5	2	40	60	100
15BCU303	Allied -Elective I	III	c, f	4	-	-	4	40	60	100
15BCU312	Allied Elective practical – I	III	c, f		-	3	2	40	60	100
15FCC301*	Introduction to Computer / Introdcution to Multimedia			4	-	-	2	100	-	100
15SSD301	Soft Skill Development – II			2	-	-	-			
Semester Total				22	-	8	22	340	360	700
SEMESTER – IV										
15ENU401	English –IV	I, II	g	4	-	-	4	40	60	100
15BCU401	Human Physiology	I, II	g	6	-	-	5	40	60	100
15BCU402	Endocrinology	I, II	g	6	-	-	5	40	60	100
15BCU411	Practical – IV Cell Biology and Human Physiology	III	c, g	-	-	5	3	40	60	100
15OEU401	Open Elective-I	III	c, g	-	-	-	3	-	100	100
15BCU404	Allied Elective-II	III	c, g	4	-	-	3	40	60	100
15BCU412	Allied Elective practical – II			-	-	3	2	40	60	100
15SSD301	Soft Skill Development II			2	-	-	1	100		100
Semester Total				22	-	8	26	340	460	800

SEMESTER – V										
15BCU501	Metabolic Pathways	V	d, e	5	-	-	5	40	60	100
15BCU502	Molecular Biology	II, III	d, e	5	-	-	5	40	60	100
15BCU503	Immunology	II, III	d, e	5	-	-	5	40	60	100
15BCU504	Plant Biochemistry	I	d, e	5	-	-	5	40	60	100
15BCU505	Core Elective –I	I	i	5	-	-	5	40	60	100
15OEU501	Open elective I	V	d	-	-	-	3	-	100	100
15BCU511	Practical –V Molecular Biology and Plant Biochemistry	V	d, e	-	-	5	3	40	60	100
15BCU521	Internship program			-	-	-	2	50	-	50
Semester Total				25	-	5	33	290	460	750
SEMESTER – VI										
15BCU601	Clinical Biochemistry	V	i, j	5	-	-	5	40	60	100
15BCU602	Drug Biochemistry	I	g	5	-	-	5	40	60	100
15BCU603	Core Elective – II	V	i, j	5	-	-	4	40	60	100
15BCU611	Practical –VI Clinical Biochemistry	II	i, j	-	-	5	3	40	60	100
15BCU691	Project	IV	j	4	-	6	6	60	90	150
	NCC/NSS/Sports/Club activity etc			-	-	-	-	-	-	-
Semester Total				19	-	11	23	220	330	550
Grand Total				132	-	48	180	1970	2330	4300

Blue – Employability

Green – Entrepreneurship

Red – Skill Development

*Foundation Course C	
15FCC301A	Introduction to Computer
15FCC301B	Introduction to Multimedia

Allied Elective-1 (Theory)		Allied Elective-1 (Practical)	
15BCU303 A	General Microbiology	15BCU312A	General Microbiology
15BCU303 B	Nutritional Biochemistry	15BCU312B	Nutritional Biochemistry
15BCU303 C	Food Preservation Technology	15BCU312C	Food Preservation Technology

Allied Elective-2 (Theory)		Allied Elective-2 (Practical)	
15BCU404 A	Bioinformatics	15BCU412 A	Bioinformatics
15BCU404 B	Biostatistics	15BCU412 B	Biostatistics
15BCU404 C	Biophysics	15BCU412 C	Biophysics

Open Elective (Theory)	
15OEU501	First Aid and Safety

Core Elective – I (Theory)		Core Elective – II (Theory)	
15BCU505 A	Human Genetics	15BCU603A	Introduction to Biotechnology
15BCU505B	Fundamentals of Nanotechnology	15BCU603B	Bioethics and Biosafety
15BCU505C	Cancer Biology	15BCU603C	Stem Cell Biology

Code	Additional Course*	Ins	Marks			Exam / Hrs	Credit
			CIA	ESE	Total		
15BCU506	Good laboratory Practices	-	-	100	100	3	04
15BCU604	Hospital Management	-	-	100	100	3	04

* Additional credit not counted for program requirement

For B.Sc. (Hons) in Biochemistry

Code	Subjects	Ins	Marks			Exam / Hrs	Credit
			CIA	ESE	Total		
15BCU507	Advanced Biochemistry	-	-	100	100	3	05
15BCU605	Advanced Analytical Techniques and Research Methodology	-	-	100	100	3	05

Code: 15BCU101

15	-Academic Year
BC	-Biochemistry
U	- Bachelor's Degree
First Digit	- Semester number (1, 2, 3 and)
Second digit	- Theory (0); Practical (1); Project (9)
Last digit	- Paper number in the concerned semester (1, 2...)

PROGRAMME OUTCOME (POs).

The Biochemistry graduate will be able to acquire

- a. Critical Thinking and Language Training:** The ability to analyze information objectively and make a reasonable judgment and conclusion by evaluating data, facts, observable phenomenon, and research findings from a set of information and distinguish among priorities to solve a problem To train them to communicate science by improving their English vocabulary. Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- b. Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- c. Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings. Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- d. Understanding cellular function:** To equip them with basic and advanced knowledge in cell biology in order to get entry/placed in cell based research and development institution/laboratories.
- e. Protein based skills:** To make them understand protein, enzymes and human physiology to lay solid foundation and to get through competitive examinations. To equip them to get placed in recombinant protein production industries/laboratory.
- f. Understanding of endocrine system and metabolism:** To train them on the regulatory role of hormone on the metabolism of carbohydrates, lipids, amino acids and nucleic acid.
- g. Molecular and Genetic understanding:** To train them on the genetic regulation of immune system and to use computational tools.
- h. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- i. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.
- j. Skill development:** To gain hands on experience on various biochemical experiments and to equip them to interpret the data.

PROGRAMME SPECIFIC OUTCOME (PSOs)

- k. Be able to demonstrate foundation knowledge in the areas of Biochemistry like cell biology, biomolecules, protein biochemistry, molecular biology, Pharmaceutical chemistry and hormonal biochemistry
- l. Be able to integrate knowledge learned in discipline specific courses like Microbiology, Plant Biochemistry, Nutritional biochemistry, Biostatistics, Drug Biochemistry and biotechnology
- m. To use standard laboratory protocols in biochemistry, modern instrumentations, proper laboratory safety protocols and classical techniques to carry out experiments and also use computers in data acquisition and processing and use available software as a tool in data analysis.
- n. To understand the applications of biological sciences in genetics, biochemical correlations of diseases, micro biology, Genetic engineering and biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- I. To give students a basic knowledge in biochemistry and to teach on ethics.
- II. To develop analytical and critical-thinking skills that allows independent exploration of biological phenomena through the scientific methods.
- III. To acquaint knowledge on modern methods of biochemical experimentation to implement for future studies.
- IV. To motivate students for social responsibilities and to educate them on ethical values in addition to inculcating environmental awareness.
- V. To enable them to execute a research objective through experimentation.

Mapping of PEOs and POs

POs	a	b	c	d	e	f	g	h	i	j	k	l	m	n
PEO I	X	X		X		X	X				X			
PEO II			X			X	X				X	X	X	X
PEO III			X	X	X		X				X	X	X	X
PEO IV								X		X				X
PEO V				X	X				X	X	X	X	X	X

பாடத்திட்டப்பொதுநோக்கம்

1. கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
2. ஆய்வுநோக்கைமேம்படுத்துதல்.
3. இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
4. மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
5. வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
6. அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

1. இந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாகஇந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாகஇடம்பெறுகின்ற, ‘தமிழ்இலக்கியவரலாறு’ குறித்தமுழுமையானஅறிமுகம்பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல்மற்றும்தொல்லியல்சார்ந்தஆவணத்தேடலுக்குரியஆய்வுமனப் பான்மையுடன், இலக்கியங்களைஅணுகுதல்.
3. தமிழின்வளர்ச்சித்துறையாகிய, ‘அறிவியல்தமிழ்’ ; ‘இணையதமிழ்’ குறித்தபன்னோக்குஅணுகுமுறையிலானஆய்வுச்சிந்தனைமேம்பாடு.
4. வேலைவாய்ப்புக்குரியசுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத்திறன்மேம்பாடும்பெற்றிருத்தல் .
5. சமுதாயமற்றும்வாழ்வியல்மதிப்புகளைப்பேணுவதற்குக்கருவியாகஇலக்கியங்க ளைநாடுகின்றமனப்பான்மைவளர்ச்சி.
6. மொழிபெயப்புத்துறைசார்ந்தவேலைவாய்புத்திறன்பெற்றிருத்தல்
தாள்கள்வரிசையும்தேர்வுச்செயல்திட்டமும்பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	4	3	40 / 60	100	4

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****Course Objectives:**

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes (CO's):

1. Develop the four types of skills
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed
6. Betterment of language competence

UNIT I:**Prose:** Google Guys (Extract) – Richard L Brandt**Poetry:** The Blind Pedlar – Osbert Sitwell**Short Story:** A Garden So Rich – Christie Craig**Vocabulary:** Prefixes, Antonyms, Sentence Completion**Grammar:** Articles, Adverbs, Pronouns**Composition:** Proverb Expansion**UNIT II:****Prose:** Happiness 101 – Geeta Padmanabhan**Poetry:** An Old Woman – Arun Kolatkar**Vocabulary:** Suffixes, Analogies**Grammar:** Nouns, Adjectives**Composition:** Dialogue Writing**UNIT III:****Prose:** Structured Procrastination – John Perry**Short Story:** The Umbrella Man – Roald Dahl**One-Act Play:** The Boy Who Stopped Smiling – Ramu Ramanathan**Vocabulary:** Synonyms, Euphemisms, Word Definitions**Grammar:** Verbs, Conjunctions and Interjection, Indirect/Reported Speech**UNIT IV:****Poetry:** No Sentence – Anjum Hassan**One-Act Play:** While the Auto Waits- O' Henry**Vocabulary:** Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

PRESCRIBED TEXT

Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

REFERENCE

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

Instruction hours/week: L: 5 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

Equip the students:

- To understand the properties and importance of water in biological system
- To know the various biomolecules present in biological system
- To introduce the importance of vitamins in human body
- To know the biological significance of carbohydrate metabolites in living systems
- To understand the functional role of nucleic acid in living systems
- To introduce the importance of vitamins in human body

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Recognize water as a universal solvent and elixir of life by knowing its importance
2. Identify the properties and classification of carbohydrates
3. Recall the role of various lipids in biomembrane including signal transduction
4. Categorize the amino acids and know their properties
5. Differentiate the structure, properties and functions of DNA and RNA
6. List the functions and deficiency disease of fat and water soluble vitamins

UNIT I**Water and Carbohydrates****Water:** An introduction to biological molecules. Structure and properties of water as biomolecule.**Carbohydrates:** Monosaccharides-Classification, structures, stereochemistry and chemical reactions. Derivatives of monosaccharides. Disaccharides- Classification, structure, chemistry and function. Trisaccharides- Structure of raffinose. Polysaccharides: Storage polysaccharides- starch, glycogen and dextrin. Properties and functions of structural polysaccharides: cellulose, chitin and glycosaminoglycans (Structures not required).**UNIT II****Lipids:** Definition. Classification of lipids; Biological significance: Role of lipids in biomembranes. Simple lipids: Physical and chemical properties of fats. Compound lipids: Structure and function of phospholipids, glycolipids and lipoproteins. Derived lipids: Fatty acids- Saturated unsaturated and essential fatty acids. Sterols- structure and functions of cholesterol.**UNIT III****Amino acids:** Definition, Amino acids as ampholytes, structure and classification of amino acids, chemical reactions of amino acids due to carboxyl groups and amino groups. Unusual amino acids: Peptides: Structure and properties – Example

UNIT IV

Nucleic acids: Structure of purines and pyrimidines: nucleosides and nucleotides. DNA: Double helix; A, B, & Z forms; circular DNA and super coiling; DNA denaturation and renaturation. RNA: Types and structure of RNA, tRNA-unusual bases.

UNIT V

Vitamins: Definition, Classification, Fat-soluble and water-soluble vitamins-sources, structure and physiological functions. Minerals: Mineral requirement, essential macro minerals and essential micro minerals- sources and functions.

TEXT BOOKS

Ambika, S, 2004. Fundamentals of Biochemistry for Medical Students, CIT Chennai.

Deb A.C., 2011, Fundamentals of Biochemistry, 9th edition New Central Book Agency, Calcutta.

Jain, J.L, Sunjay Jain and Nitin Jain, 2005. Fundamentals of Biochemistry, S. Chand and Company Ltd, New Delhi.

REFERENCES

Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition WH Freeman and Company, New York.

Lubert Stryer, L. 2009, Biochemistry, W.H. Freeman and Company, New York.

Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 2012, Harper's Biochemistry, 29th edition, McGraw-Hill Medical, London.

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

Equip the students:

- On the molecular orbital theory, preparation and properties of inorganic compounds
- On the theory of covalent bond, polar effects and stereochemistry of organic compounds
- About important industrial chemicals like silicones, fuel gases
- About Fertilizers and their impact on environment
- On the elements of photochemistry, chemical kinetics and chromatography
- About the dyes, chemotherapy and vitamins

Course Outcome

After successful completion of the course, the student will:

1. Understand the molecular orbital theory, preparation and properties of inorganic compounds
2. Understand the theory of covalent bond, polar effects and stereochemistry of organic compounds
3. Have knowledge about important industrial chemicals like silicones, fuel gases
4. Know the classes of fertilizers and their impact on environment
5. Understand the elements of photochemistry, chemical kinetics and chromatography.
6. Understand about the dyes, chemotherapy and vitamins

UNIT-I**Chemical Bonding:** Molecular orbital theory-linear combination of atomic orbitals-bonding and antibonding molecular orbitals-energy level diagram-bond order- M.O. configuration of H_2 , N_2 and F_2 molecules.Diborane: Preparation, properties and structure. $NaBH_4$: Preparation and uses.

Borazole: Preparation and properties.

Interhalogen compounds: ICl , BrF_3 , IF_5 - preparation, properties, uses and structure.

Basic properties of iodine.

Compounds of sulphur: Sodium hydrosulphite- preparation, properties, uses and structure.

Per acids of sulphur: Preparation, properties, uses and structure.

UNIT-II**Industrial Chemistry:** Silicones: Synthesis, properties and uses.

Fuels gases: Natural gas-water gas-semi water gas-carbureted water gas-producer gas- oil gas (Manufacturing details not required).

Fertilizers: NPK fertilizer-ammonium sulphate-urea-superphosphate of lime-triple superphosphate- potassium nitrate-ammonium nitrate.

Pollution: Water, air and soil pollution-sources and remedies-acid rain-ozone hole-greenhouse effect.

UNIT- III**Covalent Bond and Stereoisomerism:**

Covalent Bond: Orbital overlap, hybridization and geometry of CH_4 , C_2H_4 and C_2H_2 . Polar effects: Inductive effect-electromeric effect- mesomeric effect- steric effect- hyperconjugation.

Stereoisomerism: Elements of symmetry-polarised light and optical activity-isomerism in tartaric acid-racemisation- resolution- geometrical isomerism of maleic and fumaric acids-keto-enol tautomerism of acetoacetic esters.

UNIT- IV

Dyes, Chemotherapy and Vitamins:

Dyes: Terms used chromophore, auxochrome, bathachromic shift and hypsochromic shift-classification of dyes – based on chemical structure and application-one example each for azo, triphenylmethane, vat and mordant dyes- preparation.

Chemotherapy: Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of pencillins and chloromycetin.

Vitamins: Diseases caused by the deficiency of vitamins A, B_1 , B_2 , C and D-sources of these vitamins.

UNIT- V

Elements of Photochemistry, Chemical Kinetics and Chromatography:

Elements of Photochemistry: Photochemical laws-Beer Lambert's law-Grotthuss-Draper law-Stark-Einstein law (statement only).

Chemical Kinetics: Rate-order-molecularity-pseudo first order reactions-zero order reactions-determination of order of reaction-measurement of order and rates of reactions-effect of temperature on reaction rate-energy of activation.

Chromatography: Principles and applications of Column, Paper and Thin Layer Chromatography.

TEXT BOOKS

1. V.Veeraiyan & A.N.S. Vasudevan, Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai (2005).
2. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, Shoban lal & Company Ltd., Jalandar (2002).
3. B.S.Bahl & Arun Bahl, Advanced Organic Chemistry, S.Chand & Company Ltd., New Delhi (2005).
4. Puri, Sharma & Pathania, Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar (2003).

REFERENCE

1. R.Gopalan & S.Sundaram, Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi (2003).

Instruction hours/week: L:5 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

- To know the safety measures to be followed in laboratory
- To give hands on experience on the preparation of buffers and various solutions.
- To identify and separate the biomolecules
- To quantify the vitamin in a sample
- To acquire knowledge in the quantitative estimation of biomolecules
- To know the importance of biological macromolecules

Course outcomes (CO's)

1. Gain knowledge on lab safety
2. Trained on preparation of reagents and solution
3. Able to analyse biomolecules and vitamins qualitatively
4. Able to analyse biomolecules and vitamins quantitatively
5. Able to identify different disaccharides and polysaccharides experimentally
6. Handle the instruments associated with the practical

I. Qualitative Analysis

1. Reactions of monosaccharide- Glucose, Fructose, Galactose and Pentose
2. Reactions of disaccharides and polysaccharides- Sucrose, Lactose, Maltose and Starch
3. Reactions of amino acids- Histidine, Tyrosine, Tryptophan, Methionine and Cysteine
4. Lipid Analysis- (Group Experiments)
 - a. Determination of Acid number and peroxide value
 - b. Determination of Iodine number
 - c. Determination of Saponification Number
 - d. Determination of RM number

REFERENCES

Jayaraman J, 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.

Sadasivam S and A. Manickam, 2009. Biochemical Methods, New Age International Publishers, New Delhi.

Singh.S.P. 2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction Hours/week: L: 0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objective**

To impart hands-on training on:

- Preliminary tests for identification of an organic compound
- Detection of elements
- Identification of aromatic or aliphatic compound
- Different functional groups and its nature
- Confirmatory test for aldehydes, ketones, amines and amides
- Confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Perform preliminary tests for identification of an organic compound
2. Perform and detect the elements present in the given compound
3. Identify and differentiate between aromatic and aliphatic compound
4. Identify different functional groups and its nature
5. Perform confirmatory test for aldehydes, ketones, amines and amides
6. Perform confirmatory test for carbohydrates, phenol, acids, esters and nitro compounds

Contents

Systematic analysis of an organic compound, preliminary tests, detection of elements present, aromatic or aliphatic, saturated or unsaturated, nature of the functional group, confirmatory tests– aldehydes, ketones, amines, diamide, carbohydrates, phenols, acids, esters & nitro compounds.

Note: Each student should analyse minimum 6 compounds.

REFERENCE BOOKS:

1. R. Ramasamy, Allied Chemistry Practical Book, Priya Publications, Karur (2008).
2. A.O. Thomas, Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala (2010).
3. V.Venkateswaran, R.Veerawamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi (2004).

Course Objective

- To improve the integral development of human begins
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom
- To give students a deeper understanding about the purpose of life.
- To teach and inculcate the essential qualities to become a good leader.

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Understand the importance of value based living.
2. Gain deeper understanding about the purpose of their life.
3. Understand and start applying the essential steps to become good leaders.
4. Emerge as responsible citizens with clear conviction to practice values and ethics in life.
5. Become value based professionals.
6. Contribute in building a healthy nation

UNIT – I

Concept of Self, self-awareness, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spiritualism – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOK

1. Karpagam University Study Material, 2015.

.

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை,

ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுண்ணேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோம்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது, சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்டி, மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமார்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21, India

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes (CO's):

1. Develop the four types of skills
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed
6. Betterment of language competence

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men
– Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Text

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives

Equip the students:

- On maintenance of safety documents.
- On the preparation of SOPs
- On the detection of radioisotopes
- Interpretation of virtual lab experiment
- Different methods of centrifugation (differential/density gradient)
- Determination of pKa for biological buffers using Henderson-Hasselbach equation

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Maintain safety documents.
2. Prepare SOPs
3. Detect radioisotopes
4. Interpret virtual lab experiments
5. Use different methods of centrifugation (differential/density gradient)
6. Determine pKa for biological buffers using Henderson-Hasselbach equation in a given situation

UNIT I

pH, Handerson and Hasselbach equation; measurement of pH- Glass electrode, pH scale; Buffer- buffer solutions, buffer systems of blood. pH indicators. Various ways of expressing the concentrations of solutions- molality, molarity, normality, Mole fraction, ppm, serial dilution. Simple problems to be worked out.

UNIT II

Chromatography: Principle- partition co-efficient. Types- paper chromatography, TLC, adsorption, ion exchange, molecular sieve and affinity chromatography.

Electrophoresis- Principle, instrumentation and applications of paper electrophoresis, agarose gel electrophoresis, PAGE.

UNIT III

Centrifugation: Principle and technique of preparative and analytical centrifuge. Types of centrifuge, types of rotors, centrifugation types- Density gradient and differential centrifugation- Separation of cell organelles.

Radio active Isotopes: Radioactive decay, units of radio activity, detection and measurement of radioactivity- Geiger-Muller counter, Scintillation counter, Autoradiography, biochemical applications of radio isotopes.

UNIT IV

Colorimetry: Colour and absorption spectra. Beer Lambert's law- deviation from Beer's law. Working of single cell photoelectric colorimeter. Measurement of extinction. Calibration curve.

Spectrophotometry: Principle, instrumentation and applications of double beam spectroscopy, spectro fluorimetry, mass spectroscopy and atomic absorption spectroscopy, comparison and advantages of spectrophotometer over colorimeter.

UNIT V

Nanotechnology: Introduction and Approaches to nanomaterials fabrication (Bottom up and Top down assembly), MEMS and NEMS-introduction and its applications, Carbon nano structures-Carbon Nano tubes fibers & Crystals-applications, DNA to build nanotubes, DNA as smart glue and DNA as wire template. Applications of Nanotechnology in medicine and biology.

TEXT BOOKS

Gopalan.R, P.S, Subramanian and K. Rangarajan. 2003. Elements of Analytical Chemistry, Sultan Chand and Sons, New Delhi.

Sharma. B. K. 2004. Instrumental Methods of Chemical Analysis, GOEL Publishers, Meerut.

Merrit W.1986. Instrumental Methods of Analysis, CBS Publishers, New Delhi.

REFERENCES

Chatwal Anand. 2003. Instrumental Methods of Chemical Analysis, Himalaya Publishing House, Hyderabad.

David T, Plummer. 2002.An Introduction to Practical Biochemistry, McGraw Hill Publishing Company, New Delhi.

Frank.J, Owens. 2007. Introduction to Nanotechnology. Wiley publications, Washington, United States .

Wilson K, and Walker J, 2004. Practical Biochemistry- Principles and Techniques, Cambridge University Press, London.

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives

Equip the students:

- To be conversant with the extraction of metals
- About coordination chemistry
- On the preparation, properties, uses and structure of naphthalene and heterocyclic compounds
- To acquire knowledge on electrochemistry, biological functions of amino acids and proteins
- To acquire knowledge on thermodynamic laws, entropy, enthalpy change and the principles of electroplating
- To acquire knowledge on aromatic and heterocyclic compounds

Course Outcomes (CO's)

After successful completion of the course, the student will understand:

1. The metallurgy of metals and the theories of coordination compounds and
2. The industrial importance of EDTA, haemoglobin and chlorophyll
3. The concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds
4. The preparation, classifications and properties of amino acids, proteins and carbohydrates
5. The concepts of first and second laws of thermodynamics
6. The fundamentals of electrochemistry

UNIT-I**Metals and Coordination Chemistry:**

Metals: General methods of extraction of metals-methods of ore dressing-types of furnaces-reduction methods-electrical methods-types of refining-Van Arkel process-Zone refining.

Coordination Chemistry: Nomenclature-theories of Werner, Sidgewick and Pauling-chelation and its industrial importance-EDTA-haemoglobin-chlorophyll-applications in qualitative and quantitative analysis.

UNIT-II**Aromatic Compounds and Heterocyclic Compounds:**

Aromatic Compounds: Aromaticity-Huckel's ($4n+2$) rule- aromatic electrophilic substitution in benzene- mechanism of nitration, halogenation, alkylation, acylation and sulphonation.

Naphthalene: Isolation, preparation, properties and structure.

Heterocyclic Compounds: Preparation and properties of pyrrole, furan, thiophene and pyridine.

UNIT-III**Amino acids, Proteins and Carbohydrates:**

Amino acids: Classification, preparation and properties. Peptides-preparation of peptides (Bergmann method only).

Proteins: Classification, properties, biological functions and structure.

Carbohydrates: Classification, preparation and properties of glucose and fructose- discussion of open chain and ring structures of glucose and fructose-glucose-fructose interconversion.

UNIT-IV

Energetics: Type of systems-processes and their types - isothermal, adiabatic, reversible, irreversible and spontaneous processes-statement of first law of thermodynamics-need for the second law of thermodynamics-heat engine-Carnot cycle-efficiency-Carnot theorem-thermodynamics scale of temperature-Joule-Thomson effect- Enthalpy- Entropy and its significance-Free energy change.

UNIT-V

Electrochemistry: Kohlrausch law-conductometric titrations-hydrolysis of salts-galvanic cells-E.M.F.-standard electrode potentials-reference electrodes- electrochemical series and its applications-buffer solution-buffer solution in the biological systems-pH and its determination-principles of electroplating.

TEXT BOOKS

1. V.Veeraiyan & A.N.S. Vasudevan, Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai (2005).
2. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, Shoban lal & Company Ltd., Jalandar (2002).
3. B.S.Bahl & Arun Bahl, Advanced Organic Chemistry, S.Chand & Company Ltd., New Delhi (2005).
4. Puri, Sharma & Pathania, Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar (2003).

REFERENCES

1. R.Gopalan & S.Sundaram, Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi (2003).

Instruction hours/week: L:0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

To impart hands-on training:

- On the strength of concentrated acids
- On serial dilution of concentrated solutions
- How to determine the molar extension coefficient?
- How to obtain UV spectrum for a given compound?
- How to quantify nucleic acids using spectrophotometer?
- How to estimate the purity of nucleic acids

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Know the strength of laboratory acids and bases
2. Prepare serial dilution of concentrated solutions
3. Determine the molar extension coefficient
4. Obtain UV spectrum for a given compound
5. Quantify nucleic acids using spectrophotometer
6. Assess the purity of nucleic acids

I. Quantitative estimation of the following in unknown solution.

1. Estimation of glucose (Anthrone method)
2. Estimation of phosphorus (Fiske-Subbarow method)
3. Estimation of urea (Dam TSC method)
4. Estimation of uric acid (Caraway method)
5. Estimation of iron (Wong's method)
6. Estimation of protein (Lowry's method)
7. Estimation of DNA (Diphenylamine method)
8. Estimation of RNA (Orcinol method)

II. Preparation of buffers and measurement of pH using indicators and pH meter**III. Separation techniques (Group experiments)**

1. Paper chromatography of sugars or amino acids (ascending)
2. Separation and identification of amino acids from mixture using TLC
3. Separation of plant pigments by column chromatography
4. Separation of amino acids by paper electrophoresis

REFERENCES

Harold Varley. 2005. Practical Clinical Biochemistry, CBS Publishing, New Delhi.

Jayaraman J. 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.

Sadasivam S and A. Manickam. 2009. Biochemical Methods, New Age International Publishers, New Delhi.

Singh.S.P.2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction hours/week: L:0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

To impart hands-on training on:

- Estimation of sodium carbonate and sodium hydroxide
- Estimation of sulphuric acid
- Estimation of potassium permanganate
- Estimation of ferrous sulphate using permanganometry
- Estimation of oxalic acid using permanganometry
- Estimation of calcium using permanganometry

Course Outcomes (CO's)

After successful completion of the course, the student will:

1. Estimate sodium carbonate and sodium hydroxide using standards
2. Estimate sulphuric acid using standard oxalic acid
3. Estimate potassium permanganate by alkalimetry method
4. Estimate ferrous sulphate using standard Mohr's salt
5. Estimate oxalic acid using standard ferrous sulphate
6. Estimate calcium using direct method

Contents**I. VOLUMETRIC ANALYSIS****A. Acidimetry & Alkalimetry**

1. Estimation of sodium carbonate using standard sodium hydroxide.
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of sulphuric acid using standard oxalic acid.
4. Estimation of potassium permanganate using standard sodium hydroxide.

B. Permanganometry

1. Estimation of ferrous sulphate using standard Mohr's salt.
2. Estimation of oxalic acid using standard ferrous sulphate.
3. Estimation of calcium-direct method.

REFERENCE BOOKS:

1. R. Ramasamy, Allied Chemistry Practical Book, Priya Publications, Karur (2008).
2. A.O. Thomas, Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala (2010).

3. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition, S. Chand Publications, New Delhi (2004).

Course Objectives

Equip the students:

- To understand the concepts and components of ecosystem
- To understand the significance of eco components and measures to maintain ecosystem
- To teach the ethical and legal perspectives on ecosystem management
- To understand the undesired effects of environmental pollution
- To devise a strategy to avoid environmental pollution
- To understand the concept of conservation

Course Outcomes (CO's)

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Understand the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources.

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabililisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.
- 1.
2. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
3. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
4. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton,
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

15SSD101	SOFT SKILL DEVELOPEMENT -I	Semester-II
		2H -1C
Instruction hours/week: L:2 T:0 P:0		Marks: Internal: 100 External: - Total: 100
		End Semester Exam: 3 Hours

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes (CO's):

1. Develop the four types of skills
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed
6. Betterment of language competence

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

REFERENCES

Language in Use: Kenneth Anderson, Cambridge University Press.

Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.

Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.

Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- The course exhibits in depth knowledge on its structural organization, separation, purification and characterization of proteins by adopting various methods and techniques.
- The course also describes about some applications of specialized proteins.
- To study the kinetics of enzyme catalysed reactions
- To learn the mechanism of action of enzymes and enzyme inhibition concepts
- To understand various modes of enzyme regulation
- To learn the application of enzymes in health and diseases

Course outcomes (CO's)

1. The student gathers information on protein structure, its separation techniques and other latest developments.
2. Information on specialized proteins and its application will be known to the students.
3. Understand the basic concepts on enzymes
4. Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions
5. Relate the regulation pattern of enzymes for its application in health and diseases
6. Understand the application of enzymes as marker in various disease conditions

UNIT I

Protein-Introduction, classification, protein-structure: strong and weak bonds; primary structure- insulin, secondary structure- collagen and keratin, tertiary and quaternary structure - myoglobin and hemoglobin.

UNIT II

Protein- Properties and biological importance of proteins. Peptides – primary structure of biologically active peptides- Glutathione, Oxytocin and Vasopressin. Extraction, purification and characterization of protein. Denaturation and renaturation of protein. Identification of N and C terminal residues of proteins.

UNIT III

Enzymes - Introduction, classification, nomenclature and properties of enzymes. Active site, Lock and key and induced-fit theories, specificity of enzymes. Enzyme activity; units of enzyme activity-international unit, turnover number, specific activity. Factors affecting enzyme activity.

UNIT IV

Enzyme Kinetics - Derivation of Michaelis- Menton equation, Definition of k_m , LB plot and Eadie and Hofstee plot. Enzyme inhibition-types and differentiation of competitive, uncompetitive, non-competitive inhibitors (Derivation is not needed), allosteric and covalent

modification. Coenzymes- structure and properties of TPP, coenzyme A, flavin coenzyme, Nicotinamide coenzymes, biotin and lipoic acid.

UNIT V

Application of enzymes- Industrial enzymes, Immobilized enzymes-sources, preparation techniques and application. Clinical application of enzymes. Biosensors-colorimetric, potentiometric, optical and immunosensors.

TEXT BOOKS

Trevor and Palmer, 2004. Enzymes, East West Press Pvt Ltd, New Delhi.

Chapline M.F, and C.Bucke.1990. Protein Biotechnology, Cambridge University Press, London.

Vidhya V.G, B Anusha. 2009. Enzyme Technology, Mjp Publishers, India.

REFERENCES

Gary Walsh. 2014. Proteins Biochemistry and Biotechnology, 2nd edition, John Wiley & Sons Ltd, New York.

Glazer A.N, H.Nikaido. 2007. Fundamentals of Applied Microbiology. 2nd edition, W H. Freeman Company, NewYork.

Nicholas C. Price and Lewis Stevens. 2004. Fundamentals of Enzymology, 3rd Edition, Oxford Univ. Press, New York.

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course objectives**

Equip the students with:

- To understand the basic structure of prokaryotic cell and model organism for its study
- To understand the basic structure of eukaryotic cell and model organism for its study
- To know the tools required for studying cell morphology
- To enlight the students with structure and functions of various organelle
- To understand the cytoskeletal network and extracellular matrix
- To introduce the cell cycle, cell division and cell death process

Course outcomes (CO's)

After successful completion, the students will:

1. Differentiate the prokaryotic and eukaryotic cell
2. Understand the principle behind studying the cell morphology using various microscope
3. Identify the structure and functions of each organelle in cell
4. Recognise the mechanism behind the protein sorting and transport to their destinations like lysosome, mitochondria and chloroplast
5. Maintenance of cytoskeleton structure and function of micro, macro and intermediary filaments
6. Identify the proteins involved in cell cycle and cell cell interaction

UNIT-I

An overview of cells: Origin and evolution of cells. Cell theory, Classification of cells: prokaryotic cells, eukaryotic cell; comparison of prokaryotic and eukaryotic cells. Molecular composition of cell.

UNIT-II

Cell membrane: Fluid mosaic model of membrane structure. Membrane lipids-properties; Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes -Diffusion, active and passive transport, endocytosis and ion channels

UNIT-III**Cell organelles**

Mitochondria: - Structure and functions, Electron transport complexes.

Endoplasmic reticulum: Types, structure and functions. **Golgi apparatus:** structure and functions. **Lysosomes:** structure and functions, morphology and functions of peroxisomes and glyoxysomes.

UNIT-IV

Nucleus: - Structure and functions. Nuclear envelope and Nucleopore complex-structure. Selective import of protein to nucleus

Nucleolus: Ribosomal RNA genes. Chromosomes: chromatin structure.

Cell cycle: Phases of cell cycle, cell cycle check points. Cell division- Mitosis and meiosis. Nucleus during mitosis.

UNIT-V

Cytoskeleton: Micro, macro and intermediary filaments-structure and functions. Micro tubules: chemistry and functions; cilia and flagella.

Cell signalling – Signalling molecules & Receptors (over view)

Cell–cell interaction – cell adhesion protein, tight junction, gap junction.

TEXT BOOKS

Ajay Paul. 2007. Text Book of Cell and Molecular Biology, 1st edition. Books and Allied (P) Ltd, Kolkata.

P.S.Verma and V.K.Agarwal. 2005. Cell Biology Molecular Biology and Genetics, VII Edition, S.Chand and company Ltd, New Delhi.

R.M.Shukla. 2013. A textbook of Cell Biology, Dominant Publishers and Distributors.

C.B.Powar, 2001. Cell Biology, 3rd edition, Himalaya Publishing House.

REFERENCES

Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger. 2012. Molecular Cell Biology, 7th edition. W.H. Freeman & Company, London.

Garrette & Grisham. 2004. Principles of biochemistry, 4th edition. Saunders college publisher, Philadelphia, United States.

Geoffrey M. Cooper and Robert E. Hausman 2013. Cell-A Molecular Approach, 6th Edition.. Sinauer Associates. USA

Gerald Karp 2013. Cell and Molecular Biology, 7th edition. John Wiley and Sons, Inc, Hoboken, United States.

Instruction hours/week: L:5 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Equip the students with:

- Origin of microbiology field and theories
- Diverse nature of microbial organisms
- Life cycle of viruses
- Life cycle of bacteria
- Life cycle of algae
- Life cycle of fungi and protozoa

Course outcomes (CO's)

After successful completion, the students will understand:

1. Origin of microbiology field and theories
2. Diverse nature of microbial organisms
3. Life cycle of viruses
4. Life cycle of bacteria
5. Life cycle of algae, fungi and protozoa
6. Emerging microbial threats

UNIT I

Basics of Microbiology: Bacteria- size, shape and arrangement of bacterial cells. Bacterial cell wall structure and chemical composition. Flagella and motility, pili (fimbriae) capsules and spores. Bacterial reproduction and nutrition. Algae- occurrence, biological and economic importance of algae. Characteristics of algae and classification. Fungi- Importance of fungi, morphology, reproduction- asexual and sexual.

UNIT II

Microscopy: Introduction, Bright field microscopy, Dark field microscopy, Phase contrast microscopy, TEM, SEM.

Techniques of Microbiology: Sterilization techniques, pure culture methods. Methods of preservation and maintenance. Staining- simple, Gram, acid fast, endospore and flagella. Microbial growth- determination of growth curve and generation time.

UNIT III

Virology: Viruses- Morphology and structure- types of phages, phage structure, replication of bacterial viruses- adsorption, penetration, transcription, assembly and release. Lysogeny- mechanism of lysogeny. Retroviruses: HIV- AIDS virus working of immune system in the presence of HIV, replication in target cell. Mechanism of oncogenesis.

UNIT IV

Microbial diseases: Host parasite interaction, exo and endotoxins. Food and water borne diseases- pathogenesis and symptoms of typhoid, cholera, bacillary dysentery and hepatitis. Air borne diseases- Aetiology, symptoms and prevention of TB, chickenpox and influenza. Direct contact diseases- and symptoms of rabies and leprosy.

UNIT V

Applied microbiology: Water microbiology- bacteriological examination of water, sewage treatment. Industrial microbiology- design of fermenter, types of fermentation- solid- state and submerged fermentation, batch culture and continuous culture. Production of penicillin, citric acid and amino acids.

TEXTBOOK

Powar.C.B and H.F.Dahinwala.2007.General Microbiology, Himalaya Publishing house, Mumbai.

REFERENCES

Prescott.L,J. Harley and D. Klein .2007.Microbiology, 7th edition McGraw Hill Publishers, London.

Pelzar.A .2004.Microbiology, McGraw Hill Publishers, London

Course objectives

Equip the students with

- Concepts of nutrition
- Calorific value of carbohydrates, fats and proteins
- Recommended dietary allowances
- Nutrition as a strategy to prevent diseases
- Nutrition deficiency disorders
- Food drug interactions

Course outcomes (CO's)

After successful completion, the students will understand

1. Concepts of nutrition
2. Calorific value of carbohydrates, fats and proteins
3. Recommended dietary allowances
4. Nutrition as a strategy to prevent diseases
5. Nutrition deficiency disorders
6. Food drug interactions

UNIT-I

Energy- Definition of kilocalories, joule, energy value of foods, physiological fuel values, SDA of foods, determination of energy requirement of body, basal metabolic rate-determination, factors influencing BMR. Definition for normal and balanced diet. Calorie requirement of adults, children and old age people. Recommended dietary allowances (RDA) –ICMR Different food groups.

UNIT-II

Carbohydrates- Functions, Sources, requirement, Hyperglycemia, hypoglycemia, Protein- functions, sources and requirement, Definition of Biological Value, NPU, Digestibility coefficient. PER-definition and measurement

UNIT-III

Lipids- Functions, sources, requirement, digestion, absorption and utilization importance of essential fatty acids, their requirements and deficiency. Vitamins and Minerals: normal requirements, excess, deficiency, Significance.

UNIT-IV

Therapeutic diet - Principles of therapeutic diet, modifications of normal diet, different types of diet, difference between normal and therapeutic diet. Objectives of diet therapy. Principles of diet preparation and counseling. Diet in allergy- definition, common food allergy tests of allergy

and dietetic treatment. Diet in Diabetes, Allergy, Anemia, GI tract disorders, liver disorders and obesity.

UNIT-V

General principles and methods of food preservation: Preservation with chemicals-Microbial inhibitors, inorganic preservatives, antibiotics, mold inhibitors and antioxidants.

REFERENCES

Gordon M, Wardlaw and Paul M. 2012. Perspectives in Nutrition: U.S.A. McGraw Hill Publishers. 9rd Edition. New Delhi

Srilakshmi.B. 2015 Food Science:. New Age International (P) Ltd. Publishers. 6nd Edition., New Delhi

Srilakshmi.B. 2014 Nutrition Science: New Age International (P) Ltd. Publishers.4th Edition. New Delhi.

Swaminathan.M. 2008. Essential of Food and Nutrition Vol II The Bangalore Printing and Publishing Co. Ltd., Bangalore.

15BCU303C ALLIED ELECTIVE I-FOOD PRESERVATION TECHNOLOGY

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Equip the students with

- Concepts of nutritional preservation methods
- Principles of food processing
- Microbiology of food
- Packaging techniques
- Calorific value of carbohydrates, fats and proteins assessment in preserved samples
- Legislations related to food storage

Course outcomes (CO's)

After successful completion, the students will understand

1. Concepts of nutrition
2. Calorific value of carbohydrates, fats and proteins
3. Recommended dietary allowances
4. Nutrition as a strategy to prevent diseases
5. Nutrition deficiency disorders
6. Food drug interactions

UNIT I:

Microbiology of Food: History of microbiology of food. Types of micro-organism normally associated with food -mold, yeast, and bacteria, Microbial growth pattern, physical and chemical factors influencing destruction of micro-organisms. Micro-organisms in natural food products and their control mechanisms. Food chemistry- definition and importance

UNIT II:

Principles of Food Processing: Principles of Preservation methods. Dehydration: Novel evaporation /dehydration techniques, spray drying. Vacuum drying- osmotic dehydration - efficient drying systems, **High salt and high sugar preservations**, infrared heating Freezing of foods, freeze concentration and drying, methods of freeze concentration. High Temperature operations, sterilization and Pasteurization.

UNIT III:

Types of Preservation Technology: Microwave Processing: Microwave, properties, heating mechanism. Applications of microwave in food processing, effect of microwave on food nutrient. Food Irradiation Technology: General aspects of irradiation, ionizing radiation, irradiation process, units, mechanism, advantages and disadvantages of irradiation process. Ultrasound in food processing and preservation: Introduction and its application in food processing.

UNIT IV:

Food Packaging: Introduction to packaging. Packaging operation, package-functions and design. Principle in the development of protective packaging. Deteriorative changes in foodstuff and packaging methods for prevention, shelf life of packaged foodstuff, methods to extend Shelf-life. Evaluation of packaging, and package performance, packaging equipment, package standards and regulation, bar coding material. Biodegradable packaging.

UNIT V:

Food Quality and Food Laws: Objectives, Importance and functions of quality control. Methods of quality, assessment of food materials-fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products. Sanitation and hygiene - Integrated Food Laws

TEXT BOOKS:

Barbosa-Canovas, G.V., & Gould, G.W. 2000. "Innovation in Food Processing". Technomic Publication, Lancaster, UK:

William C. Frazier & Dennis C Westhoff. 2008. "Food Microbiology" Fourth Edition, Tata McGraw-Hill Education Publication, India.

REFERENCES:

Bibek Ray., (2003) "Fundamental Food Microbiology", 3rd edition. CRC Press LLC, N.W. Corporate Blvd., Boca Raton, Florida 33431.

Precott, Harley. 2004. "Microbiology" Sixth edition, McGraw-Hill Science, New York
Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton. 2001. "Industrial Microbiology: An Introduction", Blackwell Science, oxford, UK

Vijaya Ramesh K. 2007. "Food microbiology". First Edition MJP Publishers, 2007.

Instruction hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Equip the students:

- To understand the basic concepts of enzymes
- To study the kinetics of enzyme catalysed reactions
- To learn the mechanism of action of enzymes and enzyme inhibition concepts
- To understand various modes of enzyme regulation
- To learn the application of enzymes in health
- To learn the application of enzymes in diseases

Course outcomes (CO's)

After successful completion of the course, the student will:

1. Understand the basic concepts on enzymes
2. Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions
3. Understand the basis of enzyme inhibitor drugs
4. Be able to understand the regulation pattern of various enzymes
5. Relate the regulation pattern of enzymes for its application in health and diseases
6. Understand the application of enzymes as marker in various disease conditions

1. Enzyme kinetics

(a) Acid Phosphatase

- (i) Preparation of crude enzyme extract from potato
- (ii) Effect of pH on the activity of acid phosphatase
- (iii) Effect of temperature on the activity of acid phosphatase
- (iv) Effect of enzyme concentration on the activity of acid phosphatase
- (v) Effect of substrate concentration on the activity of acid phosphatase

(b) Catalase

- (i) Preparation of crude enzyme extract from Chow-Chow
- (ii) Effect of pH on the activity of catalase
- (iii) Effect of temperature on the activity of catalase
- (iv) Effect of enzyme concentration on the activity of catalase
- (vi) Effect of substrate concentration on the activity of catalase

2. Estimation of salivary amylase activity

3. Assay the activity of

- (i) SGOT in serum
- (ii) SGPT in serum
- (iii) Alkaline phosphatase in serum

REFERENCES

Harold Varley.2003. Practical Clinical Biochemistry, CBS Publishers, New Delhi.

Jayaraman J ,2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.

Sadasivam S,and A. Manickam ,2009. Biochemical Methods, New Age International Publishers, New Delhi.

Singh.S.P.2009. Practical Manual of Biochemistry”, CBS Publishers, New Delhi.

Instruction hours/week: L:0 T:0 P:3

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**Course objectives**

To impart hands-on training on

- Sterilization methods
- Autoclave, filtration techniques
- Preparation of microbial culture media
- Assessment of bacterial strains
- Pure cultures using streaking methods
- Colony counting

Course outcomes (CO's)

After successful completion, the students will understand

1. Sterilization methods
2. Autoclave, filtration techniques
3. Preparation of microbial culture media
4. Assessment of bacterial strains
5. Pure cultures using streaking methods
6. Colony counting

Microbiology

1. Student's microscope- parts.
2. Sterilization techniques.
3. Preparation of liquid and solid culture media.
4. Agar slant, agar deep, agar plates: culture characteristics.
5. Pure culture techniques- Pour plate and streak plate method.
6. Motility test- Hanging drop preparation.
7. Growth curve of *E. coli*.
8. Enumeration of microbial population of soil, milk and water.
9. Staining methods- simple, Grams, endospore, negative and fungal staining.
10. Characterization of microbial cultures- carbohydrate fermentation- glucose, sucrose and lactose, IMVIC test of enteric bacteria.
11. Antibiotic sensitivity test.

REFERENCES

Kannan N, 2003. Laboratory Manual in Microbiology, Panima Publishing Corporation, Bangalore.

Sadasivam S, and A. Manickam, 2009. Biochemical Methods, New Age International Publishers, New Delhi.

Instruction hours/week: L:0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives**

To impart hands-on training on:

- Content analysis of food sample
- Estimation of carbohydrates, fats and proteins
- Estimation of aminoacids in good grains
- Estimation of vitamins in fruits
- Analysis of milk and milk products
- Estimation of iron

Course outcomes (CO's)

1. Content analysis of food sample
2. Estimation of carbohydrates, fats and proteins
3. Estimation of aminoacids in good grains
4. Estimation of vitamins in fruits
5. Analysis of milk and milk products
6. Estimation of iron

Experiments:

1. Determination of moisture content of food sample
2. Determination of ash content of food sample
3. Estimation of total carbohydrates in potato.
4. Estimation of crude fibre in food.
5. Estimation of oil content in oil seeds.
6. Estimation of free fatty acids in oil seeds.
7. Estimation of crude protein in food sample.
8. Estimation of methionine in food grains.
9. Estimation of ascorbic acid in citrus fruit.
- 10) Analysis of milk and milk products-
 - i. Lactose content of milk
 - ii. Calcium content in milk.
11. Estimation of iron in apple juice.

REFERENCES

1. Jayaraman J. 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
2. Sadasivam S and A. Manickam. 2009. Biochemical Methods, New Age International Publishers, New Delhi.
3. Singh.S.P.2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction hours/week: L:0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives**

To impart hands-on training on:

- Food packaging technology
- Evaluating the tensile strength of packaging materials
- Analysis of colliform microbes
- Analysis of fungal contamination
- Analysis of food adulteration
- Determining the shelf life of packaged food

Course outcomes (CO's)

1. Food packaging technology
2. Evaluating the tensile strength of packaging materials
3. Analysis of colliform microbes
4. Analysis of fungal contamination
5. Analysis of food adulteration
6. Determining the shelf life of packaged food

1. Preparation of syrups, Grape squash and orange squash.
2. Water vapor transmission rate of different packaging materials
3. Determination of migration characteristics of packaging materials
4. Determination of migration characteristics of packaging materials using different simulants
5. Determination of bacterial counts of polymer – packed foods during storage
6. Determination of tensile strength of given packaging material
7. Determination of bursting strength of given packaging material
8. Determination of coliforms and fungal counts of polymer – packed foods during storage
9. Microwave and radiation preservation of meat, poultry and fish
10. Identification and chemical resistance of plastic films.
11. Estimation of shelf-life of packaged food stuff.
12. Detection of adulteration in foods.

TEXT BOOKS

Coles, R., Dowell, D.M., Kirwan, J. 2003. Food Packaging Technology. Black Well Publishing Ltd., 2003.

Plummer, D.T. 1971. An Introduction to Practical Biochemistry. Mc-Graw Hill Pub.Co., New York.

Raghuramulu, N, Madhavan Nair, K , and Kalyanasundaram, S. 1983. A Manual of Laboratory Techniques. National Institute of Nutrition, ICMR, Hyderabad.

REFERENCES

ShafiurRahman M. 2006. Handbook of Food Preservation. Marcel Dekker Publisher, Inc.NY.

Stanburry P.P. and Whitaker, A. 1984. Principles of Fermentation Technology.Pergamon Press, Oxford UK.

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 100 External: - Total: 100****End Semester Exam: 3 Hours****Course objectives****Equip the students with :**

- Know the basic concept of computers.
- Input/Output systems
- Understand the concept of MS-word, MS-Excel.
- Be able to work in MS-PowerPoint.
- Knowledge about internet and the usage of E-Mail services.
- Search engines

Course outcomes (CO's)**After successful completion, the students will understand:**

1. Basic concepts of computer
2. Input/Output systems
3. Working with MS-word, MS-Excel.
4. The presentation of data using MS-PowerPoint.
5. About internet and the usage of E-Mail services.
6. Search engines

UNIT-I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers-the computer system- types of Input/ Output and memory devices-computer software-categories of software.

UNIT-II

Starting with MS Office Word – Working with Text – working with tables-Checking spelling and grammar- adding graphics to document- Mail merge- printing a document – Advanced features of MS Office Word- Keyboard shortcuts.

UNIT III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

UNIT IV

Starting with MS Office PowerPoint – Working with PowerPoint- Working with different views-Designing Presentations- Slide Show.- Printing in PowerPoint.

UNIT-V

The Internet-Evolution of Internet-Owner of Internet- Anatomy of Internet – Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

TEXT BOOK

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions.2011. Pearson, New Delhi.

REFERENCES

1. Pradeep K.Sinha , Priti Sinha. Computer Fundamentals, 2007, 6th Edition BPB Publications, New Delhi.
2. Rajaraman V. 2003.Fundamentals of Computers, Prentice-Hall Of India Pvt. Limited, Chennai.
3. Wallace Wang. Microsoft Office 2007 For Dummies,1st Edition Wiley Publishing Inc.

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 100 External: - Total: 100
End Semester Exam: 3 Hours**Course objectives**

- To acquire basic knowledge on Multimedia devices.
- To understand current trends in multimedia by experiencing a variety of applications and development packages.
- To identify a range of concepts, techniques and tools for creating and editing the interactive multimedia applications.
- To identify the current and future issues related to multimedia technology.
- To identify both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary hardware and software technologies.

Course outcomes (CO's)

After successful completion, the students will

- Define what is multimedia.
- Discuss the effects of multimedia in your daily life.
- Identify five multimedia components.
- Explain why multimedia is so powerful to increase human-computer interaction.
- Examine multimedia applications in several areas.
- Understand analog and digital conversion process

UNIT - I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT - II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT - III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images – Tagging images - Searching for images - Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT - IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects.

UNIT - V

Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks. Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic ActionScript concepts: ActionScript basics – Data type basics.

TEXT BOOKS

1. Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill . (Unit I, Unit II)
2. Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill. (Unit III)
3. Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press. (Unit IV, Unit V)

REFERENCES

1. Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, Tata McGraw-Hill.
2. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, Dream Tech Press, New Delhi

.

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes (CO's):

1. Develop the four types of skills
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed
6. Betterment of language competence

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCES

Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.

Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Instruction hours/week: L:6 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives**

Equip the students:

- On the concept of homeostasis
- On the physiological functioning of cardiovascular system
- On the physiological functioning of renal system
- On the physiological functioning of gastro-intestinal and hepatic system
- On the physiological functioning of muscular skeletal system
- On the physiological functioning of reproductive system

Course outcomes (CO's)

After successful completion of the course, the student will:

1. Understand the concept of homeostasis
2. Understand the physiological functioning of cardiovascular system
3. Understand the physiological functioning of renal system
4. Understand the physiological functioning of gastro-intestinal and hepatic system
5. Understand the physiological functioning of muscular skeletal system
6. Understand the physiological functioning of reproductive system

UNIT I

Blood: composition and functions; RBC-Hemoglobin, Hemopoiesis, Leukocytes, and Platelets; Blood coagulation mechanism; blood groups and blood transfusion.

Body Fluids: ECF and ICF: Ionic composition of body fluids; body buffers

UNIT II

Digestive system: Introduction to digestive system, secretion of digestive juices; digestion and absorption of carbohydrates; proteins; and fats.

Respiratory system: Diffusion of gases in lungs, transport of oxygen from lungs to tissues through blood, factors influencing the transport of oxygen. Transport of CO₂ from tissues to lungs through blood, factors influencing the transport of CO₂.

UNIT III

Physiology of vision: Structure of eye; Receptor mechanisms of eye: Photo pigments, visual cycle and colour adaptation.

Skeletal muscle: Structure and properties Myosin, actin and regulatory proteins, sarcomere unit; mechanism of contraction of muscle fiber

Circulatory systems: Introduction, functions of circulation, heart as a pump, special junctional tissue of the heart, cardiac cycle (only the normal values), definition of Blood pressure, physiological variation and significance of blood pressure and factors controlling blood pressure.

UNIT IV

Nervous system: Structure of Neuron, resting and action potential, propagation of nerve impulses, structure of synapse, Synaptic transmission (electrical and chemical theory)

Structure of neuromuscular junction and mechanism of neuro muscular transmission, Neuro transmitters-Acetyl choline, GABA,

Kidney: Structure of nephron; composition and mechanism of urine formation; micturition; renal regulation of acid-base balance.

UNIT V

Male reproductive system: structure and functions of testis. Spermatogenesis, causes of male infertility.

Female reproductive system: structure of ovaries; ovarian cycle and menstrual cycle. Pregnancy and lactation. Causes of female infertility

TEXTBOOKS

Chatterjee.C.C .2012. Human Physiology, 11th edition, Mical Alli Agency, Calcutta.

Saradha S.2004. Textbook of Human Physiology, S. Chand and Company, New Delhi.

REFERENCES

Guyton C and J.E Hall. 2010. Textbook of Medical Physiology, 12th Editon. Prism Indian edition, W.B. Saunders Company, New Delhi.

Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell. 2012. Harper's Illustrated Biochemistry. 29th edition, McGraw Hill and London.

Instruction hours/week: L:6 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Equip the students on:

- The fundamentals of hormones and receptors
- Different mechanisms of hormonal actions
- Understanding of physiological and biochemical actions of hypothalamic, thyroid and pituitary hormones
- The role and applications of gastrointestinal hormones
- Understanding the clinical significance of adrenal and gonadal hormones
- Understanding of various endocrine disorders

Course outcomes (CO's)

After successful completion of the course, the student will:

1. Gain knowledge on functions, classification and transport of hormones
2. Understand the role of secondary messengers, effector systems and protein kinases, tyrosine kinases in hormonal action
3. Have knowledge on the biochemical action and regulation of various endocrine hormones
4. Understand the role and applications of gastrointestinal hormones
5. Have knowledge on the role and functions of adrenal and gonadal hormones
6. Be able to identify an endocrine disorder if symptoms are available

UNIT I

Hormones – Introduction, classification of hormones, chemical structure (any two for each classes). Mechanism of hormone action –Receptors: Nuclear receptors and modification of gene expression; Cytosolic hormone receptors; plasma membrane receptors and second messengers-cAMP, cGMP, Ca^{2+} and IP_3 .

Hormonal regulation of physiological processes (Basic concepts with special reference to carbohydrate)

UNIT II

Endocrine hypothalamus- Hypothalamic-pituitary axis, hypophysiotropic hormones, mechanism of action. Pituitary hormones - anatomy of pituitary gland, Hormones of the pituitary-Adenohypophysis and Neurohypophysis -Roles and mechanism of action, pathophysiology. Neuro hormones-functions. Growth hormones: somatotropins and somatomedins –role and pathophysiology

UNIT III

Thyroid gland – synthesis and chemistry of hormones , physiological roles and pathophysiology.

Parathyroid gland- synthesis, chemistry , metabolism and physiological roles .

melanotropic hormones - chemistry, mechanism of action, pathophysiology

Endocrine role of pineal gland

UNIT IV

Gastro intestinal hormones; Endocrine pancreas- insulin , glucagons , somatostatin . pancreatic peptide- chemistry, mechanism of action and physiological roles.

Adrenocortical hormones - source , chemistry, physiological role and pathophysiology.

Adrenal medullary hormones - source, chemistry, physiological role and pathophysiology.

UNIT V

Hormones of male reproductive system -source, chemistry, physiological role, mechanism of action and pathophysiology.

Hormones of female reproductive system- chemistry, physiological role, mechanism of action and pathophysiology.

Endocrinology of pregnancy, parturition and lactation. Human infertility – reasons, therapy and treatments.

Endocrine role of heart and kidney

TEXT BOOK

Madhavan Kutty K, Singh H.D, Sarada Subramanyam, 2012. Text Book of Human Physiology, 6th Edition, S Chand & Co., Pvt., Ltd, New Delhi

REFERENCES

Guyton C. and John E. Hall, 2015. Textbook of Medical Physiology. 13th edition. Saunders Publishing. Philadelphia, USA.

White A., Handler P., and Smith E. L. 2010. Principles of biochemistry: Vol II 5th Edition, McGraw-Hill Kogakusha Ltd., New Delhi

Instruction hours/week: L:0 T:0 P:5**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives**

Equip the students with:

- Mitotic stages in onion root
- Cell viability analysis using trypan blue
- Separation of sub cellular organelles
- Basics of histopathology
- Analysis of blood
- Urine analysis

Course outcomes (CO's)

After successful completion, the students will understand:

1. Mitotic stages in onion root
2. Cell viability analysis using trypan blue
3. Separation of sub cellular organelles
4. Basics of histopathology
5. Analysis of blood
6. Urine analysis

Experiments:

1. Preparation of onion root squash and observation of cell
2. Cell size determination using ocular and stage micrometer
3. Determination of cell viability using trypan blue exclusion (Demo)
4. Observation of mitotic stages in Onion root
5. Osmotic, chemical and enzymatic lysis of cells-Observing extent of cell lysis by release of cellular components (Demo)
6. Separation of cell organelles and determination of markers
7. Histopathology (Demo)
Fixation, dehydration, embedding, sectioning and staining of tissues

HUMAN PHYSIOLOGY**Blood:**

1. Collection of blood-finger tip, vein puncture
2. Separation of plasma and serum
3. Preservation of whole blood
4. Enumeration of red blood cells
5. Enumeration of white blood cells
6. Differential leucocytes count
7. Determination of blood groups
8. Determination of bleeding time
9. Determination of clotting time

10. Widal test (Kit method)
11. VDRL test (Kit method)
12. RA factor (Kit method)
13. C-reactive protein (Kit method)
14. ASO titre (Kit method)
15. Pregnancy test- Gravintex test (Kit method)

Urine collection:

Random, 12, 24 hrs, First morning urine, Preservatives

8.Urine routine analysis - Colour, appearance, specific gravity, pH, sugar, albumin, bilirubin, bile salts and bile pigments, ketone bodies, urinary deposits – Pus cell, RBC, epithelial cells and casts.

REFERENCES

1. David A Thompson and Cristina C. Thompson, 2011. Cell and Molecular Biology Lab Manual. Create Space Independent Publishing Platform.USA.
2. Elaine N Marieb, 2014. Essentials of Human Anatomy & Physiology- Laboratory manual. 7th edition. Pearson Publisher, Chennai.
3. Guyton C. and John E. Hall, 2015. Textbook of Medical Physiology. 13th edition. Saunders Publishing. Philadelphia, USA.
4. Hable Whitney and Hart Peter, 2009. Cell Biology Lab Manual. 1st edition. Kendall Hunt Publishing Dubuque, IA 52004-1840.
5. Kanai L Mukharjee, 2010. Medical Laboratory Technology- A procedure manual for routine diagnostic tests. Vol:1, 2nd edition. Tata McGraw-Hill publishing company Ltd, New Delhi.
6. Zingade US, 2007. Manual of Practical Physiology. 1st edition. Jaypee Brothers Medical Publishers Pvt. Ltd. New Delhi.

Instruction hours/week: L:0 T:0 P:0

Marks: Internal: - External: 100 Total: 100
End Semester Exam: 3 Hours**Course objectives****Equip the students with:**

- Handling emergency situations
- First aid for respiratory system
- First aid for circulatory system
- First aid for nervous system
- First aid for bone, joint and muscle system
- First aid for chemical poisoning

Course outcomes (CO's)

After successful completion, the students will understand:

1. Handling emergency situations
2. First aid for respiratory system
3. First aid for circulatory system
4. First aid for nervous system
5. First aid for bone, joint and muscle system
6. First aid for chemical poisoning

UNIT I

Introduction to first aid: Basic anatomy and physiology of body systems, Emergency action principles. Survey the scene-Do a primary survey, Call for emergency services. Do a secondary survey and appropriate emergency first aid. First Aid Kit.

UNIT II

First aid for Respiratory system : Disorders of breathing - the important ones- Choking, Drowning, Asthmatic attack. Hypoxia from inhalation of fumes, carbon monoxide poisoning, lung disease. Hyperventilation . Rescue breathing for non-breathing casualty.

UNIT III**First aid for circulatory system**

Disorder of circulation - the important ones, Shock from blood and fluid loss, Anaphylactic shock, Heart attack, CPR Wound – types& first aid. Bleeding - types and control of bleeding (direct pressure and indirect pressure), pressure points first aid preservation of amputated body part. Bandage as pressure pad, ring pad and slings for wounds and bleeding

UNIT IV**First aid for the nervous system**

Disorders of conscious - the important ones- Faint, Fit (convulsion, epilepsy, fits)
Hypoglycemic coma in diabetic patient (low blood sugar). Stroke and head injury. Drunkenness.
First aid for head injury, face injury, chest injury and abdomen injury.

UNIT V

First aid for bones, joints and muscles

Disorders of musculo-skeletal system- fractures, dislocations, sprains and strains, and cramps and their first aid. Burns, heat exhaustion and heat stroke - prevention and first aid, fever - first aid. Cold related injury bites and poisoning (swallow poison, drug overdose, inhaled poisoning, plant and chemical contact).

REFERENCES

Andy A. 2001. Good Housekeeping Family First Aid, Hearst Boo Publishers, Newyork.

Auerbach P.S. 2004 Micine for the Outdoors: The Essential Guide To Emergency Mical Procures And First Aid, fourth ition, Lyons pres, London

Davies A. 2002.The mothercare guide to Emergencies and First Aid. Conran Octopus Limit, London.

<http://electricity.pondicherry.gov.in/shock/index.htm>

<http://www.keepkidshealthy.com/WELCOME/firstaid.html>

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives****Equip the students with:**

- History of bioinformatics
- Biological database creation
- Utilization of available database
- Gene prediction using bioinformatics tools
- Prediction of protein structure using computational tools
- Statistical analysis

Course outcomes (CO's)

After successful completion, the students will understand:

1. History of bioinformatics
2. Biological database creation
3. Utilization of available database
4. Gene prediction using bioinformatics tools
5. Prediction of protein structure using computational tools
6. Statistical analysis

UNIT-I

Introduction to Bioinformatics: Objectives, History of Bioinformatics, Human Genome Project, application of bioinformatics – Molecular medicine, biotechnology, agricultural, forensic analysis.

UNIT-II

Introduction to Biological databases-Types of databases, sequence databases-nucleic acid sequence databases-Gene bank, EMBL, DDBJ, protein sequence database- Swiss-Prot, PIR, PDB structural databases, Search and retrieval of Entrez, bibliographic databases-Pubmed.

UNIT-III

Sequence alignment-local, global, pairwise and multiple alignment, Similarity searching programs- BLAST, FASTA; Gene prediction strategies and programs- Genscan, Genemark.

UNIT-IV

Protein secondary structure prediction, three dimensional structure prediction, Comparative modeling and visualization of molecules. Visualization-Rasmol, Deep view.

UNIT-V

Source of data – Primary and secondary data. Classification and tabulation of data. Diagrammatic and graphic presentation of data.

Measures of central tendency: arithmetic mean, median, mode.

Measures of variation: range, quartile deviation, mean deviation, standard deviation (simple problems only).

TEXT BOOKS

Palanichamy. 1999. Statistical methods for Biologists. 3rd edition. Palani Paramount Publications, Palani.

S.P.Gupta. 2007. Statistical methods. Sultan Chand and Sons Educational Publishers, New Delhi.

Ignacimuthu. S, 2013. Basic Bioinformatics, 2nd edition Alpha Science Intl Ltd Chennai.

S.C. Rastogi. 2009. Bioinformatics Concepts, Skills & Applications, CBS Publishers & Distributors, India.

REFERENCES

Abraham Silberchatz Henry K.Forth and Sudharshan, 1997. “Database System Concepts” Tata McGraw Hill, New Delhi.

Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.

Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.

David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.

Sundararajan. S and R. Balaji, 2003. Introduction to Bioinformatics, Himalaya Publishing House, Mumbai.

Steve Selvin. 2005. Biostatistics. 1st edition. Pearson Education Pte Ltd., New Delhi.

Jerald H Zar. 2005. Biostatistical Analysis. 4th edition. Pearson Education Pte Ltd., New Delhi.

Daniel. 2006. Biostatistics: A Foundation for analysis in the health sciences. 7th edition. John Wiley and Sons, Inc., New York.

Sundar Rao. P.S.S., and J.Richard., 2012. 5th edition, Introduction to Biostatistics and Research Methods, PHI Publication, New Delhi.

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course objectives**

Equip the students with:

- Data collection
- Various ways of representation of data
- Measures of central values and standard deviation.
- Determination of the relationship between two variables.
- Correlation and regression analysis
- Determining the level of significance of a particular data by various parameters.

Course outcomes (CO's)

After successful completion, the students will understand:

1. Data collection
2. Various ways of representation of data
3. Measures of central values and standard deviation.
4. Determination of the relationship between two variables.
5. Correlation and regression analysis
6. Determining the level of significance of a particular data by various parameters.

UNIT-I

Definitions-Scope of Biostatistics- Variables in biology, collection, classification and tabulation of data- Graphical and diagrammatic representation.

UNIT – II

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion- Range, standard deviation, Coefficient of variation.

UNIT – III

Correlation – Meaning and definition - Scatter diagram –Karl Pearson's correlation coefficient. Rank correlation.

UNIT – IV

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – V

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit.

TEXT BOOK

1. Pillai R.S.N., and Bagavathi V., 2002., Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCES

1. Jerrold H.Zar, 2003, Biostatistical Analysis, Fourth Edition, Pearson Education (Pte) .Ltd, New Delhi.
2. Dr.P.N.Arora, 1997, A foundation course statistics, S.Chand & Company Ltd, New Delhi.
3. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
4. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

Instruction hours/week: L:4 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course objectives**

Equip the students with:

- Separation techniques
- Centrifugation and filtration techniques
- Concepts of thermodynamics
- Crystallographic methods
- Structure prediction using NMR
- Spectroscopic techniques

Course outcomes (CO's)

After successful completion, the students will understand:

1. Separation techniques
2. Centrifugation and filtration techniques
3. Concepts of thermodynamics
4. Crystallographic methods
5. Structure prediction using NMR
6. Spectroscopic techniques

UNIT I: Separation Techniques

Bioseparations – batch filtration – continuous filtration – centrifugation – sedimentation velocity and equilibrium methods – reverse osmosis – ultra filtration – micro filtration,

UNIT II: Chemical Equilibrium

Chemical equilibrium – law of mass action – equilibrium constant – electrochemistry – electrolysis – Galvanic cell – fuel cells – Nernst equation – Chemical thermodynamics – heat of reaction – entropy – enthalpy.

UNIT III: Crystallography

Study of size, shape and molecular weight of macromolecules – X-ray studies – Goniometer – Bragg's spectrometer – reciprocal lattice – isomorphous replacement – refinement of structure.

UNIT IV: Structural Studies

NMR spectra – experimental arrangement – chemical shift – two dimensional NMR – electron spin resonance technique – hyperfine structure – mass spectrometry

UNIT V: Spectroscopy

Spectroscopy – visible, fluorescence, IR, UV and Raman spectroscopic studies – electron microscope – scanning, tunneling electron microscopes – atomic force microscope working and applications

TEXT BOOKS

1. Sicasankar. B (2005). Bioseparations – principles and techniques Prentice – Hall of India Pvt. Ltd.
2. Vasanthapattabhi and Goutham N. (2003) Biophysics. Narosa Publishing house

REFERENCES

3. Raymon chang (1977). Physical chemistry with applications to biological systems Macmillan Publishing Co., INC
4. Coggle J.E (1971). Biological effects of radiation Wykeham Publications (London) Ltd

Web resources

1. www.springer.com/physics/biophysics
2. onlinelibrary.wiley.com/doi/10.1016/0

Instruction hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

To impart hands-on training on:

- MS-office
- Analysis of databases such as SWISS PROT, NCBI
- Retrieval of protein structures from PDB
- Secondary structure prediction
- Molecular visualization tools
- Multiple sequence alignment

Course outcomes (CO's)

After successful completion, the students shall be able to

1. MS-office
2. Analysis of databases such as SWISS PROT, NCBI
3. Retrieval of protein structures from PDB
4. Secondary structure prediction
5. Molecular visualization tools
6. Multiple sequence alignment

Experiments:

1. Introduction to MS Office
2. Analysis of databases
 - NCBI
 - EMBL
 - DDBJ
 - PIR
 - SWISS PROT
3. Retrieval of protein structures –PDB
4. Bibliographic Databases
 - Pubmed
 - Medline
- 5 Secondary structure prediction
 - SOPMA
6. Molecular Visualization and analysis
 - RASMOL
7. Sequence similarity search for a pair of sequences using
 - BLAST
 - FASTA
8. Multiple sequence alignment
 - CLUSTAL

REFERENCE BOOKS

Allen Bregman, 2001. Laboratory Investigations in Cell and Molecular Biology, Wiley..

Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.

Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.

Dealtry G.B.and Rickwood D.. 1992, Cell biology-Lab Fax (1st edition) Black well Scientific Publishers, New Delhi.

David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.

Mani K., N. Vijayaraj. 2004. Bioinformatics- A practical approach, Aparnaa publication, India.

Rajan S.and.Selvi Christy R, 2011. Experimental procedures in Life Sciences, Published by Anjanna Book House, Chennai.

Instruction hours/week: L:0 T:0 P:3

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Equip the students with:

- Definition and representation styles of data
- Analysis of data using correlation to understand the interdependence
- Analysis of data using regression to understand the interdependence
- To learn various measures of central values and standard deviation.
- To understand the relationship between two variables.
- To test the significance of a particular data by various parameters.

Course outcomes (CO's)

After successful completion, the students will:

1. Use appropriate representation styles to present the data
2. Perform correlation analysis
3. Perform regression analysis
4. Calculate mean, median, mode and standard deviation.
5. Calculate the relationship between two variables.
6. Test the significance of a particular data by various parameters.

Experiments:

1. Through understanding of the usage of SPSS package.
 2. Application of various statistical tools to interpret research data in a clear and easily understandable manner
-
1. Mean for individual, discrete series using SPSS Package.
 2. Mean for continuous series using SPSS Package.
 3. Median for individual and discrete series using SPSS Package..
 4. Median for continuous series using SPSS Package..
 5. Mode for individual and discrete series using SPSS Package..
 6. Standard deviation for individual and discrete series using SPSS Package.
 7. Coefficient of variation for individual and discrete series using SPSS Package.
 8. Karl Pearson's Correlation using SPSS Package.
 9. Rank Correlation Coefficient for Untied Rank using SPSS Package.
 10. Rank Correlation Coefficient for Tied Rank using SPSS Package.

Instruction hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To know about fluid friction
- Understand the interfacial surface tension between two liquids
- Understand the surface tension
- To understand the basic terms and concepts of Biophysics
- Are able to describe biophysical phenomena with simple physical models
- Know the ratio between the speed of light in medium to speed in a vacuum

Course outcomes (CO's)

After successful completion, the students will understand:

1. About the fluid friction
 2. Interfacial surface tension between two liquids
 3. Surface tension calculation
 4. Basic terms and concepts of Biophysics
 5. Biophysical phenomena with simple physical models
 6. Resolving power of a telescope
-
1. Internal friction of low liquids by Poiseuille's flow method
 2. Internal friction of high viscous liquids by Stokes method
 3. Interfacial surface tension between two liquids
 4. Surface tension of liquids by capillary rise /drop weight method
 5. Specific rotatory power of sugar solution using polarimeter
 6. Specific rotatory power of biological solution using polarimeter
 7. Refractive index of liquids using spectrometer
 8. Wave length of prominent lines of mercury spectrum using a plane transmission grating
 9. Resolving power of a telescope
 10. Emissivity of a surface - spherical calorimeter

REFERENCES

Gupta S.L. and V.Kumar, 2002, Practical Physics, 25th Edition, Pragathi Prakashan, Meerut

Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics,
S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai

Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut

Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut

Instruction hours/week: L:2 T:0 P:0**Marks: Internal: 100 External: - Total: 100
End Semester Exam: 3 Hours**

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objective**Equip the students with**

- Insight on various metabolic pathways in human and also in plants
- The pathways related with energy production through catabolism of carbohydrates and lipids
- The metabolic pathways that involve with the synthesis of macromolecule
- Understanding the molecules within cells and interactions between cells that allows construction of multi cellular organisms.
- Molecular machinery of living cells.
- Metabolic pathways of amino acids and nucleic acid metabolism.

Course outcomes (CO's)**After successful completion, the students will understand:**

1. Insight on various metabolic pathways in human and also in plants
2. The pathways related with energy production through catabolism of carbohydrates and lipids
3. The metabolic pathways that involve with the synthesis of macromolecule
4. Understanding the molecules within cells and interactions between cells that allows construction of multi cellular organisms.
5. Molecular machinery of living cells.
6. Metabolic pathways of amino acids and nucleic acid metabolism.

UNIT I**Introduction to intermediary metabolism**

Introduction, overview of intermediary metabolism- the basic metabolic pathways, anabolic, catabolic and amphibolic pathways. Biological oxidation-oxidation, reduction equilibria; redox potential, enzymes and coenzymes involved in oxidation and reduction. ETC: Role of respiratory chain in energy capture. Oxidative phosphorylation- Mechanism of oxidative phosphorylation - Chemiosmotic theory, uncouplers of oxidative phosphorylation.

UNIT II**Carbohydrate metabolism**

Introduction, fate of absorbed of carbohydrate, utilization of glucose, general processes of carbohydrate metabolism-glycolysis and citric acid cycle, glycogenesis, glycogenolysis and gluconeogenesis. Alternate pathways of carbohydrate metabolism-pentose phosphate pathway (HMP shunt), Glucuronic acid cycle and Glyoxylate cycle.

UNIT III

Metabolism of lipids

Introduction- Blood lipids and plasma lipoproteins- biomedical importance, fate of dietary lipids. Oxidation of Fatty acids: β - oxidation, α -oxidation and ω oxidation. Oxidation of fatty acids with odd numbers of carbon atoms. Biosynthesis of saturated fatty acids: Extra mitochondrial and microsomal system for elongation of fatty acids. Biosynthesis of Phospholipids: Phosphatidyl choline, Phosphatidyl ethanolamine, Phosphatidyl inositol and Phosphatidyl serine. Degradation of phospholipids, Biosynthesis of glycolipids, Biosynthesis of Cholesterol. Ketone bodies – formation, importance.

UNIT IV

Metabolism of protein and amino acids

Introduction, fate of dietary proteins, catabolism of amino acid nitrogen-oxidative deamination; non-oxidative deamination, transamination-formation of ammonia, transport of ammonia, disposal of ammonia -urea cycle. Amino acid decarboxylation, Catabolism of carbon skeleton of amino acids- glycine, tyrosine, phenyl alanine, glutamic acid and lysine.

UNIT V

Metabolism of purine and pyrimidine nucleotides

Introduction, biomedical importance, biosynthesis of purine and pyrimidine nucleotides, de novo synthesis of purines and pyrimidines, salvage pathways, catabolism of purines and pyrimidines.

Inter relationship of carbohydrate, protein and fat metabolism. TCA cycle as a central core in the inter relationships in metabolism and inter conversion of major food stuffs - Carbohydrate, fats and proteins.

TEXT BOOKS

Deb C., 2011, Fundamentals of Biochemistry, 9th edition New Central Book Agency, Calcutta.

Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 2012, Harper's Biochemistry, 29th edition, McGraw-Hill Medical, London.

Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition. WH Freeman and Company, New York .

REFERENCES

Donald Voet, Judith Voet and Charette.2012. Fundamentals of Biochemistry, 4th edition, John Wiley and Sons, Inc, New York.

Pamela C, Champ Richard and A. Harvey.2008. Biochemistry. Lipponcott Company Philadelphia.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To enlight the students with genome organization of DNA
- To study the mechanism of replication DNA in prokaryotes
- To study the mechanism of replication DNA in eukaryotes
- To understand the mechanism of recombination and transposition of DNA
- To understand DNA damage, mutation
- DNA repair process

Course outcomes (CO's)

After successful completion, the students will be able to

1. Understand genome organization of DNA
2. Comprehend the mechanism of replication DNA in prokaryotes
3. Comprehend the mechanism of replication DNA in eukaryotes
4. Explain the mechanism of recombination and transposition of DNA
5. Explain DNA damage, mutation
6. Explain DNA repair process

UNIT-I

Nucleic acids: Evidences for DNA as Genetic material – Bacterial Transformation, Transduction and conjugation. DNA Organization- Chromatin, Histones and Nucleosomes: Chromosomal Organization of genes-solitary genes, tandemly repeat genes, simple sequence DNA, mobile DNA elements- transposons, mechanism of transposition.

UNIT II

Replication: Semi conservative mechanism and experimental proof, Bi-directional replication, Rolling circle model. Formation of DNA from nucleotides - Enzymology of replication, initiation, elongation and termination of replication in prokaryotes. Differences between eukaryotic replication and prokaryotic replication.

UNIT III

Transcription: Prokaryotic Transcription: RNA polymerases, Initiation, elongation and termination. Post transcriptional modifications: RNA Splicing, RNA editing, Processing of Eukaryotic mRNA, rRNA, tRNA. Prokaryotic gene regulation: Operon model – Lac operon, Trp Operon. Eukaryotic gene regulation- RNA interference, siRNA.

UNIT IV

Translation: Composition of Prokaryotic and Eukaryotic Ribosomes. Genetic code – Experimental evidences and features. Translation: Initiation, elongation and termination of protein synthesis in prokaryotes, Translation in Eukaryotes, Post translational modifications of proteins, Inhibitors of protein synthesis.

UNIT V

Recombination: Definition, types of recombination, Holliday model for Homologous recombination. Gene mutations: Types – Missense mutation and other point mutations, spontaneous mutations and induced mutations, silent mutations.

DNA Repair Mechanism: Photo repair, Excision repair, Mis-match repair, SOS repair.

TEXT BOOKS

Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger. 2012. Molecular Cell Biology, 7th edition. W.H. Freeman & Company, London.

Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition, WH Freeman and Company, New York.

REFERENCES

Benjamin L.2004. Genes VIII, Oxford University Press, Pearson Education Ltd, London.

Gerald Karp 2013. Cell and Molecular Biology, 7th edition. John Wiley and Sons, Inc, Hoboken, United States.

Freifelder D.2001. Molecular Biology, Narosa Publishing House, Madras.

Gardner and Simmons.2001. Principles of Genetics, John Wiley & Sons, New York.

Instruction hours/week: L:5 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives****Equip the students with:**

- Basics of immunology
- History of immunology
- Components of immunity
- Immunodeficiency and hyperfunctioning of immune system
- Transplantation
- Immunotechniques

Course outcomes (CO's)**After successful completion, the students will understand:**

1. Basics of immunology
2. History of immunology
3. Components of immunity
4. Immunodeficiency and hyperfunctioning of immune system
5. Transplantation
6. Immunotechniques

UNIT I

Basics of immunology : Introduction, Innate and acquired immunity, Cells of immune system. structure and function of T, B, NK cells, neutrophils, eosinophils and basophils. monocytes and macrophages ; Primary and secondary lymphoid organs. Humoral and cell mediated immunity.

UNIT II**Components of Immunity**

Antigen: Definition, requirement for antigenecity, properties of antigen-specificity, cross reactivity, immunogenicity; epitopes, adjuvents, haptan.

Antibody-Definition, properties, classes, subclasses structure, specificity and distribution; self-antigens (MHC) - Class I, II, III molecules, role of MHC in antigen processing and presentation.

UNIT III**Hypersensitivity**

Hypersensitivity- Type I, II, III & IV; Factors causing hypersensitivity; Mechanism, Pathogenesis, prevention and treatment.

Complement- definition, classical and alternate pathways, biological importance of complement system, complement deficiency diseases.

UNIT IV**Transplantation Immunology**

Transplant-Mechanism of Allograft rejection; Auto immune diseases- Rheumatoid arthritis, myasthenia gravis, Graves's disease, Systemic lupus erythematosus.

Vaccination- passive and active. Preparation of live and attenuated vaccines, novel vaccines.

UNIT V

Immunotechniques

Antigen- antibody interaction-Precipitation reaction-immuno diffusion, immuno electrophoresis; Agglutination- blood grouping; Immuno techniques – Principle and application of RIA, ELISA, Fluorescent antibody techniques, immuno blotting, hybridoma technology - elementary concepts only.

TEXT BOOKS

Janis Kuby, 2006. Immunology, 6th Edition. W.H. Freeman and Company, New York.

Pathak S., U.Palan, 2005 .Immunology essentials and fundamentals, capital publishing company, Bangalore, 2nd edition.

Vaman Rao C. 2006. Immunolgy, Narosa publishing house, 2nd edition.

REFERENCES

Charles. A. Janeway and Jr. Paul Traverse, 2004. Immunobiology, Blackwell Scientific Publishers, Oxford

Ian R. Tizard, 2009. Immunology- An Introduction, 8th Edition. Saunders College Publishers, Sydney.

Ivan Riott and Janathar Brotoff, 2006. Immunology, 7th Edition Mosby Publishers, Sydney.

Instruction hours/week: L:5 T:0 P:0Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**Course objectives**

Equip the students with

- Plant cell structure
- Transport mechanism in plants
- Photosynthesis in plants
- Microenvironment for plant growth and nitrogen fixation
- Plant growth regulators
- Photomorphogenesis in plants

Course outcomes (CO's)

After successful completion, the students will understand

1. Plant cell structure
2. Transport mechanisms in plant cell
3. Photosynthesis and carbohydrate metabolism
4. Various microenvironment and hormones required for plant growth
5. The process of nitrogen fixation
6. Photoperiodism and senescence in plants

UNIT-I

Plant Cell and Transport mechanisms: cell wall-structure and functions. Plastids: types and functions Transport mechanisms: diffusion, vacuole and turgor pressure, osmosis and imbibition, conditions necessary for imbibition. Absorption and translocation of water: Mechanism-Active and passive absorption, Factors affecting absorption of water. Ascent of sap: Mechanism and theories.

UNIT-II

Photosynthesis: Photosynthetic pigments: Chlorophyll, carotenoids and phycobillin: Photosynthetic apparatus-structure and functions of chloroplasts: light absorption. Light reactions-Two kinds of chemical system-Photosystem I&II, evidences in support of light reaction. Hill's reaction; Emerson effect, cyclic and non-cyclic phosphorylation. Dark reaction : Calvin's cycle (C3 plants). Hatch-slack cycle (C4 plants) and CAM plants. Factors affecting photosynthesis. Photorespiration.

UNIT-III

Cycles of elements and Plant Nutrition: Nitrogen cycle-Ammonification, nitrification, nitrate reduction and denitrification. Nitrogen fixation: Symbiotic and non-symbiotic nitrogen fixation. Sulfur cycle: Release of sulfur from organic compounds; Oxidation of sulfur compounds; Reduction of sulfate. Phosphorus cycle and carbon cycle. Plant nutrition: Specific roles of essential elements and their deficiency symptoms in plants. Macronutrients: Carbon, Hydrogen, Oxygen, Nitrogen, Sulfur, Phosphorus, Calcium and Potassium. Micronutrients: Manganese, Boron, Copper, Zinc, Molybdenum and Chlorine.

UNIT-IV

Plant growth regulators: Auxins: Chemistry, biosynthesis, mode of action, bioassay, practical applications of synthetic auxins. Gibberellins: Chemistry, biosynthesis and mechanism of action, role of endogenous gibberellins, bioassay and practical applications. Chemistry, mode of action and physiological role of cytokinins, abscisic acid and ethylene.

UNIT-V

Photomorphogenesis

Photoperiodism. Photochrome-function in growth and development of plant. Biochemistry of seed germination. Senescence: Biochemical changes during senescence. Senescence process in life cycle of plants.

TEXT BOOKS

Verma.S.K and Mohit Verma, 2007. A Text Book of Plant Physiology, Biochemistry and Biotechnology. 6th edition.S.Chand and Co, New Delhi.

Goodwin.T.W and Mercer.E.I. 1990. Introduction to Plant Biochemistry, 1st edition, Robert Maxwell.M.C Publisher, New York.

James Bonner and Joseph F Varner. 1977. Plant Biochemistry. 3rd edition. Academic Press, New York.

REFERENCES

Bob Buchannan ,2002. Biochemistry and Molecular Biology of Plants, IK. International, New York.

Hans-Valter Heldt ,2005. Plant Biochemistry and Molecular Biology, Oxford University Press, England.

Michael Wink, 2010. Functions and Biotechnology of Plant Secondary Metabolites, Second edition, Blackwell Publishing Ltd, London.

Instruction hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

To make the students:

- To provide hands on experience on extraction of enzymes from the plant source.
- To make them learn about isolation of bioactive compounds from fruits and vegetables.
- To learn to isolate the pigments from plants.
- To learn them about various tissue culture techniques
- To learn the PTC media preparation, culturing techniques
- To know about the Plant tissue culture

Course outcomes (CO's):

The students shall be able to

1. Gain knowledge on the isolation and enzymes and bioactive compounds from the plants.
2. Use experimental techniques related to isolation.
3. Get aware about the plant tissue culture techniques
4. Prepare the plant tissue lysates
5. Know about the estimation of vitamin
6. Isolate the DNA and RNA of enzymes from plant and animal source

MOLECULAR BIOLOGY

1. Isolation and estimation of genomic DNA, RNA and protein from plant and animal sources
2. Plasmid DNA isolation
3. Agarose gel electrophoresis of DNA
4. Separation of serum proteins by poly acrylamide gel electrophoresis (PAGE)
5. Restriction digestion of DNA (Demo)
6. Competent *E.coli* preparation(Demo)
7. Transformation and selection of transformed cell (Demo)
8. Western blotting (Demo)

(II) Plant Biochemistry

10. Estimation of starch
11. Estimation of chlorophyll
12. Estimation of vitamin C
14. Estimation of glutathione
15. Estimation of vitamin E

(III) Plant tissue culture (Demo)

16. Preparation of Tissue culture media
17. Surface sterilization
18. Callus induction

TEXT BOOKS

S.S.Purohit., 2002. A Laboratory manual of Plant Biotechnology. Agro Botanica Publishers, New Delhi.

Joseph Sambrook and Michael R. Green 2012 Molecular Cloning: A Laboratory Manual (Fourth Edition) Cold Spring Harbor Laboratory Press

S.Sadasivam and A. Manickam. 2009. Biochemical methods. (2nd edition). New age International Pvt Ltd Publishers, New Delhi and TNAU, Coimbatore.

REFERENCES

James Bonner and Joseph F Varner. 1977. Plant Biochemistry. 3rd edition. Academic Press, New York.

Singh.S.P. 2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

J.Jayaraman. 2007. A Laboratory manual in Biochemistry. (1st edition). New age International Pvt Ltd Publishers, New Delhi.

H.S.Chawla 2006, A Laboratory manual for Plant biotechnology, Oxford and IBH publishers' co Pvt Ltd, New Delhi.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To provide the student with the basic principles of human genetics
- Specific objectives of this course are to provide an understanding and discuss ramifications of inheritance, gene structure and function, gene mutation, and research related to genetics and its applications.
- The students are expected to have basic knowledge of chromosome structure, genome organization and cell division.
- To know about the genetic diversity
- To know about some common inherited human genetic disorders
- To understand the chromosomal changes

Course outcomes (CO's)

1. Comprehensive, detailed understanding of the chemical basis of heredity
2. Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.
3. Understanding of how genetic concepts affect broad societal issues including health and disease, food and natural resources, environmental sustainability, etc.
4. Understanding the role of genetic mechanisms in evolution.
5. The knowledge required to design, execute, and analyze the results of genetic experimentation in animal and plant model systems.
6. Understand that the evolution is an active biological process which impacts the human gene pool

UNIT I

History and Development of Human Genetics: Genes, Hereditary traits, Genetic Disease, Mutations and polymorphisms, Organization of Human Genome: Repetitive DNA in Human Genome, Simple sequence repeat loci; Intron, exon, UTR, regulatory sequence, non-coding RNAs, mitochondrial genome.

UNIT II

Diseases and disorders: Chromosomal disorders: Structural and numerical; Autosomal/sex chromosomal/sex reversal; Mechanisms – mitotic/meiotic non-disjunction/ chromosomal rearrangements; Inborn errors of metabolism, Haemoglobinopathies.

UNIT III

Identification of disease gene/locus: Methods of genetic study in human: Mendelian pedigree pattern and analysis expressivity chromosomal basis of genetic disorders: Chromosomal Analysis, Karyotypes and identification of chromosome variation; Nucleic acid hybridization assays, cytogenetic mapping Single gene disorders: Genetic mapping (Microsatellite and other DNA polymorphisms in mapping), LOD score; Physical mapping, sequencing strategies (PCR

based Sanger sequencing to exome sequencing) Concept of non mendelian inheritance and complex diseases

UNIT IV

Human genome analysis: Conception, mapping, cloning and sequencing, Outcome- Generation of 'OMICS' era, significant leads. Genetic variation in health and disease: Human genetic diversity- Methods of study – Biochemical/molecular genetic markers; some examples. Tracing human migrations with autosomal, Y-chromosomal and mitochondrial markers.

UNIT V

Ethical, legal and social issues in Human genetics: Prenatal/adult (individual/family/population) screening of mutation/risk factor for genetic diseases; Confidentiality/privacy, Discrimination, Ethical dilemma, Human rights, Surrogate mothers; Organ banking and transplantation; Research ethics; Medical ethics in India.

TEXTBOOKS

Korf B R. and M B Irons. 2013. Human genetics and genomics, 4th edition, Wiley-Blackwell Publishers.

Mange E J. and A P Mange. 1999. Basic Human Genetics, 2nd edition, Sinaur Associates Publishers.

Vogel T and A Motulsky, 2010. Human genetics: Problems and Approaches, 4th edition, Springer Publishers, Verlog.

REFERENCES

Strachan T. and A Read. 2010. Hman Molecular Genetics, 4th edition, Garland Science.

Pasternak J J. 1999. An Introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases, Fitzgerald Science Press, Bethesda, MD.

Blackmore W A. 1999. Chromosome Structural Analysis- A Practical Approach, Oxford University Press, Oxford.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To understand the fundamental concepts of nanotechnology.
- To provide an introduction to and an overview over nanotechnology
- To know a basic understanding of the physical laws and effects that are active in the nano-world
- To understand the concepts and strategies used today and in the near future to build molecular machines
- To understand the applications of nanotechnology will influence science of tomorrow and will change many sides of our life.
- To know the impact of nanotechnology on our society.

Course outcomes (CO's)

After successful completion, the students will understand

1. The basic knowledge in nanotechnology.
2. About bionanomaterials and its applications
3. What forces act between atoms and/or molecules when nanoparticles are generated
4. The basic principles of molecular machines
5. the functioning of molecular switches
6. The properties of carbon-nanotubes and their role for engineering nano-electronic devices.

UNIT I

Nanostructure and Properties: Structure- size Dependence of properties, Localized particles- Donors, Acceptors and Deep Traps, Mobility, Excitons Properties of nanoparticles-Metal nanoclusters –theoretical modeling of nanoparticles, geometric structure, electronic structure, Semiconducting nanoparticles-optical properties, photofragmentation, Coulombic explosion.

UNIT II

Types of nanoparticles: Metal nanoparticles-Gold, silver and Titanium nanoparticles. Metal bivalent-Zinc, copper. Magnetic nanoparticle – iron. **Characterization of nanoparticles-** Absorption spectrum, Electron microscopy (SEM, TEM), EDX, XRD, Zeta potential.

UNIT III

Biological Materials: Biological building blocks-sizes of building blocks and nanostructures, polypeptide Nanowire and protein nanoparticles. Nucleic acids-DNA Double nanowire, biological nanostructures-examples of proteins, miscelles and vesicles, multilayer films.

UNIT IV

Synthesis of Nanomaterials: Top down – ball milerling; Bottom up – co-precipitaion – sol-gel – electrodeposition – using natural nanoparticles – chemical vapor deposition. The Carbon

Nanotube – New Forms of Carbon – Types of Nanotubes – Formation of Nanotubes – Uses for nanotubes – Biological Applications

UNIT V

Applications of nanotechnology: Nanomachines and nanodevices- nanobots, Microelectromechanical systems (MEMSs), Nanoelectrochemical systems (NEMSs)- fabrication, nanodevices and nanomachines, **Nanobots**, molecular and supramolecular switches- photochemical switching, current-voltage characteristics

TEXT BOOKS

Charles P. Poole, Jr., Frank J. Owens “Introduction to Nanotechnology” John Wiley & Sons, 2003

Poole C.P., and Owens J.F., “Introduction to Nanotechnology” Wiley- Interscience, 2003.

REFERENCES

Jacob N. Israelachvili “Intermolecular and surface forces” Academic Press, 2008

Ratner M.A., Ratner D., “Nanotechnology: A Gentle Introduction to the Next Big Idea” ,First Edition, Prentice Hall PTR, 2002.

Wilson M., Kannangara K., Smith G., Simmons M., and Raguse B., “Nanotechnology: basic science and emerging technologies” , Overseas Press, 2005.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To initiate and promote the analysis of cancer as a complex biological system.
- This will encourage the emergence of integrative cancer biology as a distinct field.
- To understand various genetic and molecular changes normal cells undergo during transformation into malignant cancer cells.
- To understand the mechanisms underlying carcinogenesis.
- To understand the cell cycle, angiogenesis and apoptosis.
- To know about the fundamental principles behind cancer diagnosis, prevention, and therapeutic management

Course outcomes (CO's)

After successful completion, the students will

1. Be familiar with basic facets of carcinogenesis and methods to study the process
2. Get knowledge about the emerging themes and provides in depth analysis of cancer and its therapeutic approaches.
3. Know the role of growth factors, oncogenes, tumor suppressor genes, angiogenesis, and signal transduction mechanisms in tumor formation
4. Understand factors that contribute to cancer development and discuss cancer prevention and currently available therapeutic treatments.
5. Understand how genetics contributes to predisposition and progression of cancer.
6. Understand the differences and overlap of cancers by tissue type.

UNIT I

Introduction: Cancer- definition, hallmarks of cancer, Distinction between normal cell and cancer cell, cytological changes in cancer cells, Molecular changes in cancer cells, Genetic changes in cancer cells, Types of cancer, development of cancer, causes of cancer, properties of cancer cells.

UNIT II

Mutagens and mutations, Mechanisms of oncogene activation, Role of growth factors and receptors in carcinogenesis, Retroviral oncogenes, protooncogenes, tumor suppressor genes - P53 and Rb and their functions.

UNIT III

Cell cycle: cell cycle-G1 to S, progression of S phase, G2 to M phase, Anaphase check points and components involved as regulators of check points, role of cyclins and CDKs.

UNIT-IV

Cell death: Types of cell death-apoptosis, necrosis and others. Apoptosis during developmental process and irregular apoptosis and disease. Death causing genes – Ceds, proteins – Caspases, mechanism of programmed cell death (PCD), Pathways of apoptosis-intrinsic and extrinsic.

UNIT V

Treatment of cancer: Early detection of cancer, molecular diagnosis, treatment -radio therapy, chemotherapy, immunotherapy and use of RNAi techniques and stem cells.

TEXT BOOKS

Alberts. B., Bray, D., Lewis, J., Raff, M., Roberts, K and Watson, J.D. (1994). Molecular Biology of the cell. Garland Publisher Inc., New York

Bishop J.A. (1982). Retroviruses and cancer genes. Advances in cancer research.

Elliot and Elliot. (2001). Biochemistry and Molecular Biology. Oxford University Press.

REFERNCES

Gerald Karp. (1996). Cell and Molecular Biology. John Wiley and Sons. Inc

Lodish,H., Ber, A., Zipuoskry, L.S., Matsudaira, P., Bahimore, D and Damell J. (2001)
Molecular Biology W.H Freeman G Co. 47

Instruction hours/week: L:0 T:0 P:0**Marks: Internal: - External: 100 Total: 100**
End Semester Exam: 3 Hours**Course Objectives:****Equip the students**

- To understand the basic quality control procedures in the laboratory
- To ensure safety in laboratory
- To understand the good laboratory procedures
- To acquaint with standard operating procedures
- To understand the importance of quality audit procedures
- To learn the laboratory safety and regulations

Course Outcomes (COs):**After completion of this course the student will be able to**

1. understand the basic quality control procedures in the laboratory
2. Follow safety procedures in laboratory
3. Follow good laboratory procedures
4. Acquaint with standard operating procedures
5. Do quality audits
6. Maintain laboratory safety and regulations

UNIT I

Basic Concepts: Quality concepts, Quality Assurance, Good Manufacturing Practices, Responsibilities, Ensuring safety in laboratories: Introduction, principles-engineering controls, work practices and administrative control, personal protective equipment. General safety-biological safety, chemical safety and fire safety.

UNIT II

Quality Control: Quality control laboratory: Responsibilities, good laboratory practices, routine controls, instruments, protocols, non-clinical testing, controls on animal house, data generation and storage, quality control documents, retention samples, records, audits of quality control facilities.

UNIT III

Good Laboratory Practice (GLP): GLP – an overview and basic information, Scope. Principles of GLP: Test Facility Organization and Personnel, Quality Assurance Programme, Facilities, Apparatus, Material, and Reagents, Test Systems, Test and Reference Items, Standard Operating Procedures, Performance of the Study, Reporting of Study Result, Storage and Retention of Records and Materials. Responsibilities in GLP Implementing of GLP in non GLP analytical laboratory

UNIT IV

Inspections, Quality Audit and Quality System Reviews: Inspections of pharmaceutical manufacturers, role of quality audit, role of inspectors, methods of inspection- routine, concise, follow-up and special inspections, frequency and duration of inspections, preparations for inspections, conduct, report and regulatory actions. Loan License Auditing – Concepts, Auditing, role of quality circle in quality assurance.

UNIT V

Laboratory Regulations and Safety: List of Regulations to be followed. Laboratory safety procedure- glass ware, equipment safety, hands protection, precaution to be undertaken to prevent accident and contamination.

TEXT BOOKS

Weinberg S. 1995. Good Laboratory Practice Regulations, 3rd edition, CRC Press, U.S.A.

Harburn K, 1990. Quality Control of Packing Materials in Pharmaceutical Industry, CRC Press, U.S.A.

Prichard E. 1995. Quality in the Analytical Chemistry Laboratory, 1st edition, Wiley, U.S.A.

REFERENCES

Richard A.G., G. Richard. 2009. New Drug Approval Process Drugs and the Pharmaceutical Sciences), 5th edition CRC Press, U.S.A.

Wenclawiak B.W., Koch M , Hadjicostas E. 2004. Quality Assurance in Analytical Chemistry: Training and Teaching. 1st edition, springer. U.S.A.

Course objectives

- To understand the basic concepts of chemical reactions that occur in living systems
- To know the basics about the genetic materials
- To understand the Interactions between DNA and protein
- To understand the sources of toxic emissions
- To evaluate the environmental impact of toxic compounds in emissions and immissions
- To evaluate personal and authoritative rights and duties with toxic pollutants.

Course Outcomes (COs):

After completion of this course the student will be able to

1. Comprehensive, detailed understanding of the chemical basis of heredity
2. Understand the cell cycle, angiogenesis and apoptosis.
3. To understand the properties and importance of water in biological system
4. Compare the level of toxic pollutants evacuated in the environment, with the related concentration limits, according to specific regulations
5. Assess the influence of the toxic compounds released on the public health
6. Assess safety conditions and apply related safety regulations when dealing with toxic substances.

UNIT I

Genetic elements :Structure of double strand DNA (B,A, C, D & Z DNA). The biological significance of double strandness, sequence dependent variation in DNA. Physical properties of DNA, chemicals that react with DNA; Types of RNAs and their biological significance.

UNIT II

DNA Bending: Introduction-The Wedge model and Junction model for DNA bending. Protein induced DNA bending. DNA Supercoiling: Introduction- Heterogenicity in forms of DNA molecule. Supercoil form of DNA. DNA knots and catenanes.

DNA-Protein interaction: Introduction- General consideration on protein binding. Specific DNA-Protein interaction.

UNIT III

Cell Cycle and its regulation: Check points, Involvement of CDK's and cyclins, proteins in cell cycle. Cell cycle control of DNA replication: cell cycle and cancer. Apoptosis: Characteristics and features of cell death and mechanism; Anti -apoptotic genes. Telomeres and telomerases in genomic instability.

UNIT IV

Microbial quality of water: Treatment of municipal waste and industrial effluents. Disposal of waste. Bioremediation: Degradation of pesticides by microbes Biological control: Bacteria-*Bacillus thuringensis*, Virus-*Polyhrosis virus*, Fungi-*Berveria bassiana*, Protozoa-*N.algereae*, Parasite-*Tricoderma*, Biofertilizer-Nitrogen fixing bacteria- *Cyanobacterium* and *Azospirillum*. Role of VAM in plant nutrition.

UNIT V

Toxins: Exo and endo toxins; fungal toxins and bacteriocins. Secondary metabolites from microbes. Food preservation and Spoilage: Methods of food preservation, food preservatives, flavour enhancers, emulsifiers, stabilizers, colours, sweetners, antioxidants and food additives. Chemical and microbial spoilage of foods. Food safety.

REFERENCE BOOKS

Sinden R.R ,2006. DNA structure and function. Academic Press, London.

Geoffrey M. Cooper and Robert E. Hausman 2013.Cell-A Molecular Approach, 6th Edition. Sinauer Associates. USA.

Norman W. Desrosier N.W., 2008. The Technology and Food preservation. The Avi Publishing Company, Inc., Westport, Connecticut.

Grainger J.M and J,M Linch, 2005. Microbial Methods of Environmental Biotechnology, 4th edition, John Willey and Sons, New York.

15BCU521

INTERNSHIP PROGRAMME

**Semester V
2C**

Instruction hours/week: L:0 T:0 P:0

Marks: Internal: 50 External: - Total: 50

End Semester Exam: 3 Hours

Instruction hours/week: L:5 T:0 P:0**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course objectives**

- To understand the functions of hepatic, renal and cardiovascular system
- To evaluate the functions of hepatic, renal and cardiovascular system
- To learn fatty acid synthesis and degradation and their regulation
- To study the regulation of amino acid metabolism and its regulations with Metabolic disorders.
- To understand the inter relationship of carbohydrate, lipid, protein and nucleic acid metabolism and understand the importance of TCA cycle.
- To aware about the homeostasis of glucose metabolites by intrinsic and extrinsic control mechanism.

Course outcomes (CO's)**After completion of this course the student will**

1. Acquire the basis behind the assessment of vital organ functioning through liver function, kidney function and cardiomarker assessment.
2. Able to differentiate normal and abnormal functioning of human body.
3. Gain knowledge on glucose anabolic and catabolic pathways that ultimately control the glucose homeostasis.
4. Know the metabolic pathway of amino acid and their regulation with associated disorders.
5. Learn fatty acid synthesis and degradation and their regulation
6. Able to explain the role of lipids, their metabolism and their stringent control by hormones and other factors.

UNIT I

Disorders of carbohydrate metabolism: Normal sugar level in blood, renal threshold, regulation of blood glucose concentration; Diabetes Mellitus: Types, pathophysiology; Diagnosis -OGTT, glycosylated hemoglobin, complications- diabetic ketoacidosis and diabetic coma. Hypoglycemia: Definition and causes. Renal glycosuria- fructosuria, pentosuria and galactosuria.

Disorders of Amino acid metabolism: Cystinuria. Hartnup disease. Fanconi syndrome, Homocystinuria, Alkaptonuria, Phenylketonuria, albinism and maple syrup urine disease.

UNIT II

Disorders of Lipid metabolism: Introduction, clinical manifestation, biochemical abnormalities of lipoprotein-Abetalipoproteinemia, Hyperlipoproteinemias, Hypobetalipoproteinemias; hyperlipidemia, hypercholesterolemia, Cholesterol Acyl Transferase Deficiency. Atherosclerosis, Fatty liver, liver cirrhosis.

UNIT III

Disorders of Purine and Pyrimidine metabolism: Clinical manifestation, biochemical abnormalities, Hyper uricemia- Gout, Lesch-Nyhan syndrome, Von-Gierke's disease. Hypo uricemia – xanthinuria; Orotic aciduria.

Disorders of Bilirubin metabolism: Definition, clinical manifestation, Jaundice- types, biochemical abnormalities of Crigglar-Najjar syndrome. Gilbert's disease and Dubin Johnson disease.

UNIT IV

Gastric, pancreatic and intestinal function

Gastric function – Introduction- test of gastric function – insulin stimulation test, determination of gastrin in serum, tubeless gastric analysis.

Pancreatic function- Introduction, pancreatic function test- serum amylase and lipase, direct stimulation test-secretion of CCK, indirect stimulation test-lundh test.

Intestinal function- Introduction, tests used in the diagnosis of malabsorption, determination of total fecal fat, xylose excretion test and determination of total protein

UNIT V

Liver disease and liver function tests- Bilirubin metabolism and jaundice, liver function tests- Estimation of conjugated and total bilirubin in serum, Detection of bilirubin and bile salts in urine, Thymol turbidity test, serum enzymes in liver disease- Serum transaminases (SGOT and SGPT), and phosphatases.

Kidney function tests – Introduction, physical examination of urine, elimination tests- clearance test, insulin clearance, creatinine clearance and urea clearance: Renal blood flow and filtration fraction, clinical significance of GGT, LDH and creatine phosphokinase in kidney function.

Coagulation tests- prothrombin time, Activated Partial Thromboplastin Time (APTT) and lupus anticoagulant.

TEXT BOOKS

Ambika S. 2004, Fundamentals of Biochemistry for Medical Students, CIT Chennai.

Harper's illustrated Biochemistry, 2012, McGraw Hill publishers, New Delhi.

Chatterjea MN, 2011, Text book of medical biochemistry, 8th edition, JB publisher.

REFERENCES

Philip D.Mayne, 1994, Clinical Chemistry in Diagnosis and Treatment, ELBS Publications, New York.

Carl A. Burtis, Edward R. Ashwood and William Heinmann Teitz, 1999, Textbook of Clinical Biochemistry, W.B. Saunders Company, London.

Varley H 2003, Practical Clinical Biochemistry, CBS Publishing, New Delhi.

Macleod.J, C. wards and I. Bouchier.1995, Davidson's Principles and Practice of Medicine, English Language Book Society.

Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell ,2012.

Harper's illustrated Biochemistry, Appleton and Lange Publishers, London, 29th edition

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- This paper gives insight knowledge about the emerging themes of drug biochemistry.
- Provides an in depth analysis of specific drug classes, its metabolism and therapeutic approaches.
- Equip the students with Pharmacokinetics and Pharmacodynamics
- To get knowledge on drug tolerance and dependence
- Gain knowledge on genetically engineered drugs
- To understand the mechanism of action of drugs and its undesired effects of drugs

Course outcomes (CO's)**After successful completion, the students will understand**

1. What the body does to a drug and what a drug does to a body
2. Drug metabolism
3. The principles and procedure for genetically engineered drugs
4. How the drugs elicit the desired effect and undesired effects
5. The goal of the paper will ensure the widespread visibility and high impact of Drugs.
6. Thereby promoting on emerging research, pointing the way for the establishment of new medicines – from the identification of targets, through to the synthesis and evaluation of putative therapeutic entities.

UNIT I

Introduction to drug Biochemistry: Classification, routes of administration – factors influencing dosage and drug action, Absorption and distribution of drugs, binding of drugs to plasma proteins, Drug Dose relationship (LD_{50} , ED_{50} , therapeutic index), Drug – Receptor interaction, Drug binding forces, Receptor theories, Drug – Receptor interaction.

UNIT II

Drug metabolism: Drug Biotransformation pathways - phase I – oxidation, reduction and hydroxylation. Phase II- Conjugation, Elimination of drugs from body system. Storage of drugs in adipose tissue.

UNIT III

Drug abuse; drug dependence; drug resistance- Biological mechanism, ways to overcome.

Chemotherapy: Antibacterials – Mode of action of sulfonamides, penicillin, streptomycin, tetracycline, chloramphenicol, antiviral drugs, antifungal drugs; Antimetabolites of folate, purines & pyrimidines, Anti tubercular drugs.

UNIT IV

Mechanism of action drugs used in the treatment of diabetes mellitus (Acarbose, Biguanides), AIDS (Azidophymidine, Didanosine), cancer (Methotrexate, Busulfan), heart (Amrinone, Digoxin) and kidney disorder (Benzophiadiazines, furosemide); antiepileptic drug (Lamictal, Tapclob), drugs for cough (Dextromethorphan Hydrobromide, Noscaphine) and bronchial

asthma (Salbutamol,Aminophylline), diuretics (Manitol, Xanthine), anti ulcer drugs (Cimetidine, Ranitidine) and drugs for fever (Paracetamol, Ibuprofen).

UNIT V

Toxicology- Introduction, definition and disciplines of toxicology, classification of toxicity and toxicants, Mechanisms of toxic effect, treatment of intoxication, methods in toxicology testing, heavy metal toxicity and chelation therapy. Environmental pollution, mycotoxins, mushroom poisons

TEXTBOOK

Satoskar.R.S, S.P.Bhandarkar and S.S.Ainapuri. 2003. Pharmacology and Pharmacotherapeutic, 18th edition,Popular Prakashan, Mumbai.

REFERENCES

Hamilton.D, R.J. Philips and D. Scott .2004. Occupational, Industrial and Environmental Toxicology, Mosby Inc Publishers.

Berg G,M.I., R.G. Hendrickson and A.Morocco 2005. Medical Toxicology Review. McGraw Hill Mical Publishing Company.

William Foye, 2012. Principles of Medicinal Chemistry, 7th edition, B.I. Wanerly Pvt. Ltd, New Delhi.

Grahame-Smith D.G and J. K. Aronson, 2002.Oxford textbook of Clinical Pharmacology and Drug Therapy: 3rd edition. Oxford University Press.

K.D.Tripathy (2009). Essentials of Medical Pharmacology, Jaypee brothers medical publishers, New Delhi.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To give students both a theoretical background and a working knowledge of the instrumentation and techniques employed in a biotechnology laboratory
- Able to understand about the gene structure, replication, transcription, translation recombination mechanism of DNA.
- Know the regulation of the synthesis of DNA, RNA and protein.
- Know the DNA sequencing and Gene transfer techniques
- Understand the plant tissue culture technique
- Perform techniques involving the manipulation of DNA; and explore career opportunities in biotechnology

Course outcomes (CO's)**After successful completion, the students**

1. Understand the background of gene structure and flow of genetic information from DNA to RNA.
2. Understand the animal cell culture and stem cells
3. Understand the genetic engineering of plants
4. Understand the transgenic animals and gene therapy
5. Understand the DNA, genes, and gene Expression
6. Understand the recombinant DNA technology

UNIT -I

Introduction – Basic steps in gene cloning. Vehicles in gene cloning-Plasmids- basic features, size and copy number, classification. Bacteriophage- basic features, life cycle. Cosmids and phagemids. Viral vectors and plant vectors.

UNIT- II

Introduction of DNA into living cells-methods, microinjection, electroporation, shotgun methods. Transformation and transfection in *E.coli* – recombinant selection and screening. Maximizing the expression of cloned genes in *E.coli*- Promoters, Cassettes and production of fusion protein.

UNIT- III

DNA sequencing-Sanger and Maxim Gilbert method. PCR- techniques and applications. DNA foot and finger printing- applications. Hybridization probes- radiolabelled and non-radiolabelled. Hybridization techniques- Southern, Northern, Western blotting techniques. Site directed mutagenesis. DNA microarray.

UNIT- IV

Gene transfer techniques- Microinjection, biolistic methods, vector based transfer. Plant tissue culture-Media composition, nutrients and growth regulators, callus culture. Genetic engineering

of plants-methodology- plant transformation with Ti plasmid of *Agrobacterium tumefaciens*. Production of herbicide resistance plant (with reference to glyphosate only). Applications of transgenic plants.

UNIT –V

Genetic engineering of animals – methodology-production of transgenic mice (with reference to insulin only). Knock out mice, Applications of Transgenic animals. Animal biotechnology- Artificial insemination and embryo transfer. *In vitro* fertilization (IVF).

Animal cell culture-Facilities and culture media for animal cell culture. Primary cell culture techniques-cell separation and monolayer culture. Cell lines. Recombinant proteins from cell cultures: interferons, viral vaccines. Gene therapy.

TEXT BOOKS

U.Sathyannarayana 2005. Biotechnology, 1st edition, Uppala Author-Publisher Interlinks, Vijayawada.

Kumar H.D.1991. A Textbook of Biotechnology 2nd edition, East-West Press Private Ltd.

Kumaresan V.2005. Biotechnology, 1st edition, Saras Publications.

Singh B. D. 2004. Biotechnology, Kalyani Publishers, Chennai.

REFERENCES

Bernard Glick and Pasternick, 2002. Molecular Biotechnology, Panima Publishing Corporation, Delhi.

Brown T. A 2010. Gene cloning- an introduction, 6th edition, Wiley-Blackwell, London.

Mahesh S., A. B. V.Murthy 2003. Biotechnology, New age International Publishers, New Delhi.

Old & Primrose 2003. Principles of Gene manipulation, S. B. Blackwell scientific publication, New York.

Instruction hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives**Equip the students with:**

- To enable students to understand the ethical issues in life sciences and animal handling and to give a more insight in to IPR.
- To understand the food safety
- To understand the Biosafety guidelines and regulations
- Know the conservation and sustainable use of biodiversity
- Components of clinical research (Phases)
- Fundamentals of IPR and patents laws

Course outcomes (CO's)**After successful completion, the student will understand:**

1. Food safety
2. Application and level of bioafety
3. CPCSEA Guidelines for using small experimental animals
4. Human ethics committee and their guidelines
5. The patent procedure
6. Intellectual property rights and Patents laws

UNIT I

Bioethics – Positive effects, Negative effects. Consumer traits – food safety- Environmental concerns- Economic and Social Concerns.

Biosafety – Introduction, definition, need, application and level of bioafety. Bioethics - Introduction to Bioethics in life sciences;

UNIT II

Biosafety guidelines and regulations- National and International Guidelines. Introduction – Regulatory framework in various countries – USA- European Union-Canada-Australia- South Africa- Asian Region- International Guidelines. Biosafety guidelines in India. Guidelines for research in transgenic organisms. **Human ethics committee and their guidelines**

UNIT III

CPCSEA Guidelines for Laboratory Animal Facility Goal- Veterinary care- Animal procurement- **acclimatization**, Quarantine, Sterilization and separation – Surveillance, diagnosis, treatment and control of disease- Animal care and technical personnel, Personal hygiene- Animal experimentation involving hazardous agent- Multiple surgical procedures on single animal- Duration of experiments- Physical restraint- Physical relationships of animal facilities to laboratories – **rehabilitation and sacrifice procedure**. Functional areas - Environment- Animal husbandry- Activity – Food- Bedding- Water- Sanitation and cleanliness. Assessing the effectiveness of sanitation – Waste disposal- Pest control- Emergency , weekend and holiday care.

UNIT IV

Participation of public and NGO's in biosafety and protection of biodiversity – introduction. Participation – consultative processes – public participation and education – role of NGO's in biosafety and biotechnology – environmental and food safety. Food supply and population. Role of public and NGO's in protection, conservation and sustainable use of biodiversity.

UNIT V

Intellectual Property Rights - An introduction- **Types**; Origin of the Patent Regime- Early patterns Act & Indian Pharmaceutical Industry – History of Indian Patent System- The Present Scenario – Basis of Patentability –Patent Application Procedure in India- Patent Granted Under Convention Agreement- Patent Procedure – Opposition to Grant of Patent. Grant and Sealing- Exclusive Rights – Grant of Exclusive Rights- Special Provision for selling or distribution – Suits relating to infringements.

TEXT BOOKS

Sateesh M K. 2008. Bioethics and Biosafety, I K International Publishers Pvt Ltd.

Shaleesha A.S. 2008. Bioethics, Published by Wisdom Educational Service, Chennai.

REFERENCES

Deepa Goel. 2013. IPR, Biosafety and Bioethics, 1st edition, Pearson Education Publishers, Chennai.

Geetha B. and R Ramamurthy. 2007. Bioethics and Biosafety, 1st edition, APH Publications.

Instruction hours/week: L:5 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**Course objectives**

- The course is to offer the student state of the art education of stem cell and how the pluripotent cells and multipotent cells can be used to treat the neurodegenerative disorders, cardiovascular disorders and diabetes.
- Explain the specific characteristics of stem cells.
- Relate the importance of stem cells to the development and maintenance of multicellular organisms.
- Understand how cell-cell signaling maintains stem cells and influences differentiation of specialized cell.
- Understand how defects in stem cell behavior can lead to medical problems.
- Describe current limitations of stem cell biology applications and areas of active research

Course outcomes (CO's)**After successful completion, the student will:**

1. Get the knowledge of wide ranging, topics related to stem cells, regenerative biology and embryonic cells.
2. Differentiate between embryonic and adult stem cells, and describe their characteristics
3. Define the molecular mechanisms of stem cell differentiation
4. Discuss potential applications of stem cells in regenerative medicine.
5. Gain a knowledge of the intrinsic and extrinsic factors important for stem cell renewal and differentiation.
6. Understand the clinical significance of stem cell research and the possible problems that need to be overcome.

UNIT I

Introduction to Stem Cells – Definition, Classification, characteristics, Differentiation and dedifferentiation, Basic culture procedures – Isolation, culture methods, identification, stem cell markers, feeder layer; Instrumentations in stem cell biology.

UNIT II

Different kinds of stem cells – Adult Stem cells-stem cell niche, Embryonic stem cells, Embryonic Germ cells, Hematopoietic stem cell, Neural stem cells, muscle and cardiac stem cells, Umbilical cord blood stem cells, cancer stem cells, Mesenchymal stem cells, Induced pluripotent Stem cells.

UNIT III

Therapeutic applications – stem cells and neurodegenerative disorders, stem cells and diabetes, stem cells and cardiac disorders, regeneration of epidermis, Success stories of stem cell therapy. Stem cell banking.

UNIT IV

Cell Cycle Control, Checkpoints, and Stem Cell Biology: regulation of the eukaryotic cell cycle
- The spindle checkpoint - Cell cycle checkpoints in a changing cell cycle and their **relationship to stem cells**.

UNIT V

Regenerative medicine: Current stem cell therapies, Correlation between stem cells and cancer, Stem cells and aging. Hematopoietic stem cells and their clinical application. Treatment of neural diseases (Parkinson's disease, Huntington's disease and Alzheimer's disease). Repair of damaged organs (liver and pancreas).

TEXT BOOK

Essentials of Stem cell Biology – Robert Lanza, John Gearhart, Brigid Hogan, Academic Press, 2005.

REFERENCES

Daniel R. Marshak, Richard L. Gardner, David Gottlieb Stem Cell Biology. Cold Spring Harbor Laboratory Press, 2001.

Lodish, H., Ber, A., Zipursky, L.S., Matsudaira, P., Baltimore, D and Darnell J. (2001) Molecular Biology W.H Freeman & Co. 47

Instruction hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- Understand the *in vitro* study of the biological properties that contribute to the prevention, diagnosis, prognosis and monitoring of diseases and disease states in humans.
- To teach students on phlebotomy, serum and/or plasma collection.
- The estimation of biomolecules such as glucose and cholesterol
- Assessment of renal function through the analysis of urea and uric acid in serum
- Assessment of liver function through the estimation of bilirubin
- To impart skills to assess various biomolecules to diagnose the functioning of vital organs.

Course outcomes (CO's)

1. Know the analytical methods commonly used in the clinical laboratory.
2. Know how can contribute the clinical laboratory to assess the health status of individuals
3. Students acquire the skills to perform phlebotomy and to estimate biomarkers to assess the vital organ functions.
4. Explain the physiopathological bases and the biochemical markers of the most prevalent diseases in our population
5. Interpret and integrate the analytical data from the principal biochemical tests for the screening, diagnosis, prognosis and monitoring of pathologies
6. Use clinical laboratory techniques to determine biochemical markers of different pathologies and critically assess the results, speculating on the nature of any possible underlying pathologies.

BLOOD ANALYSIS

1. Determination of blood sugar by O-Toluidine method.
2. Determination of urea DAM-TSC method.
3. Determination of phosphorus by Fiske-Subbarow method.
4. Determination of alkaline phosphatase in serum.
5. Determination of acid phosphatase in serum.
6. Determination of cholesterol in serum by Zak's method.
7. Determination of total proteins by Lowry's method and Biuret method.

URINE ANALYSIS

8. Determination of creatinine by picric acid method.
9. Determination of urea DAM-TSC method.
10. Determination of uric acid by Caraway's method.
11. Determination of calcium by permanganate method.
12. Determination of phosphorus by Fiske-Subbarow method.

KIT METHOD (Group experiments)

13. Estimation of triglycerides in serum
14. Estimation of creatinine in serum
15. Estimation of haemoglobin in serum
16. Extraction of lipids from liver and estimation of cholesterol

REFERENCES

Jayaraman.J.2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.

Patel.H .2003.A Manual of Medical Laboratory Technology, Navaneet Prakashan limit, Bombay.

Sadasivam.S, and A. Manickam .2009.Biochemical Methods, New Age International Publishers, New Delhi.

Singh.S.P.2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction hours/week: L:4 T:0 P:6**Marks: Internal: 60 External: 90 Total: 150
End Semester Exam: -**

Instruction hours/week: L:0 T:0 P:0**Marks: Internal: - External: 100 Total: 100**
End Semester Exam: 3 Hours**Course objectives****Equip the students with:**

- Managerial skills
- Hospital organization
- Specialized service areas
- Human Resources
- Finances
- Quality Assurance

Course outcomes (CO's)

After Successful completion, the students will understand:

1. The Managerial skills required for hospital management
2. Hospital organization
3. Overview of specialized service areas
4. Human Resources required for the running of the hospital
5. Maintenance of income and expenditure documents
6. Ensuring Quality Assurance

UNIT –I**Managerial skills:** Planning, Information system, communication, Delegation, Decision making, Monitoring and evaluation, Managing time, Meetings, Negotiations and Innovation.**UNIT-II****Hospital organization:** Hospital Organization – Structure and functions – Objectives, Types of hospitals, Hospital organizational principles. Hospital organizational functions – Organization and function of the governing body, senior management executives, The department heads. Hospital committees. The Clinical Services – The medical staff organization, The nursing services – objectives, administrations, Rules, policies and procedures, Meetings and audit.**UNIT III****Specialized service areas:** Casualty services- Characteristics, management problems, instructions. Disaster: Be prepared- Plan of action, Outpatient services- location, physical infrastructure facilities, problem in functioning of OPD. Day care, The operating department, diagnostic services, medical records- nature and contents, Pharmacy –functions, problems in drugs supply, physical facilities and legal implications.**Unit IV****Human resources:** Personnel – introduction, problem people, restraining, performance appraisal system- objectives, technology of appraisal, conflicts in appraisal. Material and management - objectives, process of material and management.

Unit V

Finances: Methods of financing, internal control, preparation of income and expenditure account. Activity based costing in hospitals- objectives, clinical budgeting and advantages.

Quality assurance: Quality management in hospitals, quality management programs.

TEXTBOOK

C.M. Francis, 1995. Hospital administration. 2nd edition, JAYPEE brothers medical publishes Pvt. Ltd. New Delhi, India.

REFERENCES

C.M. Francis and Mario C de Souza, 2000. Hospital administration. 3rd edition, JAYPEE brothers medical publishes Pvt. Ltd. New Delhi, India.

B.M. Sakharkar, 1999. Principles of hospital administration and planning. 1st edition, JAYPEE brothers medical publishes Pvt. Ltd. New Delhi, India.

**ADVANCED ANALYTICAL TECHNIQUES AND
RESEARCH METHODOLOGY**

Instruction hours/week: L:0 T:0 P:0**Marks: Internal: - External: 100 Total: 100
End Semester Exam: 3 Hours****Objective:****Equip the students with:**

- Principles of NMR and X-Ray Crystallography
- Principles of Ultrasound imaging
- Working principles of EEG, ECMO
- Fundamentals of nanotechnology
- Experimental design
- Clinical Research

Outcome:

After successful completion, the students will understand:

- Principles of NMR and X-Ray Crystallography
- Principles of Ultrasound imaging
- Working principles of EEG, ECMO
- Fundamentals of nanotechnology
- Experimental design
- Clinical Research

UNIT I

NMR-Principles, features of NMR spectra, NMR imaging. X-Ray crystallography-Determination of molecular structure. X-Ray Comput Tomography (CAT Scan)-basic principles and system components.

UNIT II

Ultrasonic imaging systems-physical principles- mical ultra sound. ECG-Electrical and mechanical activity of heart, leads, heart sound, artificialheart valve, Pacemaker- heart lung machine. Electroencephalography (EEG) - Electrical activity of the brain, Applications. Fibre optics- Sources, detectors, application, Endoscope.

UNIT III

Nanotechnology-Introduction, development of nanotechnology, fundamental concepts, nano materials, tools - nano tubes, nanopores, cantilevers, dentrimers and quantum dots. Nano voyage into medical application and drug designing. Nano integrate eco system.

UNIT IV

Analysis and Identification of research requirements: Prioritization of research area. Review of work done in identification area - time scheduling - laboratory facilities, Research duration – choice of research topic – Methodology – Procure, experiment design.

Experiment design: Regarding observation. Types of observation. Laboratory setting sample; Data collection – Presentation of and analysis of collect data. Preparation of result reports and Publication of research findings in peer review journals, impact factor.

UNIT V

Quality Control: Introduction, GLP, equipments and computer system, quality assurance unit, standard operating procures, reagents and solutions and conduct of study, study protocol and study report and record retention and retrieval. Clinical trial: Types, Design, Clinical trial protocol, Design features, Statistical power, Phases- Phase 0, Phase I, Phase II, Trial design, Phase III, Phase IV. Intellectual Property rights in India

TEXT BOOKS

Kothari, C. R. 2009. Research Methodology – Methods and Techniques. New Age International Pvt. Ltd, New Delhi.

Gupta. S.P, 2007. Statistical Methods. Sultan Chand and Co. New Delhi.

REFERENCES

Beck J.C, 2004. PR: Patents - Trademarks-Plant-Copyright, Plant Breers Rights - Intellectual GeriatricsReviem Syllabus.5th edition. AGS Publishers, New York.

Kenneth W.H, and P.S.Khandpur, 2005, Handbook of Biomedical Instrumentation-. A Biologist's Guide to principles and techniques of practical Biochemistry, Tata Mcgrow Hill ,Cambridge University press, London.

Mick Wilson,Kamali Kannangara,Geoff Smith,Michelle Simmons,Burkhard Raguse 2005 “Nanotechnology-Basic Science and emerging technologies”-Overseas Press.

Richard Booker,Earl Boysen 2006. Nanobiotechnology, Pointer publishers, Rajastan.

Pocock SJ, 2004, Clinical Trials: A Practical Approach, John Wiley & Sons, ISBN 0-471-90155-5.

M.Sc., - BIOCHEMISTRY

PREAMBLE

- Biochemistry is the study of chemistry and relating to biological organisms.
- Biochemistry is sometimes viewed as a hybrid branch of organic chemistry which specializes in the chemical processes and chemical transformations that take place inside of living organisms.
- Biochemistry incorporates everything in size between a molecule and a cell and all the interactions between them.
- Biochemistry essentially remains the study of the structure and function of cellular components (such as enzymes and cellular organelles) and the processes carried out both on and by organic macromolecules - especially proteins, but also carbohydrates, lipids, nucleic acids and other biomolecules.
- All life forms alive today are generally believed to have descended from a single proto-biotic ancestor, which could explain why all known living things naturally have similar biochemistries.
- Biochemistry is most simply put the chemistry of life.

KARPAGAM ACADEMY OF HIGHER EDUCATION
Coimbatore – 641 021
DEPARTMENT OF BIOCHEMISTRY
M.Sc., CURRICULUM (2015 – 2016 Batch)
(Scheme of Examination for 2015- 2016 onwards)

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
SEMESTER - I										
15BCP101	Chemistry of Biopolymers	I	a	4	-	-	4	40	60	100
15BCP102	Enzymes and Microbial Technology	II	d	4	-	-	4	40	60	100
15BCP103	Bioinstrumentation	II	d, e	4	-	-	4	40	60	100
15BCP104	Cellular Biochemistry	III	a	4	-	-	4	40	60	100
15BCP105	Plant Biochemistry	III	a	4	-	-	4	40	60	100
15BCP111	Practical – I Quantitative Estimation and Separation Techniques	I,III	c, f	-	-	4	2	40	60	100
15BCP112	Practical – II Plant Biochemistry and Microbiology	I, III	d	-	-	4	2	40	60	100
	Seminar Presentation	I, II	a,e	2	-	-	-	-	-	-
Semester Total				22	-	8	24	280	420	700
SEMESTER – II										
15BCP201	Regulation of Metabolic Pathways	II	a	4	-	-	5	40	60	100
15BCP202	Molecular Biology	II	a, b	4	-	-	5	40	60	100
15BCP203	Bioinformatics	II	a, b	4	-	-	4	40	60	100
15BCP204	Core Elective - I	III	d	4	-	-	4	40	60	100
15OEP201	Open elective			4			3	-	100	100
15BCP211	Practical – III Molecular Biology and Animal Biotechnology	II	d, g, h	-	-	4	3	40	60	100
15BCP212	Practical – IV Biological Databases and Analysis	III	d, g, i	-	-	4	3	40	60	100
	Journal paper analysis and Presentation	I-III	a, e	2	-	-	-	-	-	-
Semester Total				22	-	8	27	240	460	700
SEMESTER – III										
15BCP301	Immunology	I	a	4	-	-	4	40	60	100
15BCP302	Clinical Biochemistry and Endocrinology	I, III	a, d	4	-	-	4	40	60	100
15BCP303	Chemsitry of Natural Products	II	a, d	4	-	-	4	40	60	100
15BCP304	Drug Biochemistry and Neurochemistry	III	a, d, j	4	-	-	4	40	60	100
15BCP305	Core Elective – II	III	e,g	4			4	40	60	100
15BCP311	Practical – V Clinical Enzymes and	I, II	d, e	-	-	4	2	40	60	100

	Immunology									
15BCP312	Practical – VI Clinical Biochemistry and Animal Studies	I	d, e, i	-	-	4	2	40	60	100
	Seminar Presentation	I-III	d, e, h	2	-	-	-	-	-	-
	Journal paper analysis and Presentation	I-III	d, e	2	-	-	-	-	-	-
Semester Total				22	-	8	24	280	420	700
SEMESTER – IV										
15BCP491	Project and Viva Voce	I-III	a-j	05	-	25	15	80	120	200
Semester total				05	-	25	15	80	120	200
Program Total							90	880	1420	2300

Open Elective (Theory)	
15OEP401	Bioremediation

Core Elective – 1 (Theory)		Core Elective – 2 (Theory)	
15BCP204A	Recombinant DNA Technology	15BCP305A	Biostatistics and Research Methodology
15BCP204B	Good Laboratory Management	15BCP305B	Clinical Research and IPR
15BCP204C	Fermentation Technology	15BCP305C	Biopharmacy
15BCP204D	Plant Tissue Culture	15BCP305D	Animal Tissue Culture
15BCP204E	Dietetic Management of Disease	15BCP305E	Genomics and Proteomics

Code	Additional Course	Objectives and		Instruction hours /			Credit(s) Total	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								-	100	100
15BCP306	Clinical Data Management	III	b, i, j	-	-	-	04	-	100	100
15BCP401	Drug Desinging	III	b, i, h	-	-	-	04	-	100	100

Blue – Employability

Green – Entrepreneurship

Red – Skill Development

Code: 15BCP101

15 -Academic Year

BC -Biochemistry

P - Masters Degree

First Digit - Semester number (1, 2, 3 and)

Second digit - Theory (0); Practical (1); Project (9)

Last digit - Paper number in the concerned semester (1, 2...)

PROGRAMME OUTCOME (POs)

PG biochemistry graduate will be able to achieve

- a. **Critical Thinking and Effective Communication:** The teaching is intended to kindle the critical thinking of the student to address problems (Problem based learning) and equip them to list out their understanding (Activity based learning). The syllabus also includes journal paper presentation and analysis on specific topics of all subjects which will be evaluated by faculty handling the subject.
- b. **Future Career:** To prepare students for future careers in the various fields of biochemistry such as academic and research institution.
- c. **Societal Contribution and Social Interaction:** The Biochemistry Programme will benefit the society on the whole by adding to the highly skilled scientific workforce, particularly for the biomedical research sectors, in the academic, industry as well as for research laboratories across the country and the globe. Inside the classrooms group discussion is encouraged on topics during the last five minutes of class to improve the understanding and to share the knowledge and view point. Outside the classroom, various outreach programme are conducted on various health initiatives.
- d. **Identification and Differential Diagnosis:** To acquire biochemist position in leading hospitals and scientist position in industries.
- e. **Ethics:** Students learn about the significance of having right moral features to develop good interpersonal skills.
- f. **Environment and Sustainability:** Understand the role of citizen to maintain sustainable environment and encourage Eco-friendly initiatives.
- g. **Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context of health and disease.

PROGRAMME SPECIFIC OUTCOME (PSOs)

- h. To prepare students for future careers in various fields of biochemistry by enhancing analytical and critical-thinking skills in which a core understanding of the chemistry of biological processes is important for the understanding of human health and disease.
- i. To equip highly skilled scientific workforce, particularly for the biomedical research sectors, in the academic, industry as well as for research laboratories across the country and the globe.
- j. The skills acquired in the programme will help the students in acquiring scientific, academic and industrial positions such as Analyst, Research Scientist at Pharma (R&D) Industries, Academician, Project Associates (JRF, SRF), Doctoral Research positions abroad at India and abroad. Clinical biochemist at renowned hospitals, medical coding, Scientific writers.

PROGRAMME EDUCATIONAL OBJECTIVE (PEOs)

- I. The course aims to impart advanced and in depth understanding on all the human physiological and pathological state. To understand the molecular process and their perturbation during disease.
- II. The programme covers various aspects of Biomolecule estimation and regulation to ascertain health and disease state. metabolic pathways alterations along with their regulation at the replication, transcriptional, translational, and post-translational levels including by studying DNA, RNA and protein molecules, immunology, endocrinology, advancements in rDNA technologies to circumvent genetic disorders.
- III. Further to enrich research understanding various genomic, proteomic and bioinformatics tools are added. Animal cell culture, IPR, Biostatistics, research methodology, clinical research and Plant tissue culture are offered as elective papers to get specialized in a specific area. The final semester is devoted exclusively to enrich the students to address specific research objective.

Mapping of PEOs and POs

POs	a	b	c	d	e	f	g	i	j	k
PEO I	X		X			X				
PEO II	X		X	X	X	X		X	X	X
PEO III	X	X	X	X	X		X		X	X

Course objectives**Equip the students:**

- To understand the biological significance of polysaccharides in living systems
- To understand the structure of amino acids and proteins and their biological significance in living systems
- To know the structure, properties and biological significance of lipids in biological systems
- To understand lipid peroxidation and the importance of antioxidants in degenerative diseases
- To understand the structure and functional role of nucleic acid in living systems
- To understand the nucleic acid interaction with proteins and their molecular aspects.

Course outcomes (CO's)**After successful completion of the course, the student will:**

1. Understand the structure and organization of storage and structural polysaccharides in living system
2. Recognize the structure and importance of proteins and amino acids in biological system.
3. Recall the role of lipids in bio membrane including signal transduction
4. Equip with the knowledge on antioxidants and their importance
5. Differentiate the structure, types, properties and functions of DNA and RNA
6. Recognize the nucleic acid interaction with proteins and gain knowledge in molecular techniques.

UNIT I

Polysaccharides: Occurrence, structure and biological functions of cellulose, chitin, starch and glycogen. Fructans, arabinans and galactans(brief account). Occurrence, structure, and biological functions of bacterial cell wall polysaccharides and blood group antigens. Structure and significance of glycoconjugates -Glycosaminoglycans – structure and biological role of hyaluronic acid, chondroitin sulfate and heparin, sialic acid; glycoproteins and glycolipids.

UNIT II

Proteins: Orders of protein structure. Primary structure – determination of amino acid sequence of proteins. The peptide bond – The Ramachandran plot. Secondary structures – α -helix, β -sheet and β -turns. Fibrous proteins- Collagen triple helix-Structure and assembly. Globular proteins-forces involved, folding process and folding patterns. Tertiary structure –Myoglobin organisation. Quarternary structure of proteins- Structure of haemoglobin. Models for haemoglobin allostery. Quintinary structure-basics only.

UNIT III

Lipids: Introduction- simple lipid, compound lipids-phospholipids, glycolipids and storage lipids. Properties of lipids-Micelles, bilayers and liposomes. Significance of lipid anchored protein-prenylated, fatty acylated and GPI anchored proteins. Lipoproteins – classification and composition. Lipids as signals, cofactors and pigments (Brief account). Lipid peroxidation and antioxidants.

UNIT IV

Nucleic acids: DNA double helical structure – Watson and Crick model. A, B and Z forms of DNA. Tertiary and quadruplex structures of DNA. DNA supercoiling and linking number. Properties of DNA – DNA bending, buoyant density, viscosity, denaturation and renaturation – The cot curve – Chemical synthesis of DNA. Major classes of RNA – mRNA, rRNA, tRNA, sn RNA, siRNA, hn RNA – structure and biological functions. Secondary and tertiary structure of tRNA and rRNA.

UNIT V

Nucleic acid interaction with proteins: DNA binding motifs in proteins – the basic helix loop helix (bHLH) motif, zinc finger, the leucine zipper, helix-loop helix and homeo domain. RNA binding motifs in proteins. Molecular aspects of protein-nucleic acid binding – direct interactions. Techniques characterizing nucleic acid-protein complex – gel retardation assay, DNase I footprinting.

REFERENCES

1. Lehninger Principles of Biochemistry 4th edition Nelson and Cox, Freeman Publishers, 2005
2. Harper's Biochemistry 26th edition. McGraw Hill, 2003
3. Biochemistry 4th edition. Zubay, William C. Brown Publication, 1998
4. Biochemistry. Voet and Voet, John Wiley, 1995
5. Nucleic acid structure and recognition. Neidle, Oxford University Press, 2002
6. Nucleic acids in Chemistry and Biology. Blackburn and Gait, IRL Press, 1996
7. David Rawn.J.(2004). Biochemistry, First Indian reprint, Panima Publishing Corporation, New Delhi.

Course objectives**Equip the students:**

- To understand the structure of enzymes and their classifications.
- To analyse the active site of enzymes by various experimental approaches.
- To learn the kinetics of enzyme catalysed reactions.
- To learn the importance of enzyme immobilization and its wide applications in medicine and industries.
- To study various fermentor designs, culture systems and the application of fermentation process in industry.
- To learn the fermented products preparation, downstream processing and its industrial applications.

Course outcomes (CO's)**After successful completion of the course, the student will:**

1. Understand the mechanism of action of enzymes and their classifications.
2. Recall the kinetics of enzyme catalyzed reactions
3. Understand the enzyme immobilization concept and apply the knowledge to produce more products out of it.
4. Gain knowledge in designing fermentor based on Industrial needs
5. Have clear understanding of microbe's implication to derive a product and the role of enzymes in downstream process.
6. Clear in concept of various culture techniques and apply the suitable one for a particular application.

UNIT I

Proteins: Enzymes - Nomenclature and classification of Enzymes with examples; coenzymes and cofactors. Active site rule: catalytic triad; Mechanism of enzyme action - Lock and key model, Induced fit model. Factors affecting enzyme activity. Isolation, purification and characterization of enzymes.

UNIT II

Enzyme Kinetics : Derivation of MM equation, LB plot, Eadie Hofstee plot and Hanes plot. Enzyme inhibition-Types and differentiation of competitive, uncompetitive, Non-competitive inhibition, Allosteric inhibition, feed-back inhibition and regulation. Allosteric enzymes- cooperativity, Hills equation, Physiological significance of sigmoidal behaviour. R and T states and K and V series. Mechanism of action of enzymes - chymotrypsin and lysozyme.

UNIT III

Immobilization of enzymes: Methods of immobilization - adsorption, covalent binding, entrapment, membrane confinement. Effect of immobilization on enzyme. Use of enzymes in detergents, Leather Industry, Wool Industry, Food, Dairy, Juice and Beverage Industry, Sugar Industry. Uses in medicine. Enzyme engineering. Artificial enzymes and synzymes, Abzymes, ribozymes, enzymes in organic solvents.

UNIT IV

Microbial Growth: Balanced and Unbalanced microbial growth; Measurement of growth; Principles of microbial growth and culture systems-batch culture, fed batch culture, semi-continuous culture and continuous culture. Isolation and screening of industrially important microbes. Important strains for better yield. Design of a fermenter. Types of bioreactor-Continuous stirred tank, Bubble column, Airlift, Fluidized bed, Packed bed and Photobioreactor.

Solid substrate fermentation and Media fermentation. Examples of bioprocess for the production of biomass. Microbial metabolic products-primary and secondary metabolites.

UNIT V

Production of fermented products and downstream processing: Production of alcohol and alcoholic beverages. Microbial production of Organic acids: Source, recovery and uses of Citric acid, Lactic acid, Acetic acid and L-ascorbic acid. Production of antibiotics: Penicillin and Tetracyclin. Bioinsecticides: Production of Bacterial and fungal polysaccharides, commercial production of Xanthan gum and pullulan. Production of edible mushroom and SCP.

Biofertilizers (*Phosphobacterium* and *Rhizobium sp.*, - Basics only).

TEXT BOOKS

1. Jain J.L, 2013, Fundamentals of biochemistry, S. Chand & Co Ltd, New Delhi.
2. Sathya Narayana U, 2005. Biotechnology, Books and Allied Publishers, Kolkata.
3. Trevor and Palmer, 2004. Enzymes, East West Press Pvt Ltd, New Delhi.
4. Wolf Crueger and Annesie Cruger, 2004. Biotechnology: A Textbook of Industrial Microbiology, 2nd Edition, Panima Publishers, Bangalore.
5. M. R. Adams and M. O. Moss, 2004, Food Microbiology, New age publishers, New Delhi.
6. R. Singh and S.K.Ghosh, 2004, Industrial Microbiology, Global Vision publishers, New Delhi.

REFERENCES

1. Chapline M.F and C. Bucke, 1990, Protein Biotechnology. Cambridge University Press, London.
2. Gary Walsh, 2002, Proteins Biochemistry and Biotechnology, John Wiley & Sons Ltd, New York.
3. Glazer A.N, H.Nikaido,2007, Fundamentals of Applied Microbiology. W H. Freeman Company, New York.
4. Nicholas C.Price and Lewis Stevens, 2004, Fundamentals of Enzymology, 3rd Edition, Oxford Univ. Press, New York.
5. Stanbury P.F, A.Whitaker and S.J.Hall, 2005, Principles of Fermentation Technology, Elsevier Publishers.
6. Thomas. E and W.Creighton 2002, Proteins: Structure and Molecular properties, W.H Freeman and Company, New York.
7. Patel, 2003, Industrial Microbiology, Macmillan India limited, New Delhi.

Instruction hours/week: L: 4 T: 0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objective**Equip the students:**

- To learn centrifugation techniques and their applications in biological system.
- To understand the principle of colorimetry
- To understand the applications of advanced spectrophotometric techniques
- To learn the basics, advanced techniques and applications of chromatography
- To learn the principle and applications of electrophoresis techniques
- To understand the principle and applications of radio isotopic techniques in biological sample analysis

Course outcomes (CO's)**After successful completion of the course, the student will:**

1. Apply the centrifugation techniques in biological system
2. Use colorimetry and spectrophotometry for sample analysis
3. Use spectrophotometry for sample analysis
4. Use chromatographic techniques for sample analysis
5. Detect radioisotopes and analyze samples
6. Use electrophoretic techniques for sample analysis

UNIT I

Colorimetry: Colour and absorption spectra, Beer's law and Lambert's law. Principle of photoelectric colorimeter, Spectroscopy – Properties of electromagnetic radiations, Instrumentation and applications of UV Visible and mass spectroscopy, Spectrofluorimetry, atomic spectroscopy, NMR spectroscopy and ICPMS, Applications.

UNIT II

Centrifugation: Principle, types of centrifuges, Principles and applications of analytical and preparative centrifuges, density gradient and ultra centrifugation. Relative molecular mass determination and sedimentation coefficient. Sub cellular fractionation of cellular components. Applications.

UNIT III

Chromatography: Principles, Types – paper chromatography, thin layer chromatography and HPTLC, Column chromatography - Ion exchange chromatography, affinity chromatography, gel filtration chromatography, Low pressure liquid chromatography (LPLC) and High Performance Liquid Chromatography (HPLC)- Normal and Reverse Phase Gas -liquid chromatography Mass spectroscopy (GC – MS), MALDI-TOF. Application of Chromatography.

UNIT IV

Electrophoresis: Principle, instrumentation and applications of agarose gel electrophoresis, sodium dodecyl sulphate – polyacrylamide gel electrophoresis (SDS-PAGE), native PAGE, isoelectric focusing, immunoelectrophoresis, 2D gel electrophoresis. Pulse field gel electrophoresis, capillary electrophoresis, gel documentation – Applications.

UNIT V

Radioisotopic techniques: Introduction, nature of radio activity, types and rate of radioactive decay, units of radio activity, detection and measurement of radioactivity-Geiger-Muller counter, solid and liquid scintillation counter. Autoradiography, X-ray diffraction and circular dichorism. Non radioactive, fluorescent methods.

Flowcytometry: Principles and applications.

TEXT BOOKS

1. Chatwal, G.R. and S.K.Anand, 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai.
2. Sharma, B.K.2004. Instrumental Methods of Chemical Analysis, 24th Edition, Goel Publishing House, Meerut.

REFERENCES

1. Boyer, R. 2000. Modern Experimental Biochemistry. 3rd Edition. Addison Wesley Longman. New Delhi.
2. David Friedfelder, 2001. Physical Biochemistry. 5th Edition Oxford Publishers. New York.
3. Keith Wilson and John Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology, 7th Low Price Edition, Cambridge University Press, India.

15BCP104

CELLULAR BIOCHEMISTRY

4H-4C

Instruction hours per week: L: 4 T: 0 P:0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives**Equip the students**

- To recall the knowledge in organization and dynamics of mitochondria.
- To understand the molecules within the cell and interaction between cells that allows construction of multicellular organisms.
- To understand cytoskeleton network and extracellular matrix.
- To learn cell signaling mechanisms and pathways
- To understand cell cycle, cell division and cell death process.
- To recognize cancer and mutational changes at gene level.

Course outcomes (CO's)**Upon successful completion of this course, participants will be able to:**

1. Recognize the organization and dynamics of mitochondria.
2. Recognize cell cell interaction and their mechanism.
3. Maintain cytoskeleton structure and functions of micro, macro and intermediary filaments.
4. Recognize the cell signaling mechanisms and pathways.
5. Enumerate the phases of cell cycle, events in cell division and mechanism of cell death
6. Relate properties of cancerous cells to mutational changes in gene function.

UNIT I

Membrane: Membrane bilayer- models, Membrane lipids- fluidity, asymmetry, phase transition, Liposomes.

Membrane proteins – Types, Orientation, Mobility – Experiments, flippases, proteins of RBC membrane, RBC ghosts, Bacteriorhodopsin, Porins – aquaporin. solubilisation of proteins, lipid anchored proteins, Carbohydrates – cell surface carbohydrates – Lectins and selectins.

UNIT II

Membrane transport: Passive diffusion, facilitated diffusion in erythrocytes, Carriers and ion channels, Ion concentration gradients.

Uniporter Catalyzed transport, active transport systems. Transport process driven by ATP- Ion pumps: Calcium ATP ase; $\text{Na}^+ \text{K}^+$ ATPase; Mechanism, Gastric $\text{H}^+ \text{K}^+$ ATPase, ABC superfamily – ATPases that transport peptides and drugs (MDR proteins).

Co-transport by Symporters and antiporters, Group translocation.

Osmosis and receptor mediated endocytosis.

UNIT III

Mitochondria – Reduction potential, electron transport chain – Complexes, Q-cycle, Cyt C oxidase complex, Translocation of protons and the establishment of a proton motive force, machinery for ATP formation and chemi-osmotic mechanism, ATP synthase – Experiments, inhibitors and uncouplers of oxidative phosphorylation.

Microfilaments – Actin – Structures, Assembly, Myosin. Microtubules – Organisation and dynamics, kinesin and dynein. Cilia and flagella – Structure and functions, intermediary filaments.

UNIT IV

Cell – Matrix interaction: Cell – Cell interaction: Extra cellular matrix; Collagen, hyaluronan and proteoglycans, laminin, integrins and fibronectins.

Cell – Cell adhesion: Specialised junctions – Desmosomes, Gap junctions, Tight junctions. Adhesion molecules – Cadherins, Connexins.

Cell – Cell signaling – Signalling molecules and their receptors; functions of cell surface receptors, pathways of intracellular signal transduction, second messengers, G-protein coupled receptors, receptor tyrosine kinases, Ras, MAP kinases.

UNIT V

Cell cycle and cancer: Cell cycle and its control, Cell cycle control in mammalian cells, checkpoints in cell cycle regulation.

Cancer: Properties of tumour cells and genetic basis and onset of cancer.

Tumour viruses – DNA & RNA Viruses as transforming agents – mechanism.

Tumour suppressor genes and functions of their products. Carcinogenic effect of chemicals and radiation. Apoptosis (Programmed cell death) – pathways, regulators and effectors on apoptosis.

TEXT BOOKS

1. Ajay Paul, 2009. Text Book of Cell and Molecular Biology, 1st edition. Books and Allied (P) Ltd, Kolkata.
2. Geoffrey M. Cooper and Robert E. Hausman 2013. Cell-A Molecular Approach, 6th Edition. Sinauer Associates. USA.
3. Gerald Karp 2013. Cell and Molecular Biology, 7th edition. John Wiley and Sons, Inc, Hoboken, United States.
4. Nelson.D.L and Cox.M.M. 2012. Lehninger's Principles of Biochemistry, 6th edition. W.H.Freeman and company, New York.

REFERENCES

1. Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger. 2012. Molecular Cell Biology, 7th edition. W.H. Freeman & Company, London.
2. Garrette & Grisham, 2004. Principles of biochemistry, 4th edition. Saunders college publisher, Philadelphia, United States.
3. Bruce Alberts, Alexander Johnson, Julian Lewis and Martin Raff. 2007. Molecular Biology of the Cell, 5th edition. Garland Publishing Co. New York.

PLANT BIOCHEMISTRY**Instruction hours/week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course objectives****Equip the students**

- To recollect the knowledge in plant cell organelles and their functions
- To understand the functions and regulations of major biosynthetic pathways of plants
- To learn and understand the role of plant growth substances in various stages of plant growth
- Obtaining knowledge on tissue culture techniques
- To learn metabolic engineering to increase the production of plant secondary metabolites
- To become familiar with the applications of plant tissue culture techniques

Course outcomes (CO's)**Upon successful completion of this course, participants will be able to:**

1. Recall the understanding of plant cell organelles and their functions
2. Recognize the source of food for other organisms and their synthesis in plants
3. Recall the role of plant growth substances in various stages of plant growth
4. Equip with tissue culture techniques
5. Understand the role of secondary metabolites and their production and importance
6. Understand the application of tissue culture in mass production

UNIT I

Plant cell: Structure of plant cell – cell wall, vacuoles, plastids, mitochondria, peroxisomes and Golgi complex. Overview of photosynthesis: photosynthetic apparatus, reaction center, photosystems I and II, mechanism of photosynthesis-cyclic and non cyclic photophosphorylation; evidences in support of light and dark reactions.

UNIT II

Assimilatory mechanisms in plants: Photorespiration and water consumption, CO₂ assimilation by C3 and C4 plants, CAM plants. Nitrogen assimilation; reduction of nitrate, nitrogen fixation in symbiotic and non-symbiotic plants, nitrogen cycle. Sulphate metabolism in leaf; sulfite reduction and sulphur cycle, glutathione synthesis. Carbon and phosphorus cycles.

UNIT III

Lipid metabolism in plants: Biosynthesis of fatty acids in plastids, synthesis of waxes, triacyl glycerols and glycolipids. Synthesis of chlorophyll. Carotenoid formation. Synthesis of nitrogenous compounds: caffeine synthesis, ureide synthesis in nodulated legumes.

Secondary oxidative mechanisms: β - oxidation, ω - oxidation, glyoxylate pathway.

UNIT IV

Plant growth substances: chemistry, biosynthesis, mode of action and physiological role of auxins, gibberellins, cytokinins, abscisic acid and ethylene. Factors influencing endogenous growth- Biotic and Abiotic factors. Phytochromes: molecule, biological display, functions as light sensor. Senescence: biochemical changes, regulation.

UNIT V

Plant secondary metabolites: Alkaloids, flavonoids, terpenoids, phenols-Occurrence, distribution & functions, Production of secondary metabolites in plants, stages of secondary metabolite production, PTC- Totipotency, meristematic and nodal cultures-Callus induction. Somatic embryogenesis. Metabolic engineering for increased production of secondary metabolites.

TEXT BOOKS

1. Verma.S.K and Mohit Verma, 2010. A Text Book of Plant Physiology, Biochemistry and Biotechnology. 7th edition.S.Chand and Co, New Delhi.
2. John.W.Anderson and John Beardall.Molecular Activities of Plant cells-An introduction to Plant Biochemistry. Blackwell Scientific Publications.
3. Goodwin.T.W and Mercer.E.I. Introduction to Plant Biochemistry, 1st edition, Robert Maxwell.M.C Publisher, New York.
4. James Bonner and Joseph F Varner, Plant Biochemistry. 3rd edition. Academic Press, New York.

REFERENCES

1. Bob Buchannan ,2002. Biochemistry and Molecular Biology of Plants, IK. International, New York.
2. Hans-Valter Heldt ,2005. Plant Biochemistry and Molecular Biology, Oxford University Press, England.
3. Michael Wink, 2010. Functions and Biotechnology of Plant Secondary Metabolites, Second edition, Blackwell Publishing Ltd, London.
4. Hans-Walter Heldt, Birgit Piechulla, Fiona Heldt, 2011. Plant Biochemistry, Fourth Edition, Academic Press Publication, London, UK.

Instruction hours / week: L:0 T:0 P:4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

- To provide hands on experience on preparation of buffers and determination of pH of solutions
- To estimate the macromolecules quantitatively thro colorimetric procedures
- To perform fluorometric experiments and titrimetry
- To separate the macromolecules using TLC and column chromatography.
- To perform the secondary metabolite quantification using HPLC.
- Gain hands on training in protein extraction and purification techniques.

Course outcomes (CO's)**After completion of this course the student will**

1. Prepare buffers and reagents based on the needs of experiments
2. Estimate macromolecules quantitatively thro colorimetric procedures
3. Estimate vitamins and calcium using fluorimetry and titrimetry
4. Quantify secondary metabolites using HPLC
5. Separate the macro molecules using TLC and column chromatography
6. Extract and purify protein from various sources

Colorimetry

1. Isolation and estimation of starch from potato (Anthrone method)
2. Isolation and estimation of glycogen from liver (Anthrone method)
3. Estimation of Total carotenoids (Spectroscopic method)
4. Estimation of fructose in fruits (Resorcinol method)
5. Estimation of ascorbic acid (DNPH method)
6. Estimation of Vitamin E (Dipyrridyl method)

Fluorimetry

7. Estimation of thiamine from cereals or fruits
8. Estimation of riboflavin

Titrimetry

9. Estimation of lactose in milk
10. Estimation of calcium in milk

Separation techniques

11. Separation of amino acids by paper chromatography- circular, ascending &

Descending.

12. Separation of plant pigments by TLC.
13. Separation of plant pigments by column chromatography.
14. Estimation of quercetin using HPLC (Demo).

Cell biology:

15. Preparation of standard buffer and determination of pH of buffers.
16. Subcellular fractionation by differential centrifugation and purity assessment with marker enzymes (Group Experiment).
17. Salting out of proteins using ammonium sulphate precipitation

REFERENCES

1. Jayaraman J ,2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
2. Sadasivam S, and A. Manickam ,2009. Biochemical Methods, New Age, International Publishers, New Delhi.
3. Singh S.P,2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

15BCP112
2C

PRACTICAL – II

4H-

PLANT BIOCHEMISTRY AND MICROBIOLOGY

Instruction hours/week: L:0 T:0 P: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives**Equip the students**

- To screen phytochemicals and estimate the amount of secondary metabolites
- To handle microbiological techniques
- To identify microbes in soil and water samples
- To isolate, characterize and purify microbial enzymes
- To perform antibacterial activity of active compounds
- To gain hands on experience in plant tissue culture

Course outcomes (CO's)**After completion of this course the student will perform**

1. Phytochemical screening and secondary metabolite estimation
2. Microbiological techniques
3. Microbial identification in soil and water samples
4. Isolation, characterization and purification of microbial enzymes.
5. Antibacterial activity of active compounds
6. Callus induction and regeneration of plantlets

Experiments**Plant Biochemistry**

1. Phytochemical screening of any one selected medicinal plant
2. Estimation of Tannins
3. Estimation of Flavonoids
4. Estimation of Chlorophyll
5. Estimation of Phenols

Microbiology

6. Isolation of pure culture – serial dilution, pour plate, spread plate, streak plate methods.
7. Colony morphology – colony counting.
8. Staining techniques- simple, differential, spore, and fungal staining.
9. Antibiotic resistance / sensitivity test (Disc method)
10. Estimation of bacteria- growth curve of bacteria and generation time.
11. Identification of microorganisms – biochemical tests (IMVIC test)(Group Experiment)
12. Microbiology of potable water
13. Isolation, characterization and purification of ANY one of the following microbial enzymes

- a) Amylase
- b) Protease
- 14. Assay of Antibacterial of ANY ONE selected medicinal plant by Disc or Well diffusion and broth dilution method.
- 15. Assay of antifungal activity of ANY ONE selected medicinal plant by Disc or Well diffusion.

Plant tissue culture (Group experiment)

- 16. Preparation of tissue culture media
- 17. Surface sterilization
- 18. Induction of meristem culture
- 19. Callus induction.
- 20. Regeneration of shoot and root from callus culture.

REFERENCES

- 1. Jayaraman J , 2011. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
- 2. Kannan.N , 2003. Laboratory Manual in Microbiology, Panima Publishing Corporation, Bangalore.
- 3. Sadasivam S and A. Manickam , 2009. Biochemical Methods, New Age International Publishers, New Delhi.
- 4. Singh S.P, 2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.
- 5. Talib V.H , 2007. A Handbook of Medical Laboratory Technology, CBS publishers,2nd edition. New Delhi.
- 6. Varley H, 2003. Practical Clinical Biochemistry, CBS Publishers, New Delhi.

Course objectives

- To shed knowledge on generation and transformation of energy in metabolic pathways.
- To know the metabolic pathway of carbohydrate and their regulation with associated disorders.
- To learn fatty acid synthesis and degradation and their regulation
- To study the regulation of amino acid metabolism and its regulations with Metabolic disorders.
- To understand the inter relationship of carbohydrate, lipid, protein and nucleic acid metabolism and understand the importance of TCA cycle.
- To aware about the homeostasis of glucose metabolites by intrinsic and extrinsic control mechanism.

Course outcomes (CO's)**After completion of this course the student will perform**

1. Gain knowledge on glucose anabolic and catabolic pathways that ultimately control the glucose homeostasis.
2. know the metabolic pathway of amino acid and their regulation with associated disorders.
3. learn fatty acid synthesis and degradation and their regulation
4. Able to explain the role of lipids, their metabolism and their stringent control by hormones and other factors.
5. Understand the anabolic and catabolic processes associated with amino acids and nucleic acids and their regulation.
6. Able to understand the energy homeostasis during starvation and energy excess

UNIT I

Introduction to control of enzyme activity: Allosteric interaction; Reversible covalent modification; proteolytic action; control of amount of enzyme; control of rates of enzyme degradation; feedback inhibition; feed forward stimulation. Role of compartmentation. Elucidation of Metabolic pathways- Single-and Multi-step pathways. Experimental approaches to study the metabolism- using metabolic inhibitors and isotopes.

UNIT II

Carbohydrate Metabolism: An overview of Glycolysis and Gluconeogenesis. Regulation of Glycolysis and Gluconeogenesis-Reciprocal control of Glycolysis and Gluconeogenesis, TCA cycle- steps, regulation at branch points; Glycogen Metabolism: Overview of

glycogenesis and glycogenolysis. Reciprocal control of glycogenesis and glycogenolysis. Hormonal regulation of fuel metabolism; Metabolic disorders-Diabetes mellitus.

UNIT III

Lipid metabolism: An overview of fatty acid synthesis and degradation, Regulation of fatty acid synthesis- control of acetyl CoA carboxylase and fatty acid synthetase complex; Reciprocal control of fatty acid synthesis and degradation. Biosynthesis of triacyl glycerol, phosphatidyl choline, phosphatidyl ethanolamine and sphingomyelin and their regulation. Synthesis and degradation of cholesterol and its regulation. Obesity and regulation of body mass. Metabolic disorders- Atherosclerosis, Hyper and hypo lipoproteinemia.

UNIT IV

Amino acid metabolism: Regulation of synthesis of aspartate and aromatic family of aminoacids. Key role of glutamate dehydrogenase and glutamine synthetase in nitrogen metabolism and their allosteric regulations. Amino acid degradation- deamination, decarboxylation and transamination. Regulation of urea cycle. Biosynthesis of heme (porphyrin) and its regulations. Molecules derived from aminoacids. Metabolic disorders- Alkaptonuria, phenyl ketonuria.

UNIT V

Nucleic acid metabolism: De novo synthesis of purine and its regulation – Role of PRPP amino transferase. De novo synthesis of pyrimidine and its regulation – Role of aspartate carbomyl transferase. Regulation of deoxy ribonucleotides by activators and inhibitors. Tissue specific metabolism- Metabolic profile of major organs- Brain, Muscle, Liver and Adipose tissue. Intergration of metabolism. Metabolic disorders- Gout, SCID.

TEXT BOOKS

1. Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition WH Freeman and Company, New York.
2. Robert K. Murray, David A. Bender, Kathleen M. Botham and Peter J. Kennelly 2012. Harper's illustrated Biochemistry, 29th Edition.. McGraw-Hill Medical. London.

REFERENCES

1. Donald Voet and Judith Voet ,2004. Biochemistry, John Wiley and Sons,. 2nd Edition. New York
2. Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition WH Freeman and Company, New York.

3. Leubert Stryer, 2009. Biochemistry, W.H. Freeman and Company. New York.
4. Pamila C. Champ and Richard A. Harvey ,2008. Biochemistry, Lipponcott Company, Philadelphia.
5. Robert K. Murray, David A. Bender, Kathleen M. Botham and Peter J. Kennelly 2012.Harper's illustrated Biochemistry, 29th edition.. McGraw-Hill Medical. London.
6. Smith. 2003. Principles of Biochemistry, McGraw– Hill International Book Company, London.
7. Geoffrey Zubay,2009. Biochemistry, Wm.C Brown Publishers, Saunders and Company, Philadelphia.

Course objectives**Equip the students**

- To acquire the knowledge on Organization of DNA in a genome and transposons
- To know the mechanism behind replication and repair.
- To enable the knowledge on transcription and translation.
- To understand the mechanism of Regulation of gene expression in prokaryotes
- To study the structure and remodeling of chromatin
- To learn the mechanism of Eukaryotic gene regulation

Course outcomes (CO's)**After completion of this course the student will**

1. Acquire the knowledge on molecular structure of genes.
2. Understand the structure of nucleic acids and the DNA replication process
3. Learn about the process of transcription
4. Understand the mechanism of translation
5. Learn about gene regulation in prokaryotes
6. Learn about gene regulation in eukaryotes

UNIT I

Molecular structure of genes: Molecular definition of gene, chromosomal organization of genes and non-coding DNA, protein coding genes, tandemly repeated genes, single sequence DNA. Structural organization of eukaryotic chromosomes- histone proteins, chromatin, functional elements. Mobile DNA elements- bacterial IS elements, transposons, viral transposons and non- viral transposons. Mutation- types.

UNIT II

DNA replication and repair: General features of chromosomal replication. Enzymology of DNA replication, DNA replication machinery. Replication in prokaryotes and eukaryotes- Initiation, elongation and termination. DNA damage-types. Repair mechanism of DNA damage-all types.

UNIT III

Transcription: prokaryotic gene transcription- Initiation, elongation and termination. Eukaryotic gene transcription- transcription unit, RNA polymerases- types, Transcription and processing of mRNA, tRNA and rRNA. Regulatory sequences in protein coding genes- TATA box, initiators, CpG island, promoter-proximal element, activators and repressors of transcription, Multiple transcription control elements. Regulation of transcription factor activity by lipid-soluble hormones.

UNIT IV

Translation: Deciphering genetic code, features. Wobble hypothesis. Initiation, elongation and termination of prokaryotic and eukaryotic translation. Fidelity of translation. Post translational modifications-all types; Protein targeting-Targeting protein to nucleus, ER, Golgi complex. Protein degradation- ubiquitin mediated degradation.

UNIT V

Prokaryotic gene regulation: Operon model, Lac, trp and ara operons. Regulatory proteins-DNA binding domain, protein- protein interaction domain. Recombination- holiday model, Rec BCD enzymes, Rec A protein, Messelson Radding model, site- specific recombination. Antisense RNA technology.

Eukaryotic gene regulation: Transcriptionally active chromatin, chromatin remodeling, DNA binding transactivators and coactivators. Regulation of gene expression by intracellular and intercellular signal, RNAi.

TEXT BOOKS

1. Watson J. D., Hopkins, N. H., Roberts, J. W., Steitz, J. A. and Weiner, A. M. (2005) Molecular biology of the gene, The Benjamin/Cummings publishing companies, Inc, California.
2. Benjamin Lewin (2008) Genes IX, Oxford University Press, 9th Edition, Oxford, London,
3. Weaver R. F. (2008) Molecular biology, WCB McGraw-Hill companies, 6th Edition.Inc, New York.

REFERENCES

1. Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger. 2012. Molecular Cell Biology, 7th edition. W.H. Freeman & Company,
2. Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, WH Freeman and Company, 6th Edition, New York.
3. Arther Kornberg, A. Baker , 2005. DNA replication, W.H. Freeman and Co, USA.
4. Geoffrey M. Cooper and Robert E. Hausman 2013.Cell-A Molecular Approach, 6th Edition.. Sinauer Associates. USA

Instruction hours / week: L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives**Equip the students**

- To make students understand the essential features of the interdisciplinary field of science for better understanding the biological data.
- To retrieve the sequence analysis of Nucleic acid and protein
- To create opportunity to interact with algorithms, tools and data in current scenario.
- To make the students look at a biological problem from a computational point of view.
- To find out the methods for analyzing the expression, structure and function of proteins,
- To understand the relationships between species.

Course outcomes (CO's)**After completion of this course the student will perform**

1. Acquire the knowledge on biological data, submission and retrieval from databases.
2. Able to make experiment pair wise and multiple sequence alignment
3. Analyze the secondary and tertiary structures of protein sequences.
4. Understand the data structure (databases) used in bioinformatics and interpret the information (especially: find genes; determine their functions),
5. Understand and be aware of current research and problems relating to this area.
6. Knowledge on applications of bioinformatics

UNIT I

Definition, concepts of Bioinformatics: Objectives, History of Bioinformatics, Milestones, Genome sequencing projects, Human Genome Project- Science, applications and ELSI.

Introduction to Biological databases: Types of databases, sequence databases-nucleic acid sequence databases, GenBank, protein sequence database, Swiss-Prot, PIR, motif database-PROSITE, structural databases, bibliographic databases and organism specific databases-GMOD- Searching and retrieval of data-Entrez and SRS.

UNIT II

Introduction to sequence Alignment: Pairwise and multiple sequence alignment, substitution matrices, Similarity searching programs, BLAST, FASTA, Multiple sequence alignment – CLUSTAL, Phylogenetic analysis-PHYLIP theory of phylogeny, tree building methods.

UNIT III

Protein prediction strategies and programs: Protein Secondary Structure Prediction, three dimensional structure prediction-Comparative modeling, threading, protein folding and visualization of molecules – Visualization tools-RasMol, Deep View.

UNIT IV

Gene Identification and Prediction: Gene Mark, Gene Scan, Pattern Recognition, Global gene expression studies-DNA Micro array.

UNIT V

Applications of Bioinformatics-Molecular medicine, biotechnology, agricultural, Computer Aided Drug Designing- Lead molecules, properties, ADME profiles, QSAR. receptors, docking.

REFERENCES

1. Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.
2. Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.
3. Baxevanis. A.D and B.F.F Quellette, 2001. Practical Guide to the Analysis of Genes and Proteins, John Wiley & Sons, New York.
4. David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.
5. Ignacimuthu. S, 2013. Basic Bioinformatics, 2nd edition Alpha Science Intl Ltd Chennai.
6. Rastogi S.C, Namitha Mendiratta and Parag Rastogi, 2004. Bioinformatics – Concepts, Skills, Applications. CBS Publishers & Distributors, New Delhi.
7. Rastogi S.C and Namitha Mendiratta, 2006. Bioinformatics Methods and applications
8. Genomics, Proteomics and Drug Discovery 2nd Edition, Parag Rastogi Publication, India.

9. Sundararajan. S and R.Balaji, 2003. Introduction to Bioinformatics, Himalaya Publishing House, Mumbai.

M.Sc., Biochemistry

2015-2016

15BCP204A

**CORE ELECTIVE –I
RECOMBINANT DNA TECHNOLOGY**

Semester II

4H-4C

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Equip the students

- To make the student to understand the concept of gene manipulation and gene transfer technologies.
- To understand the concept of recombinant DNA technology or genetic engineering
- To interpret the characterization of recombinant protein
- To infer the knowledge on cDNA
- To expose students to application of recombinant DNA technology in biotechnological research.
- To train students in strategizing research methodologies employing genetic engineering techniques.

Course outcomes (CO's)

After completion of this course the student will

1. Understand the application of genetic engineering techniques in basic and applied experimental biology
2. Learn the concept of recombinant DNA technology or genetic engineering
3. Understand the expression of gene cloning vectors
4. Explore the knowledge on genomic library
5. Proficiency in designing and conducting experiments involving genetic manipulation.
6. Describe DNA fingerprinting, and restriction fragment length polymorphism (RFLP) analysis and their applications.

UNIT I

Introduction to gene manipulation: Basic techniques- Isolation and purification of nucleic Acids, Agarose gel Electrophoresis. Hybridization of nucleic acids-probes and types. Hybridization techniques-Southern, Northern, Western blotting. DNA and RNA markers.

UNIT II

Gene cloning vectors: Plasmids, bacteriophages, phagemids, cosmids, Artificial chromosomes- BAC, YAC, HAC. Restriction mapping of DNA fragments, Map construction, Cloning in *E. coli*- Vector engineering and codon optimization. Gene expression in *E.coli*. Expression vector- PET vector. Genomic library.

UNIT III

Isolation and characterization of gene transcripts: Introduction, Converting mRNA transcripts into cDNA, Screening representative cDNA libraries, Functional sequencing of cDNA expression libraries. Expressed cDNAs compared with computer databases. Characterization of recombinant proteins- Processing, purification and refolding and stabilization-Insulin, hGH, tpA.

UNIT IV

Mutagenesis: Site-directed mutagenesis, *In vitro* mutagenesis-Linkers, synthetic oligonucleotides and transposons, Role of Tagging in gene analysis, Identification and isolation of genes through T-DNA or transposons.

Gene therapy- Different strategies for gene therapy, therapeutics based on targeted exhibition of gene expression and mutation correction *in vivo*, Gene therapy for inherited diseases, ADA, FH, Cystic fibrosis.

UNIT V

Transgenics: Gene transfer techniques- Microinjection, biolistic methods, vector based transfer.

Transgenic plants: Agrobacterium & Ti plasmids. Methods of engineering herbicide resistance plants, Stress resistance plants and modification of plant nutritional content (amino acids, β - carotene) Plants as bioreactors: edible vaccines.

Transgenic animals: Method of Engineering transgenic mice, transgenic cattle- applications
Biosafety- regularities and concerns. Societal impact of genetically modified food.

REFERENCES

1. Bernard R. Glick, Jack J. Pasternak and Cheryl L. Patten, 2009. Molecular Biotechnology, 4th edition, Panima Publishing Corporation, Delhi.
2. James D.Watson,Michael Gilamn,Jan Witkowski and Mark Zotler 2006 . Recombinant DNA, 3rd Edition. W.H. Freeman Company, New York.
3. Kingsman S .M and A. J. Kingsman , 2001 . Genetic Engineering: An Introduction to Gene Analysis and Exploitation in Eukaryotes, 6th Edition. Blackwell Scientific Publication, Oxford.
4. Kreuzer H and Massay A,2008. Molecular Biology and Biotechnology, 3rd Edition Aim Press, Washington,DC.

5. Primrose S. B , 2003. Molecular Biotech, 2nd edition, Panima Publications, New Delhi.
6. Sambrook J, E.F.Fritch and T.Maniate, 2001. Molecular Cloning, A Laboratory Manual, Cold Spring Harbor Laboratory Press, New York.
7. Tom Strachan and Andrew, P. Read , 2003. Human Molecular Genetics, 3rd edition. John Wiley and Sons,Toronto. Canada.

Course Objectives:**Equip the students**

- To understand the basic quality control procedures in the laboratory
- To ensure safety in laboratory
- To understand the good laboratory procedures
- To acquaint with standard operating procedures
- To understand the importance of quality audit procedures
- To learn the laboratory safety and regulations

Course Outcomes (COs):**After completion of this course the student will be able to**

1. understand the basic quality control procedures in the laboratory
2. Follow safety procedures in laboratory
3. Follow good laboratory procedures
4. Acquaint with standard operating procedures
5. Do quality audits
6. Maintain laboratory safety and regulations

UNIT I

Basic Concepts: Quality concepts, Quality Assurance, Good Manufacturing Practices, Responsibilities, Ensuring safety in laboratories: Introduction, principles-engineering controls, work practices and administrative control, personal protective equipment. General safety-biological safety, chemical safety and fire safety.

UNIT II

Quality Control: Quality control laboratory: Responsibilities, routine controls, instruments, protocols, non-clinical testing, controls on animal house, data generation and storage, quality control documents, retention samples, records, audits of quality control facilities.

UNIT III

Good Laboratory Practice (GLP): GLP – an overview and basic information, Scope. Principles of GLP: Test Facility Organization and Personnel, Quality Assurance

Programme, Facilities, Apparatus, Material, and Reagents, Test Systems, Test and Reference Items, Standard Operating Procedures, Performance of the Study, Reporting of Study Result, Storage and Retention of Records and Materials. Responsibilities in GLP Implementing of GLP in non GLP analytical laboratory

UNIT IV

Inspections, Quality Audit and Quality System Reviews: Inspections of pharmaceutical manufacturers, role of quality audit, role of inspectors, methods of inspection- routine, concise, follow-up and special inspections, frequency and duration of inspections, preparations for inspections, conduct, report and regulatory actions. Loan License Auditing – Concepts, Auditing, role of quality circle in quality assurance.

UNIT V

Laboratory Regulations and Safety: List of Regulations to be followed. Laboratory safety procedure- glass ware, equipment safety, hands protection, precaution to be undertaken to prevent accident and contamination.

TEXT BOOKS

1. Weinberg S. 1995. Good Laboratory Practice Regulations, 3rd edition, CRC Press, U.S.A.
2. Harburn K, 1990. Quality Control of Packing Materials in Pharmaceutical Industry, CRC Press, U.S.A.
3. Prichard E. 1995. Quality in the Analytical Chemistry Laboratory, 1st edition, Wiley, U.S.A.

REFERENCES

1. Richard A.G., G. Richard. 2009. New Drug Approval Process Drugs and the Pharmaceutical Sciences), 5th edition CRC Press, U.S.A.
2. Wenclawiak B.W., Koch M , Hadjicostas E. 2004. Quality Assurance in Analytical Chemistry: Training and Teaching. 1st edition, springer. U.S.A.

Course Objectives:**Equip the students**

- To understand the basics of fermentation technology
- To gain knowledge on preservation and maintenance of industrially important microorganisms
- To learn the effective bioreactor system for effective fermentation technology
- To gain knowledge on fermentation kinetics
- To understand downstream processing
- To learn the application of fermentation technology in food, pharmaceutical and therapeutic industry

Course Outcomes (COs):**After completion of this course the student will be able to**

1. Understand the basics of fermentation technology
2. Preserve and maintain industrially important microorganisms
3. Use effective bioreactor system for effective fermentation technology
4. Gain knowledge on fermentation kinetics
5. To carryout downstream processing
6. Apply fermentation technology in food, pharmaceutical and therapeutic industry

Unit I:

Introduction of fermentation technology: History of fermentation. Fermentation process. Microbial culture, Screening and selection for fermentation processes. Preservation and improvement of industrially important microorganisms. Inoculum production for bacterial and fungal processes. Strain improvement

Unit II:

Bioreactor Design: Fermentor functions, construction and maintenance of aseptic conditions. Control of various parameters: temperature control; Aeration and agitation system (Non-Newdonian fermentations), baffles; types of fermentors, computer applications in fermentation technology. Sterilization of fermentor, aseptic inoculation

and sampling methods, Specialized bioreactors: tubular bioreactors, membrane bioreactors, tower bioreactors, fluidized bed bioreactors, Immobilized system and packed bed reactors and Photobioreactor.

Unit III:

Fermentation kinetics: Fermentation growth kinetics. Simple unstructured kinetic model for microbial growth of bacterial, fungal, animal and plant systems. Kinetic of substrate utilization, biomass growth and product formation in continuous system, batch and fed batch cultures, total cell retention cultivation, inhibition on cell growth and product formation.

Unit IV:

Downstream process: Basic concepts of bio-separation technology, separation characteristics of proteins and enzymes –size, stability properties; purification methodologies characteristics of bio enzymes products; Flocculation and conditioning of broth, over view of reaction processes involved in separation. Centrifugation as a tool for downstream processing.

Unit V:

Bioreactor Products: Production of fermented dairy products, Fermented foods and beverages; Types of fermentation processes and their advantages and disadvantages; production of penicillin, recombinant insulin. Propagation of animal and plant cell using bioreactors for production of pharmaceuticals, therapeutic proteins and monoclonal antibodies.

TEXT BOOKS

1. Stanier, R.Y. 1996. “General Microbiology”, Vth Edition, MacMillan, publisher, London
2. Lehninger, 2008. “Principles of Biochemistry. 5th Edition, David Nelson & Michael Cox,
3. W.H. Freeman and company, NY.
4. Kalia M. and Sangita, S. 1996. Food Preservation and Processing, First edition, Kalyani Publishers, New Delhi.
5. Microbiology; Pelczar, Chan and Krieg; Tata McGraw Hill, New Delhi
6. E.M.T.El. Mansi, C.F.A. Bryce, .A.L.Demain, A.R. Allman. 2006. “Fermentation microbiology and biotechnology”, 2nd Edition, Taylor & Francis, Florida.

REFERENCES

1. James M. and Jay. 2000. “Modern Food Microbiology”, 5th Edition, CBS Publishers, New Delhi
2. Stanier, R.Y. 1996. “General Microbiology”, Vth Edition, MacMillan, publisher, London
3. Toledo R.T. 2000. “Fundamentals of Food Process Engineering; 2nded, CBS Publishers, New Delhi.
4. Precott, Harley.2004. Microbiology (Sixth edition) McGraw-Hill Science, NewYork.
5. Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higon. 2001. “Industrial Microbiology: An Introduction”, Blackwell Science, UK

Course Objectives:**Equip the students**

- To understand the role of nutrients and hormones in plant growth and development
- To gain knowledge on media composition for plant tissue culture
- To maintain aseptic condition in laboratory
- To gain knowledge on setting up of plant tissue culture laboratory
- To understand plant transformation techniques
- To understand the applications of plant tissue culture

Course Outcomes (COs):**After completion of this course the student will be able to**

1. Understand the role of nutrients and hormones in plant growth and development
2. Design media composition for plant tissue culture
3. Maintain aseptic condition in laboratory
4. set up a plant tissue culture laboratory
5. Carryout plant transformation techniques
6. Apply plant tissue culture for mass production of significant products.

UNIT I**Growth and Development:**

Role of Plant Hormones in growth & development. Plant Nutrition - Effect of soil pH on mineral availability, uptake & assimilation of minerals and their physiological role.

Impact of macro, micro, vitamins in plant growth development.

UNIT II

Introduction to plant tissue culture: Totipotency, Tissue culture Media (Composition and preparation). Nutritional components of tissue culture media. Plant Hormones- Types, structures, biosynthesis & metabolism. Basic concepts of aseptic cultures and its uses. Different areas and applications of plant tissue culture.

UNIT III

Basic techniques in tissue culture: Design & lab setup of Tissue Culture laboratory. Types of culture, Initiation of callus and suspension cultures, Micro propagation (Organogenesis, Somatic Embryogenesis, Shoot tip culture, Rapid clonal propagation, Embryo Culture and Pollen culture). Production of haploids and their application, Storage of plant genetic resources and Cryopreservation.

UNIT IV

Plant transformation technology: Ti & Ri Plasmid and their transfer mechanisms, Use of Ti & Ri as vectors, Binary vectors, Use of 35s & other promoters genetic markers- methods of nuclear transformation, viral vectors & their applications, Use of reporter gene, Particle bombardment, electroporation, Microinjection, Chloroplast transformation- transplastomics, Transformation of monocots, Transgene stability & gene silencing in Plant transformation.

UNIT V

Plant tissue culture and its applications: Transgenic plants - for- biotic (weeds, insects, viruses, fungi and bacteria) and abiotic (drought, salt, temperature, poor soil quality and oxidative) stress tolerance. Production of secondary metabolites. Molecular farming (improvement in protein, lipids, carbohydrates). Plant antibodies, vaccines, therapeutic proteins and active principles. Biofortification of important crops (rice and banana).

TEXT BOOKS

1. Davies K. 2004. "Plant pigments and their manipulation" – Annual plant reviews, vol 14 Blackwell Publication, UK
2. Slater A, Scott NW, Fowler MR. 2008 "Plant Biotechnology: the genetic manipulation of plants" Oxford Press, UK
3. Altman A, Hasegawa PM . 2012 "Plant Biotechnology and agriculture. Prospect for the 21st century" Academic press, USA.

REFERENCES

1. Brown T. A.. 2010. "Gene Cloning and DNA Analysis: an introduction", 6th edition, Wiley-Blackwell Publisher, UK.
2. Chawla H.C. 2009 " Introduction to plant biotechnology 3rd Edition", Oxford & IBH publication Pvt .Ltd, New Delhi.

3. Primrose S.B and R.M.Twyman. 2003. "Principles of Genome Analysis".Blackwell Publishing, Oxford.
4. Winnacker E.. 2003. "From Gene to Clones ; Introduction to gene technology", 4th edition, (2003), Panima Publisher, India

M.Sc., Biochemistry

2015-2016

**15BCP204E
4C**

CORE ELECTIVE –I

**Semester II
4H-**

DIETETIC MANAGEMENT OF DISEASE

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives

Equip the students with

- Nutrition as a drug
- Dietary management of diabetes
- Dietary management of obesity
- Dietary management of cardiovascular diseases
- Nutrition deficiency affecting hematopoiesis and diet for individual with cancer
- Dietary management of musculoskeletal diseases

Course outcomes (CO's)

After successful completion, the students will understand:

1. Nutrition as a drug
2. Dietary management of diabetes
3. Dietary management of obesity
4. Dietary management of cardiovascular diseases
5. Nutrition deficiency affecting hematopoiesis and diet for individual with cancer
6. Dietary management of musculoskeletal diseases

UNIT-1

Nutrition- Foods for normal nutrition. Diets in gastrointestinal diseases-Acute gastrointestinal conditions, chronic and non-acute disorders of the upper gastrointestinal tract, lower gastrointestinal conditions, pancreatitis, liver diseases, gall stones, appendicitis, cholelithiasis. Diet for hepatitis

Nutrition for critically ill- Burns, Enteral nutrition, Enteral feeding vs parenteral feeding, Indications of enteral nutrition, Types of enteral feed formula, Complications of enteral feeding. Parenteral nutrition- Techniques of infusion, Complications of parenteral feeding.

UNIT II

Diet for diabetes mellitus- Nutrition recommendations for patient with diabetes, Meal planning, Exchange list of different food groups, Diabetic diets based on exchange list, Diabetic diets menu wise.

Diets in Renal disease-Acute renal failure, Proteinuria, Indoor diet charts for renal patients.

UNIT III

Diet for Cardiovascular Diseases- Risk Factors, Hypertension, Atherosclerosis, Stroke and other peripheral diseases, Cardiomyopathy and cardiac failure, Rheumatic heart disease, dietary management, general guidelines for coronary heart disease, Dietary recommendations of WHO.Diet for Acute cardiac diseases

Obesity- Body fat distribution, Health risks of obesity, Weight reduction, Factors contributing to obesity.

UNIT IV

Cancer and diet therapy- Influence of diet on carcinogenesis, Dietary risk factors and cancers at various sites in the human body, diet therapy, eating well during cancer treatment, managing eating problems during treatment

Diet for inborn errors of metabolism- phenylketonuria, Galactosaemia, Celiac disease.

UNIT V

Nutrition related bone disease- osteoporosis.

Dietary factors in dental disease- Starch & dental cavities, protective factor in food

Blood –Nutrition deficiency affecting hematopoiesis.

REFERENCES

1. Rekha Sharma ,2004. Diet Management,3rd Edition,Reed Elsevier India Private Limited, Chennai.
2. Garrow J.S.and W.P.T. James, 2000. Human Nutrition & Dietetics,Longman Group, UK.
3. Srilakshmi, 2006. Dietetics, 5th Edition.New Age International.Pvt Ltd, New Delhi.

15OEP201
3C

OPEN ELECTIVE

BIOREMEDIATION

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives**Equip the students to understand**

- Environmental pollution and its impact on living beings
- Bioremediation process
- Bioremediation techniques
- Bioremediation of contaminants
- Recent approaches in bioremediation
- Waste water management

Course outcomes (CO's)**After successful completion, the students will be able to**

1. Understand impact of environmental pollution on living beings
2. Do bioremediation process
3. Understand bioremediation techniques
4. Carryout bioremediation of contaminants
5. Understand recent approaches in bioremediation
6. Manage waste water treatment

UNIT I

Environmental pollution: Definitions, Parts of environment, Environmental contamination versus pollution. Nature of contaminants: Recalcitrant compounds, pollutants. Physico-chemical properties of contaminants. General classification of contaminants. Effect of contaminants on environment. Environmental segments – structure and composition of atmosphere - Pollution – Air, water, soil, thermal and radiation – Effects – acid rain, ozone layer depletion and greenhouse effect. Sources of heavy metal pollution

UNIT II

Bioremediation: Introduction of Bioremediation, general perspectives, constraints and priorities of bioremediation, Advantages, limitations and applications. Factors affecting process of biodegradation. Contaminant availability for biodegradation. Microbial

interactions with inorganic pollutants, Microbial metal resistance, Microbial transformation, accumulation and concentration of heavy metals.

UNIT III

Bioremediation Techniques: *In situ* and *ex situ* bioremediation. Characterization of essential factors for bioremediation. Strategies for improvement of bioremediation techniques. Bioremediation monitoring (physical, chemical, biological). Molecular techniques in the analysis of contaminated sites.

UNIT IV

Bioremediation of contaminants: Nature of organic compound and wastes, Decomposition of organic matter, microbes involved in decomposition. Aerobic and anaerobic decomposition of organic waste, Waste water treatment (Primary, Secondary and Tertiary), Bioreactor for waste water treatment, microbes for waste water treatment. Environment impact of fertilizers.

UNIT V

Recent approaches in bioremediation: Organic and vermicomposting (Elementary concepts only). Recent biotechnological trends in bio augmentation and bio stimulation. Role of plasmids in bioremediation. Evolution barriers for new microbes. Enhancement of novel microbial degradative abilities. Genetics and gene manipulation of bioremediation. Role of environmental biotechnology in management of resources. Reclamation of wasteland, biomass production, biogas and biofuel production. Development of environmentally friendly processes such as integrated waste management.

TEXT BOOKS

1. Rajendran. P & Gunasekaran. P. 2006. “Microbial Bioremediation”, MJP publishers, New Delhi.
2. Kamaraj. P & Arthanareeswari. M. 2010. “Environmental Science – Challenges and Changes”, 4th Edition, Sudhandhira Publications.
3. Sharma. B. K. and Kaur. 1994. “Environmental Chemistry”, Goel Publishing House, Meerut.

REFERENCES

1. De. A.K., “Environnemental Chemistry”. 1996. New Age International, New Delhi.
2. Helen P and Kavitha. 2008. “Principles of Environmental Science”, Sci tech Publications, 2nd Edition. Chennai.

3. Foster C.F., John Ware D.A. 1987. "Environmental Biotechnology", Ellis Horwood Ltd. London.
4. John. T. cookson, Jr. 1995. "Bioremediation engineering; design and application". McGraw Hill, Inc. New York

M.Sc., Biochemistry

2015-2016

Semester II

15BCP211

PRACTICAL – III

5H-3C

MOLECULAR BIOLOGY AND ANIMAL BIOTECHNOLOGY

Instruction hours/week: L:0 T:0 P:4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Equip the students

- To understand the Molecular structure, functions of cells, molecules such as DNA, RNA, proteins.
- To understand the principles of animal cell culture and its application.
- To learn the knowledge on quantity of DNA by Diphenylamine method
- To infer the Estimation of RNA by Orcinol method
- To know the Preparation of competent *E coli*- transformation
- To explore the knowledge on Ligation of DNA

Course outcomes (CO's)

After completion of this course the student will perform

1. To demonstrate knowledge and understanding of the molecular machinery of living cells, cell and tissue culture to manipulate.
2. To explore the genomes of animals for ways to improve the livestock for food production and biomedical purpose as well as and to analyse, interpret, and participate in reporting to their peers on the results of their laboratory experiments.
3. Identification of DNA by Agarose gel electrophoresis
4. Estimation of RNA by Orcinol method
5. Preparation of competent *E coli*- transformation
6. Ligation of DNA

MOLECULAR BIOLOGY

1. Isolation of DNA and RNA from liver
2. Estimation of DNA and RNA - UV method
3. Estimation of DNA by Diphenylamine method
4. Estimation of RNA by Orcinol method
5. Estimation of Protein by Lowry's method

6. Culturing and Isolation of Plasmid DNA
7. Agarose gel electrophoresis of DNA
8. Restriction digestion analysis of DNA (Demonstration)
9. Preparation of competent *E coli*- transformation (demonstration)
10. Determination of Molecular weight of polypeptides by SDS PAGE (group)
11. Polymerase Chain Reaction for amplification of DNA (demonstration)
12. Ligation of DNA
13. Southern Blot Analysis (Demonstration)
14. Western Blotting (Demonstration)

ANIMAL TISSUE CULTURE (Demonstration)

15. Preparation and Sterilization of media
16. Cell lines and maintenance -Trypsinisation, Passaging, Staging
17. Cell counting and cell staining
18. Cell viability determination – Tryphan blue exclusion.

REFERENCES

1. Freshney.R. I., 2010. Culture of Animal Cells - A Manual of Basic Techniques, 6th edition, John Wiley and Sons, Inc, Publication, New York.
2. Jayaraman.J., 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
3. Kannan.N., 2003; Laboratory Manual in Microbiology, Panima Publishing Corporation, Bangalore.
4. Sadasivam,S and A. Manickam, 2009; Biochemical Methods, New Age International Publishers, New Delhi.
5. Singh.S.P., 2009; Practical Manual of Biochemistry, CBS Publishers, New Delhi.
6. Talib.V.H., 2003; A Handbook of Medical Laboratory Technology, CBS Publishers, New Delhi.

Instruction hours/week: L:0 T:0 P:4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

To make the students

- To provide hands on experience on various biological databases
- To learn the retrieval of data from the biological databases
- To make them learn about pair wise and multiple sequence analysis.
- To learn and apply the statistical approaches
- To study the models for phylogenetic analysis and tree reconstruction.
- To teach them protein prediction methods and its validation.

Course outcomes (CO's)

The students shall be able to

1. The course will enable students to use various biological databases
2. The importance functions in the biological system.
3. The use computational approaches for pair wise, multiple and phylogenetic analysis.
4. Aware to predict the physio-chemical properties, protein structure and validation using computer-based labs.
5. Solve the biological problems using various computational tools and techniques.
6. Visualization of Protein structure by RASMOL.

Experiments:

1. Biological Databanks Sequence databases, Structure Databases, Specialized databases
2. Data base file formats.
3. Data retrieval tools and methods (PUBMED, ENTREZ, SRS)
4. Sequence Similarity searching (NCBI- BLAST, FASTA)
5. Protein sequence analysis (ExPASy proteomics tools)
6. Multiple sequence alignment (Clustal-W)

7. Gene structure and function prediction (Using ORF Finder, Genscan, GeneMark)
8. Molecular Phylogeny (PHYLIP)
9. Sequence Analysis using EMBOSS
10. Protein structure visualization – RASMOL (Menu function and Command line entries), Deep View.

REFERENCES:

1. Arthur M. Lesk, 2014. Introduction to Bioinformatics, Oxford University Press, Oxford.
2. Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.
3. Baxevanis. A.D and B.F.F Quellette, 2001. Practical Guide to the Analysis of Genes and Proteins, 3rd edition, John Wiley & Sons, New York.
4. David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. Cold Spring Harbour Laboratory Press, New York.

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives**Equip the students with**

- Specialized immune cells and their function
- Mechanisms of humoral immunity
- Mechanisms of cell mediated immunity
- Hyperactivation of immune cell and associated pathogenesis
- Basis behind immunodeficiency diseases
- Utility of immune based principles in diagnostic field

Course outcomes (CO's)**After successful completion, the students will understand:**

1. The structure and functions of specialized immune cells
2. Basis of humoral immunity
3. Basis of cell mediated immunity
4. Hypersensitivity reactions (I-V)
5. Hereditary and acquired immunodeficiency diseases
6. Utility of immune based principles in diagnostic field

UNIT I

Cells of the immune system: Haematopoiesis. Overview of Immune stem cells-Lymphoid cells, mononuclear, granulocytes, mast cells and dendritic cells. Lymphoid classes B, T and NK – B & T Cell maturation, activation and differentiation; Lymphocyte surface markers, CD nomenclature. Cell-mediated and humoral response.

UNIT II

Antigen: Epitope, B cell and T cell epitope, haptens, viral and bacterial antigens; factors influencing adjuvant technology. Immunoglobulins-domains, B cell receptors, antigenic determinants on immunoglobulins, Immunoglobulin super family. Immunoglobulin genes: multigene family; Immunoglobulin rearrangement- antibody diversity.

UNIT III

Hyper sensitivity: Type I, II, III, IV, V and VI. Complement-definition, classical and alternate pathway, MHC: organization, MHC molecules and genes, MHC and immune responsiveness, Transplantation and rejection.

UNIT IV

Immunity to infection: Definition and types of immunity, Primary and secondary immunodeficiency diseases. Auto-immune diseases, Tumor immunology
Vaccines: Active and passive immunization, Types of vaccines with example. Monoclonal Antibodies- Production and Applications.

UNIT V

Immuno Techniques: Antigen-Antibody interactions- precipitation reaction, agglutination tests- haemagglutination; Complement fixation test. Direct and indirect immunofluorescence, RIA, ELISA, CLIA, ECLIA, Immunoblotting, effector cell assay, Hemolytic plaque assay and Elispot assay.

TEXT BOOK

1. Roitt I., 2006. Essential Immunology. Blackwell Science, Oxford, UK 11th edition.

REFERENCES

2. Abbas, Lightman and Pober, 2000. Cellular and Molecular Immunology, W.B. Saunders and company, Philadelphia, United States.
3. Charles. A. Janeway and Jr. Paul Traverse, 2004. Immunobiology, 6th edition, Blackwell Scientific Publishers, Oxford university, London.
4. Geoffrey Zubay, 2009. Immunology, W.B. Saunders and company, Philadelphia, United States.
5. Ian R. Tizard, 2009. Immunology- An Introduction,,Saunders College Publishers, Sydney, 8th Edition.
6. Ivan Riott and Janathar Brotoff, 2006. Immunology, Mosby Publishers,Sydney. 7th Edition.

7. Janis Kuby, 2006. Immunology,. W.H. Freeman and Company, New York. 6th Edition.

M.Sc., Biochemistry

2015-2016

Semester III

15BCP302 CLINICAL BIOCHEMISTRY AND ENDOCRINOLOGY 4H-4C

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives

Equip the students with:

- Biological fluid collection and analysis
- Blood cell counting
- Assessment of inflammatory markers
- Estimation of clinically relevant enzymes
- Diagnosis of cancer
- Assessment of endocrine pathophysiology

Course outcomes (CO's)

After successful completion, the students will:

1. Collect and analyze biological fluid
2. Count the total RBC and different WBC using hemocytometer
3. Learn the assessment of CRP, RA and ESR
4. Perform estimation of clinically relevant enzymes
5. Understand the cancer marker assessment
6. Understand the endocrine pathophysiology

UNIT I

Clinical Samples: Blood collection, processing and transfusion process. Normal blood profile. Cerebrospinal fluid: Composition, clinical investigation of CSF in meningitis. Amniotic fluid: Origin, composition and analysis of amniotic fluid. Collection of urine. Urine preservatives. Test for urine compounds. Clinical significance of urinary components.

UNIT II

Serology and Hematology: C- reactive protein test, immunological test for pregnancy. Rheumatoid arthritis (RA) test, ESR. Coagulation test, prothrombin test. Haemoglobin. Normal and abnormal Hb, separation of haemoglobin, Thalassemia, Hemoglobinopathies. Disorder of erythrocyte metabolic pathways, erythrocyte enzyme disorders. Porphyrins and

disorder: porphyrias.

UNIT III

Clinical Parameters: Myocardial infarctions, hepatobiliary disease. General principles of hormone assay and clinical significance of steroid, protein and thyroid hormone (experimental details are not required). Oncology- oncogenes and cell cycle, Cancer Markers; Free radical induced lipid peroxidation. Free radical scavengers. Antioxidants in disease prevention.

UNIT IV

Overview of important endocrine glands and their hormones: Chemistry, synthesis, control, physiological role and pathophysiology of hypothalamus, pituitary, thyroid and parathyroid hormones.

UNIT V

Chemistry, synthesis, control, physiological role and pathophysiology of pancreas, adrenal medulla, adrenal cortex, male and female reproductive hormones. Endocrinology of pregnancy, parturition and lactation.

REFERENCES

1. Carl, A. Burtis, Edward R. Ashwood and William Heinmann Teitz, 1999. Textbook of Clinical Biochemistry, W.B. Saunders Company, London.
2. Emil. Smith, Philip Handler and Abraham White, 2004. Principles of Biochemistry, Mcgraw Hill International Book Company, London.
3. Harold Varley, 2003. Practical Clinical Biochemistry, volume 1 and 2, CBS Publishers, New Delhi.
4. Mac. E. Hadley, 2004. Endocrinology, Prentice Hall International Inc, London.
5. Philip D. Mayne, 1994. Clinical Chemistry in Diagnosis and Treatment, ELBS Publications, New York.

Course objectives**Equip the students**

- To learn and understand the methods of plant analysis
- To gain knowledge on natural products from plant sources
- To extract the natural products from plant sources
- To gain knowledge on natural products from plant sources
- To learn extraction of secondary metabolites from marine organisms
- To extract drugs from natural sources

Course outcomes (CO's)**After successful completion, the students will**

1. Learn and understand the methods of plant analysis
2. Gain knowledge on natural products from plant sources
3. Extract the natural products from plant sources
4. Gain knowledge on natural products from plant sources
5. Learn extraction of secondary metabolites from marine organisms
6. Extract drugs from natural sources

UNIT I

Methods of plant analysis-Extraction- sequential and percolation techniques. Separation techniques-Column chromatography, TLC, GLC and HPLC. Methods of identification-UV, IR, NMR and MS; Analysis of results- Qualitative and quantitative methods.

UNIT II

Natural products from plant sources: Chemistry, distribution and techniques for anthocyanins, phenolics, flavonol and flavones, tannin and quinines (General discussion only).

UNIT III

Natural products from plant sources: Chemistry, distribution and techniques for triterpenoids, essential oils, steroids, carotenoids and alkaloids (General discussion only).

UNIT IV

Natural products from microbes: Sample collection; Screening tests- antiviral, antibacterial, anticancer, antihypercholesterolemic. Commercial production of microbial enzymes - Invertase and beta galactosidase.

UNIT V

Marine organism and animals: Secondary metabolite from marine algae, bacteria, fungi and vertebrates. Separation and isolation techniques- Desalting, ion exchange and reverse

phase column chromatography; Bio assay directed fractionation. Isolation of simple peptides. Drugs from animal sources – hormones, carbohydrate and proteins.

TEXT BOOKS

1. Harborne J.P 2008. Phytochemical methods- A Guide to modern techniques of plant analysis. Fourth Indian reprint-3rd Edition, Springer (India) Pvt Ltd, New Delhi.
2. Michael J. Wailes, Neil L. Morgan, John S. Rockey, Gary Highton 2001. Industrial Microbiology: An Introduction”, Blackwell Science, Replica press Pvt Ltd, New Delhi.

REFERENCES

1. Sujatha VB, B.A. Nagasampagi, S. Meenakshi (2014) Natural Products-Chemistry and applications. Second reprint. NK Mehra for Narosa Publishing House Pvt Ltd, New Delhi.
2. E.M.T. El-Mansi, C.F.A. Bryce, A.L. Demain, A.R. Allman (2006). Fermentation microbiology and biotechnology”, 2nd Edition, Taylor & Francis, Florida.
3. Arnold L. Demain, Julian E. Davies, Ronald M. Atlas (1999). Manual of industrial microbiology and biotechnology, 2nd Edition, ASM Press, Washington.

Course objectives

Equip the students with

- Pharmacokinetics
- Pharmacodynamics
- Drug tolerance and dependence
- Genetically engineered drugs
- Mechanism of action of drugs
- Undesired effects of drugs

Course outcomes (CO's)

After successful completion, the students will understand

1. What the body does to a drug
2. What a drug does to a body
3. Drug dependence
4. The principles and procedure for genetically engineered drugs
5. How the drugs elicit the desired effect
6. Undesired effects of drugs

UNIT I

Drugs – Introduction, sources and routes of administration, Structural features and pharmacological activity, prodrug concept, Adsorption – factors modifying drug absorption. Distribution, metabolism - phase I, II reactions, action of cytochrome P450 and excretion of drugs.

Drug receptors – Localization, types and subtypes, models and theories. G-protein coupled receptor and ion-channel linked receptors. Examples of drug-receptor interactions. Agonists and antagonists.

UNIT II

Drug tolerance and drug dependence. Principles of basic pharmacokinetics. Adverse response to drugs, drug intolerance, pharmacogenetics, drug allergy, tachyphylaxis, drug abuse, vaccination against infection, factors modifying drug action and effect. Assay of drug potency: chemical, bioassay and immunoassay.

UNIT III

Genetically engineered protein and peptide agents as drugs, Novel drug delivery systems, anti-AIDS drug development, oncogenes as targets for drugs, multidrug resistance phenotypes, production of secondary metabolites by plant tissue culture. Genome based medicine.

UNIT IV

Mechanism of action of drugs used in therapy of Respiratory system – cough, bronchial asthma, pulmonary tuberculosis. Antimicrobial drugs – sulphonamides, trimethoprim,

penicillins, aminoglycosides and bacterial resistance, Cancer chemotherapy. Thyroid and antithyroid drugs, insulin and oral antidiabetic drugs, antifertility and ovulation inducing drugs. Pharmacotherapy of gout and rheumatoid arthritis, Immuno therapy – Immunosuppressants and immunostimulants, Enzymes in therapy.

UNIT V

Brain – Neurotransmitters, encephalins and endorphins; general function of autonomic and somatic nervous system; cholinergic transmission and receptors; adrenergic transmission and receptors; muscarinic receptors. Non steroidal and anti inflammatory drugs; adrenergic blocking drugs; cholinergic blocking drugs; muscarinic blocking drugs; parkinson's disease; Alzheimer's disease. Neurodegenerative disorders – Amyotrophic, lateral sclerosis, senile dementia, schizophrenia, Huntington's disease.

TEXTBOOKS

1. Satoskar.R S., S.D.Bhandarkar and S.S. Ainaipare, 2003. Pharmacology and Pharmacotherapeutics, Popular Prakasham, Mumbai.
2. Graham Patrick, 2002. Medicinal Chemistry Instant notes, Viva books private limited, New Delhi.
3. Sujit K.Chaudhuri,2001. Quintessence of Medical Pharmacology, New central book agency limited, Calcutta.

REFERENCES

1. Bernard R. Glick, Jack J. Pasternak and Cheryl L. Patten, 2009. Molecular Biotechnology, 4th edition, Panima Publishing Corporation, Delhi.
2. Grahame-Smith D.G and J. K. Aronson, 2002.Oxford textbook of Clinical Pharmacology and Drug Therapy: 3rd edition. Oxford University Press.
3. William O.Foye,Thomas L.Lemke,David A.Williams, 2012. Principles of Medicinal Chemistry, 7th edition, B.I. Wanerly Pvt. Ltd, New Delhi.
4. Wolf E ,1995. Burgers Medicinal Chemistry and Drug Discovery. Principles and Practice, John Wiley and Sons, Manfred.

Course objectives**Equip the students with:**

- Definition and representation styles of data
- Analysis of data using correlation to understand the interdependence
- Analysis of data using regression to understand the interdependence
- To learn various measures of central values and standard deviation.
- To understand the relationship between two variables.
- To test the significance of a particular data by various parameters.

Course outcomes (CO's)**After successful completion, the students will:**

1. Use appropriate representation styles to present the data
2. Perform correlation analysis
3. Perform regression analysis
4. Calculate mean, median, mode and standard deviation.
5. Calculate the relationship between two variables.
6. Test the significance of a particular data by various parameters.

UNIT I

Definitions-Scope of Biostatistics- Variables in biology, collection, classification and tabulation of data- Graphical and diagrammatic representation.

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion- Range, standard deviation, Coefficient of variation.

UNIT II

Correlation: Meaning and definition - Scatter diagram –Karl Pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT III

Test of significance: Tests based on Means only-Both Large sample and Small sample tests – Student's t test, Chi square test - goodness of fit. Analysis of variance – one way and two way classification. CRD, RBD Designs.

UNIT IV

Research: Scope and significance – Types of Research – Research Process – Characteristics of good research – Problems in Research – Identifying research problems. Research Designs – Features of good designs.

UNIT V

Sampling Design : Meaning – Concepts – Steps in sampling – Criteria for good sample design. Scaling measurements – Techniques – Types of scale.

REFERENCES

1. Gupta S.P., 2007. Statistical Methods, Sultan Chand & Co, New Delhi.
2. Kothari C.R., 2009. Research Methodology – Methods and Techniques, 3rd edition, New Age International Pvt. Ltd, New Delhi.
3. Sundar Rao P.S.S., and J.Richard., 2006. Introduction to Biostatistics and ResearchMethods, PHI Publication, New Delhi.
4. Sandhu. T., 1990. Research Techniques in Biological Sciences, Anmol Publishers, New Delhi.

Instruction hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course objectives**Equip the students with:**

- The process of drug discovery
- Pre-clinical studies
- Components of clinical research (Phases)
- Questionnaire preparation
- Fundamentals of IPR
- Patents laws

Course outcomes (CO's)**After successful completion, the student will understand:**

1. Steps involved in drug discovery
2. Using small experimental animals
3. Phase 2 and Phase 3 trials
4. Questionnaire preparation
5. Intellectual property rights
6. Patents laws

UNIT I

Drug discovery and Development: Introduction to Pharmaceutical Industry, New drug discovery-Target Identification- Target Prioritization/ validation, Lead identification, Lead optimization ; Preclinical studies - Preclinical technology, Chemistry manufacturing and controls / Pharmaceuticals Pharmacology/Toxicology

UNIT II

Basics of Clinical Research: Definition of clinical research and development, History of randomized trial Literature - Finding and Evaluation databases of Scientific Literature; Critiquing of Research Projects, Time management and resource implications

UNIT III

Epidemiology: Experimental Procedures - Controlled Experiments, Sampling Techniques, Questioner Design, Validity and reliability of observations, Primary variables, Acquisition and using secondary data, Randomization and Blinding: Theory and practice

UNIT IV

IPR: Introduction to Copyright - Conceptual Basis, International Protection of Copyright and Related rights- An Overview (International Convention/Treaties on Copyright). Indian Copyright Law -The Copyright Act, 1957 with its amendments, Ownership, transfer and duration of Copyright, Renewal and Termination of Copyright.

UNIT V

Patent: Introduction to Patent Law - Paris Convention, Patent Cooperation Treaty, WTO-TRIPS, Harmonisation of CBD and TRIPs. Indian Patent Law- The Patents Act, 1970, Amendments to the Patents Act, Patentable Subject Matter, Patentability Criteria, Procedure for Filing Patent Applications, Patent Granting Procedure.

TEXT BOOK

1. Weinberg S and Sandy W. 2009. Guidebook for Drug Regulatory Submissions, 1st edition, Wiley-Blackwell, U.S.A.

REFERENCES

1. Richard A.G., G. Richard. 2009. New Drug Approval Process Drugs and the Pharmaceutical Sciences), 5th edition CRC Press, U.S.A.
2. Duolao W, A Bakhai. 2005. Clinical Trials: A Practical Guide to Design, Analysis and Reporting, Remedica, London.
3. Weinberg S. 1995. Good Laboratory Practice Regulations, 3rd edition, CRC Press, U.S.A.
4. Harburn K, 1990. Quality Control of Packing Materials in Pharmaceutical Industry, CRC Press, U.S.A.
5. Prichard E. 1995. Quality in the Analytical Chemistry Laboratory, 1st edition, Wiley, U.S.A.

15BCP305C

**CORE ELECTIVE –I I
BIOPHARMACY****Semester III****4H-4C****Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course objectives****Equip the student**

- To explain the relationship among physicochemical and biological factors, dosage forms,
- To understand the routes of administration and therapeutic outcomes;
- To illustrate the principles of pharmaceuticals and biopharmaceuticals in dosage form design and development;
- To describe production procedures
- To learn quality control measurements and stability improvements for tablets and sterile products and different routes of drug administration in principles and applications
- To identify the needs and differences in drug use for various patient groups, and devise appropriate strategies from perspectives of dosage forms.

Course outcomes (CO's)**After completion of this course the student will**

1. Explain biopharmaceutical, physiological, biochemical and cell biology-related aspects
2. Understand the transport and metabolism of drugs in the gastrointestinal tract and in the liver.
3. Explain mechanisms behind the transport of drug and metabolism and how drugs can interact with other drugs and food and methods to study these
4. Have developed its ability to plan, compile, analyse and report experiment that has importance for biopharmaceutical issues -
5. Recognize the regulatory requirements within the biopharmaceutical area
6. Describe the role of biopharmaceuticals in drug development within the pharmaceutical industry

UNIT I

Phytochemistry: Authentication of medicinal plants, Biosynthesis of primary and secondary metabolites - alkaloids, terpenoids. Phenolic compounds and coumarins.

Classification and sources of alkaloids. Major classes in phenolic compounds – carotenoids, flavonoids, tannins and phenolic acids. Classification of terpenoids.

UNIT II

General extraction and isolation techniques for compounds from plants. Techniques involved in extraction of phytochemicals – Perculation, Soxhlet extraction, Supercritical Fluid extraction, Pilot scale extraction, reflux and other methods. Factors affecting extraction.

UNIT III

Isolation and purification techniques – Thin layer and Column chromatography. Chemical fingerprinting – HPLC, HPTLC, FTIR, NMR and GC-MS.

UNIT IV

Biotechnology of medicinal plants: Production of secondary metabolites from plant culture. Indian Standard Specifications (ISI) laid down for sampling and testing of various drugs in finished form by the Bureau of Indian Standards. Toxicity testing in drugs and Safety.

UNIT V

Bioactive studies: Anticancer, antidiabetic, anti-inflammatory, hepatoprotectives, antimicrobials from medicinal plants. Antioxidants of plant origin – Reactive Oxygen Species (ROS), antioxidant polyphenols.

REFERENCES

Harborne, J.B., 1998. Phytochemical methods to modern techniques of plant analysis. Chapman & Hall, London.

Trease GE, Evans MC, 1979. Textbook of Pharmacognosy, 12th edition. Balliere-Tindal, London.

Irfan A. Khan and Atitya Khanum (Eds.). 2004. Role of Biotechnology in medicinal and Aromatic plants, Vols. I-X. Ukaaz Publications, Hyderabad.

Instruction hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives**Equip the students**

- To impart the knowledge on basic tissue culture techniques and limitations in products
- To study about tissue culture laboratory and safety – biohazards
- To extrapolate the different types of culture media
- To understand the various types of cultures
- To learn synchronization of cell cultures and cell division
- To know the importance of stem cell research and its applications.

Course outcomes (CO's)**After completion of this course the student will be able to**

1. Demonstrate foundational knowledge of Cell culture techniques and competence in laboratory techniques.
2. Set up a tissue culture lab to carry out research based on cell lines.
3. Extrapolate the different types of culture media
4. Understand the various types of cultures
5. Learn synchronization of cell cultures and cell division
6. Know the importance of stem cell research and its applications.

UNIT I

Introduction, importance, history of cell culture development, different tissue culture techniques including primary and secondary culture, continuous cell lines, suspension culture, organ culture, advantages and limitations medical/pharmaceutical products of animal cell culture-genetic engineering of animal cells and their applications. Risks in a tissue culture laboratory and safety - biohazards.

UNIT II

Different types of cell culture media, growth supplements, serum free media, balanced salt solution, other cell culture reagents, culture of different tissues and its application. Facilities for animal cell culture-infrastructure, equipment, culture vessels. Biology and characterization of cultured cells-cell adhesion, proliferation, differentiation, morphology of cells and identification.

UNIT III

Primary cell culture techniques - mechanical disaggregation, enzymatic disaggregation, separation of viable and non-viable cells. Mass culture of cells - manipulation of cell line selection - types of cell lines - maintenance of cell lines - immobilization of cells and its application - synchronization of cell cultures and cell division - production of secondary metabolites - biotransformation - Induction of cell line mutants and mutations - cryopreservation – germplasm conservation and establishment of gene banks.

UNIT IV

Animal cell culture scale up: Scale up in suspension - stirrer culture, continuous flow culture, air-lift fermentor culture; Scale up in monolayer - Roller bottle culture, multi surface culture, multi array disks, spirals and tubes - monitoring of cell growth. Organ culture - whole embryo culture - specialized culture techniques - measurement of cell death.

UNIT V

Tissue engineering: Design and engineering of tissues - tissue modeling. Embryonic stem cell engineering - ES cell culture to produce differential cells - Human embryonic stem cell research. Transgenic animals-transgenic animals in xenotransplantation

TEXT BOOKS

1. Animal Cells Culture and Media, D.C.Darling and S.J.Morgan, 1994. BIOS Scientific Publishers Limited.
2. Animal Biotechnology, M.M. Ranga, 2000. Agrobios, India.
3. Biotechnology, Satyanarayana, U., 2006. Books and Allied (P) Ltd. India.

REFERENCES

1. Epithelial Cell Culture, Ann Harris, 1996. Cambridge University Press, London.
2. Methods in Cell Biology, Volume 57, Jennie P.Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.

Instruction hours/week: L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course objectives**Equip the students**

- To provide a comprehensive theoretical knowledge on genomics and proteomics
- To learn the fundamentals, current techniques and applications.
- To update and strengthen basic concepts in proteomics and genomics
- To address the modern biological issues.
- To use the different methodologies, techniques and tools commonly used in genome sequencing, assembly and annotation.
- To understand the Characterization of protein complexes

Course outcomes (CO's)**After completion of this course the student will be able to**

1. Identify and describe the different components in prokaryotic and eukaryotic genomes and proteomes.
2. Identify molecular mechanisms responsible for diseases.
3. Use the different methodologies, techniques and tools commonly used in genome sequencing, assembly and annotation.
4. Use the different methodologies, techniques and tools commonly used in proteomics.
5. Address the modern biological issues.
6. Characterize the protein complexes

UNIT I

Genome Sequencing: Introduction to Genes, Genome organization –prokaryotes and eukaryotes, Genetic markers- RFLP, Mini and Micro satellite, STS, EST, SSCP, RAPD, RFLP, SNP and SSR. Human Genome and Genomic analysis: Size, features, composition and characteristics of human genome – Sequence repeats, transposable elements, gene structure and pseudogenes.

UNIT II

Sequencing Genomes- methodology, chain termination method, chemical degradation method, shotgun sequencing and assembly of contiguous DNA sequence. cDNA and genomic library construction. Genomic Mapping: Different types of Genome maps and their uses, Genetic and Physical mapping techniques. Map resources. Practical uses of genome maps, NGS

UNIT III

Gene Expressions and Microarrays: Gene structure and pseudo genes. Concepts of microarrays, spotter analysis, Normalization –total intensity, using regression techniques, ratio statistics. Clustering Gene expression profiles-hierarchical, single-linkage, complete linkage, and average linkage. Tools for microarray analysis- MADAM, spot finder, SAGE Applications of Microarrays- Bioinformatics challenges in micro array design and analysis.

UNIT IV

Analytical Proteomics:RP-HPLC, Mass Spectrometry – ESI MS and MALDI techniques and applications. Characterization of protein complexes – protein-protein interactions, yeast two-hybrid system and protein micro arrays.

UNIT V

Experimental Proteomics: Proteome analysis- 2D gel electrophoresis: general strategy, immobilized pH gradients, sample preparation, isoelectric focusing, second dimension PAGE, staining, transfer of proteins from 2D gels, image acquisition and analysis of 2D gels. 2DE databases.

TEXT BOOKS

1. Brown TA., 2002 . Genomes. John Wiley & Sons. Singapore.
2. Pennington S. and M.J. Dunn, 2001. Proteomics: From Sequence to Function. Bios Scientific Pub.Ltd. Oxford.
3. Primrose S.B and R.M.Twyman, 2003. Principles of Genome Analysis. Blackwell Publishing, Oxford.
4. Richard P. Simpson, 2004. Proteins and Proteomics. A Laboratory Manual. Cold Spring Harbor Laboratory Press, New York.

REFERENCES

5. Charles R. Cantor, and Cassandra L. Smith, 1999. Genomics: The Science and Technology behind the Human Genome Project, John Wiley & Sons Pvt. Ltd. Singapore.

6. Dov Stekal, 2003. Microarray Bioinformatics, Cambridge University Press, Cambridge.
7. Greg Gibson and Spencer V. Muse., 2003. A Primer of Genome Science. Sinauer Associates Inc. Publishers, Sunderland, New York.
8. Liebler, 2001. Introduction to Proteomics, Tools for the New Biology. Humana Press, New Jersey. USA
9. Reiner Westermeier and Tom Naven., 2002. Proteomics in Practice. Wiley – VCH, Weinheim, Germany.

Course objectives

To impart hands-on training in:

- Assays of clinically relevant enzymes
- Diagnostic utility of enzyme assays
- Radial immunodiffusion
- Double immunodiffusion
- Immunoelectrophoresis
- Glucose tolerance test

Course outcomes (CO's)

After successful completion, the students will understand:

1. Various methods of assaying clinically relevant enzymes
2. The diagnostic significance of enzyme assays
3. Working knowledge principle of Radial immunodiffusion
4. Working knowledge principle of Double immunodiffusion
5. Working knowledge principle of Immunoelectrophoresis
6. Working knowledge principle of Glucose tolerance test

ENZYMOLOGY

1. Determination of the activity of the following serum enzymes:

- a. LDH
- b. Acid phosphatase
- c. Alkaline phosphatase
- d. Aspartate amino transferase
- e. Alanine amino transferase
- f. 5' nucleotidase
- g. Sodium potassium ATPase
- h. Ceruloplasmin

IMMUNOLOGY (DEMONSTRATION)

2. Raising of antibodies- single soluble and particulate antigen

3. Immunodiffusion- single radial and double diffusion.
4. Immunoelectrophoresis.
5. Rocket immunoelectrophoresis
6. ELISA

Case study-Report

7. Serum enzyme in liver disease
8. Serum enzyme in cardiac disease
9. Serum enzyme in cancer disease
10. Glucose Tolerance Test

REFERENCES

1. Jayaraman J, 2007. Laboratory Manual in Biochemistry, New Age International Publishers New Delhi.
2. Sadasivam S and A. Manickam, 2009. Biochemical Methods, New Age International Publishers, New Delhi.
3. Singh S.P, 2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.
4. Talib V. H, 2003. A Handbook of Medical Laboratory Technology, CBS Publishers, New Delhi.

Course objectives

To impart hands-on training in:

- The estimation of biomolecules such as glucose and cholesterol
- Assessment of renal function through the analysis of urea and uric acid in serum
- Assessment of liver function through the estimation of bilirubin
- The determination and significance of A/G ratio
- Handling experimental animals
- Various routes of injections

Course outcomes (CO's)

Upon successful completion of this course, students will be able to:

1. Explain the physiopathological bases and the biochemical markers of the most prevalent diseases in our population
2. Perform the estimation of biomolecules such as glucose and cholesterol
3. Assess renal and liver function through the analysis of urea and uric acid and bilirubin in serum
4. Determine A/G ratio and interpret its relevance
5. Handle the small experimental animals and
6. Understand the differences and significance of routes of injections

Clinical analysis

1. Estimation of glucose in serum
2. Estimation of cholesterol in serum
3. Estimation of urea in the urine and serum
4. Estimation of chloride in the urine and serum
5. Estimation of calcium in the urine and serum
6. Estimation of magnesium in the urine and serum
7. Analysis of urinary calculi

8. Estimation of Bilirubin in serum(Kit method)
9. Estimation of triglyceride in serum (Kit method)
10. Estimation of HDL in serum (Kit method)

ANIMAL STUDIES (Group experiment)

11. Handling of animals
12. Methods of injection
13. Induction of liver toxicity
14. Assay of lipid peroxidation in rat liver.

REFERENCES

1. Jayaraman J, 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
2. Sadasivam S and A. Manickam, 2009. Biochemical Methods, New Age International Publishers, New Delhi.
3. Singh S.P, 2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.
4. Talib V.H, 2003. A Handbook of Medical Laboratory Technology, CBS Publishers, New Delhi.

M.Sc., Biochemistry		2015-2016
15BCP491	PROJECT AND VIVA VOCE	Semester IV 15C
Hours / week: L:5 T:0 P:25		Marks: Internal: 80 External:120 Total: 200

SCOPE

To understand structural features of clinical data management.

OBJECTIVE

Since the emerging trends are numerous the goals of the course is to introduce the student to the current trends in database management for clinical research.

UNIT I**Drug Development Process**

Review FDA approved process for development and approval of a drug, role of key player in drug development. Key events in history that have impacted human subject rights, review informed consent process and describe regulatory requirements.

UNIT II**GCP Regulation and Guidelines**

Key concept in regulatory application such as GCP, regulation guidance and ICH guide lines. Review mandatory regulations of FDA that apply to sponsor investigator and IRB. Review the regulatory documents which must be collected and maintained, discuss the role of these regulatory documents, and identify strategies to ensure their accurate completion, review management of study files.

UNIT III**Database Management Systems (DBMS) for Clinical Research**

The concept of a multi-table relational database and data normalization. Rows as entities, columns as attributes. Primary and foreign keys. One-to-One, One-to-Many and Many-to-Many relationships. The basic tables in a clinical research study: subjects, measurements, and examiners.

Creating a table in design or “data dictionary” view. Field names, types, and descriptions; validation rules, primary and foreign keys, lookup tables, and relationships between tables. Creating data entry forms/subforms.

UNIT IV

Queries and Reports, Importing Data

Filtering by form. Writing select queries and reports for monitoring study progress. Importing data and appending and updating records.

UNIT V

Queries and Exporting Data

More sophisticated queries, including totals (“group by”) queries. Exporting data for statistical analysis. SAS Programming

TEXT BOOKS

1. Martin D.Hynes, 1998. Preparing for FDA pre-approval inspections, Informa Health Care Publication.
2. Raghu Ramakrishnan, Johannes Wendy Bohaychuk and Graham Ball, 1999. Conducting GCP-compliant clinical research, John Wiley Son’s publication.
3. Richard K. Rondel and Sheila A.Varley, 2000. Clinical Data Management, John Wiley and Sons.

REFERENCES

1. Abraham Silberchatz Henry K.Forth, Sudharshan ,2005. “Database System Concepts” 5th Edition Tata McGraw Hill, New Delhi.
2. Date C.J, 2003. An Introduction to Database Systems, 8th Edition Addison Wesley
3. Gehrke, 2003. Database Management SystemsMcGraw-Hill Professional, New Delhi
4. Jack Shostak, 2005. SAS Programming in the Pharmaceutical Industry, SAS Publication.

SCOPE

This paper encodes information on drug designing, drug discovery and drug metabolism.

OBJECTIVE

To assist the students to know the actual path of drug mechanism of action and drug discovery.

UNIT I

Introduction to drugs, classification of drugs, passage of drugs across biological membrane; absorption and distribution of drugs; Drug metabolism and elimination- methods of study of drug metabolism, microsomal drug metabolism, binding of drugs to plasma proteins, Introduction and receptor concept-. Types of receptors, receptor theories, isolation of receptors. consequences of drug receptor interaction

UNIT II

Monte Carlo Simulation Methods, Conformational analysis, *Ab initio*, dft and semi empirical methods, Use of molecular modeling to discover and design new molecules. Techniques of molecular dynamics, Molecular Dynamics Simulation Methods - molecular dynamics using simple models, molecular dynamics with continuous potential-setting up and running a molecular dynamic simulation, constraint dynamics.

UNIT III

Recent advances in drug design methodologies- Biomolecular structure, Structure activity relationship, Pharmacokinetics, Pharmacophoric pattern, ADME Properties, quantitative structure activity relationship, Use of genetic algorithms and principle component analysis in the QSAR equations.

UNIT IV

Ion channels- Structure, function and Pharmacology, Enzymes and enzyme inhibitors, - Enzyme Inhibition strategies.- Enzyme inhibition as a tool for drug development – Examples. Finding new drug targets to treat disease- strategies for target identification and

lead design- Use of Genomics and Proteomics for understanding diseases at molecular level-
- new targets for anti-cancer drugs, Lipinski's rule.

UNIT V

Principles and methods of docking, docking problem, structure based drug design, induced fit docking. 3D database search approaches. Screening technology and Informatics for natural products drug discovery. The drug development process, the practice and limitations of Computer assisted drug discovery process, Commercial analysis of docking software's.

TEXT BOOKS

1. Andrew R. Leach., 2001. Molecular Modeling; Principles and Applications, Prentice Hall
2. Kothekar.V, 2005. Essential of Drug Designing 2nd Edition, Academic Press, New York.
3. Penelope W Coddling, 1998. Structure-Based Drug Design, Springer Publishers, Berlin Publications, New Delhi.
4. Satoskar, R.S. Bhandarkar, S.D and S.S. Ainapure, 14th edition, 1995. Pharmacology and pharmacotherapeutics. Popular Prakashnan Bombay.

REFERENCE BOOKS

1. Alan L. Harvey, 1998. Advances in Drug Discovery Techniques, John Wiley & Sons, New York.
2. Arup K Ghose, 2001. Combinatorial Library Design and Evaluation, Marcel Dekker Publishers, New York.
3. Patrick.L. Graham (1995), An introduction to medicinal chemistry, Oxford University Press.
4. Povl Krogsgaard-Larsen, 2002. Textbook of Drug Design and Discovery, Taylor & Francis Publishers, New York.
5. Richard B Silverman, 2004. The Organic Chemistry of Drug Design and Drug Action, Elsevier Publishers, Ireland.
6. William Foye (1986), 3rd edition, Principles of medicinal chemistry.

KARPAGAM ACADEMY OF HIGHER EDUCATION
DEPARTMENT OF BIOTECHNOLOGY
B. Sc. Biotechnology
SCHEME OF EXAMINATION (2015 -2016 Batch)

Code	Subjects	Objectives and Outcomes		Ins*			Marks			Exam/ Hrs	Credits
		PEO's	PO's & PSO's	L	T	P	CIA	ESE	Total		
Semester – I											
15LAU101	Language – I	-	-	05	00	00	40	60	100	3	05
15ENU101	English – I	-	-	04	00	00	40	60	100	3	04
15BTU101	Biochemistry	I	a, b	04	01	00	40	60	100	3	05
15BTU111	Biochemistry – Practical I	I	a, b	00	00	05	40	60	100	3	03
15BTU102	Allied Chemistry I	I	a	04	00	00	40	60	100	3	04
15BTU112	Allied Chemistry- Practical I	I	a	00	00	03	40	60	100	3	02
15FCA101	Foundation course A -Value Education	I	a	02	00	00	100	-	100	-	01
15SSD101	Soft Skill Development I	IV	o	01	01	00	-	-	-	-	-
Semester Total				20	02	08	340	360	700	-	24
Semester – II											
15LAU201	Language – II	-	-	05	00	00	40	60	100	3	05
15ENU201	English – II	-	-	04	00	00	40	60	100	3	04
15BTU201	Microbiology	I	c	04	01	00	40	60	100	3	05
15BTU211	Microbiology -Practical II	I	c	00	00	05	40	60	100	3	03
15BTU202	Allied Chemistry II	I	a	04	00	00	40	60	100	3	04
15BTU212	Allied Chemistry - Practical II	I	a	00	00	03	40	60	100	3	02
15FCB201	Foundation course B - Environmental studies	I, IV	d, o	02	00	00	100	-	100	-	01
15SSD101	Soft Skill Development – I	IV	o	01	01	00	100	-	100	-	01
Semester Total				20	02	08	440	360	800	-	25
Semester – III											
15ENU301	English – III	-	-	04	00	00	40	60	100	3	04
15BTU301	Bioinstrumentation	I, III	d, l	03	01	00	40	60	100	3	04
15BTU302	Cell and Molecular Biology	II	e	04	00	00	40	60	100	3	04
15BTU311	Cell and Molecular Biology- Practical III	II, IV	e, n	00	00	05	40	60	100	3	02
15BTU303	Allied Elective –I	I, III, IV	c, l, o	04	00	00	40	60	100	3	04

15BTU312	Allied Elective Practical I	I, III	c, l, o, n	00	00	03	40	60	100	3	02
15FCC301	Computer course	I	a	04	00	00	100	-	100	-	02
15SSD301	Soft Skill Development – II	IV	o	01	01	00	-	-	-	-	-
Semester Total				20	02	08	340	360	700	-	22
Semester –IV											
15ENU401	English – IV	-	-	04	00	00	40	60	100	3	04
15BTU401	Genetics	II	e	06	00	00	40	60	100	3	05
15BTU402	Immunology	II	f	05	01	00	40	60	100	3	05
15BTU411	Genetics and Immunology – Practical IV	II	f, n	00	00	05	40	60	100	3	03
15BTU403	Allied Elective - II	I, III	c, k	04	00	00	40	60	100	3	03
15BTU412	Allied Elective Practical - II	III, IV	c, k, n	00	00	03	40	60	100	3	02
15SSD401	Soft Skill Development –II	IV	o	01	01	00	100	100	100	-	01
Semester Total				20	02	08	340	460	700	-	23
Semester –V											
15BTU501	Recombinant DNA Technology	II	e, g	04	01	00	40	60	100	3	05
15BTU502	Bioprocess Technology	II	g, h	04	01	00	40	60	100	3	05
15BTU503	Food Biotechnology			05	00	00	40	60	100	3	05
15BTU504	Environmental Biotechnology	III, IV	d, k, l	05	00	00	40	60	100	3	05
15BTU505	Core Elective – I	III, IV	j, l	05	00	00	40	60	100	3	05
15BTU506 15BTU604	Additional Course	I, IV	a, n	-	-	-	-	100	100	3	04
15OEU501	Open elective	I, II	k, l, m, o	00	00	-	-	100	100	3	03
15BTU511	rDNA, Bioprocess, Food, and Environmental Biotechnology - Practical V	I, III, IV	d, k, l, n	00	00	05	40	60	100	3	03
15BTU521	Internship	III	l	00	00	-	50	-	50	-	02
Semester Total				23	02	05	290	560	850	-	37
Semester –VI											
15BTU601	Animal Biotechnology	III	i	04	01	00	40	60	100	3	05

15BTU602	Plant Biotechnology	II, III	i, g	04	01	00	40	60	100	3	05
15BTU603	Core Elective –II	I, II	k, l, m, o	05	00	00	40	60	100	3	04
15BTU611	Animal and Plant Biotechnology -Practical VI	II, III, IV	i, g, n	00	00	05	40	60	100	3	03
15BTU691	Project and Viva- voce	III	l	10	00	00	60	90	150	3	06
	Extension Activity			00	00	-	-	-	-	-	-
	Semester Total			23	02	05	220	330	550	-	23
	G. Total			126	12	42	1970	2430	4300	-	154

*Additional credit not counted for program requirement

Core Elective

Core Elective –I		Core Elective -II	
15BTU505A	Bioinformatics	15BTU603A	Tissue Engineering
15BTU505B	Bio-nanotechnology	15BTU603B	Applied Biotechnology
15BTU505C	Biofertilizer Technology	15BTU603C	Herbal Technology

Allied Elective – I

Theory		Practical	
15BTU303A	Biostatistics	15BTU312A	Biostatistics – Practical
15BTU303B	Clinical Microbiology	15BTU312B	Clinical Microbiology -Practical
15BTU303C	General Mathematics		

Allied Elective – II

Theory		Practical	
15BTU403A	Fundamentals of Computer	15BTU412A	C Programming - Practical
15BTU403B	Biophysics	15BTU412B	Biophysics - Practical
15BTU403C	Medical Microbiology	15BTU412C	Medical Microbiology -Practical

Open Elective

15OEU401	Sericulture Technology
----------	------------------------

Additional course(s)

Code	Course (s)
15BTU506	Animal House Management
15BTU604	Entrepreneurship Biotechnology

LS: Language course; EN: English course ; ECA: Extra Curricular Activities; NCC: National Cadet Corps; NSS: National Social Service; DSE : Discipline Specific Elective

Blue – Employability Green – Entrepreneurship Red- Skill Development

PROGRAMME OUTCOMES (POs)

- a) Graduates will acquire in-depth understanding of basic concept, knowledge about biochemistry and cell organelles, their functions for applied field, allied subject and life skills.
- b) The students will be able to discuss the metabolic aspects of biomolecules.
- c) The Graduates will gain the technical capability of handling, isolating and identifying various organisms from different sources.
- d) Understanding and better knowledge of the causes, types and control methods for environmental pollution by the students.
- e) The student will be able to discuss the mechanisms associated with gene expression system in prokaryotes and eukaryotes.
- f) Understand the role of different types of cells, effectors and effectors mechanisms in immune-technology by the students.
- g) Develop skills associated with screening of industrially important strains, various aspects of bioprocess technology and rDNA technology by the graduates.
- h) The student will be able to understand the production of enzymes from different sources and enzyme characterization and kinetic actions in living organisms.
- i) The student will be able to understand the production of transgenic plants and animals for human and environmental welfare.
- j) Understand the basic concepts and modern knowledge of bioinformatics by graduates.
- k) Apply the knowledge and skills gained from molecular aspects should be useful in developing new innovations in different life forms by the graduates.
- l) The student will be able design, solve the application-oriented problem in biotechnological field through project-based learning.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

To enable the student to emerge as:

- m) Proficiency to work on biotechnological concepts and interdisciplinary areas of science and technology towards product and process development for industrial and academic research applications.
- n) An expert in Biotechnology and allied fields (medical, microbial, agricultural, environmental, plant and animal) for utilizing the practical skills to address biotechnological challenges.
- o) Proficiency to acquire knowledge in facing the interviews, to become an entrepreneur and develop leadership skills with life-long learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

To impart the following PEOs to the students of Under-graduates in Biotechnology:

PEO I: To obtain detailed information about the fundamentals of Biotechnology, allied subjects and life skills.

PEO II: To provide information about the molecular methods which involved in cellular processes of living systems such as microbes to higher order organisms for applied aspects. To address the emerging need for skilled scientific manpower with research ethics involving organisms.

PEO III: To impart the basics and current molecular tools in the areas of Molecular Diagnostics, Fermentation Technology, Plant, Animal & Environmental Biotechnology are included to train the students for man power development and also sensitize them to scope for research. The practical subjects will provide information about the careers in the industry and applied research where biological system is employed.

PEO IV: To make the graduates of Biotechnology to learn and to adopt in a competitive world of technology update and contribute to all forms of life.

MAPPING OF PEOs AND POs

PEOs	Programme Outcome (s)														
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
PEO I	x	x	x	x											
PEO II					x	x	x	x							
PEO III									x	x	x	x			
PEO IV											x	x	x	x	x

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
முதல் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	5	3	40 / 60	100	5

பகுதி-I, தமிழ்
15LAU101 :

தமிழ் முதல் தாள்

பருவம் I
5-H,5-C

அலகு-I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.
கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு
இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.
சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை
அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.
பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள
குழலியல் : அன்பாதவன் - மரணம்
காதல் : வைரமுத்து - காதல் உயில்
தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு-II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20
2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்
3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு-III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்
2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்
3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு-IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை
2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே
3. கத்தர்வன் - துண்டு
4. வாஸந்தி - வடிகால்
5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு-V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி
2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21.

Course Objectives

The main objectives of the course are

- To enable the learners to acquire English language skills at a faster pace
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improve their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes

On successful completion of the course the students will be able to

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts

1. Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference

2. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

Course Objectives

The main objectives of the course are

- To know the qualitative and quantitative determination of the biochemical substances
- To study their structure and functions of macromolecules
- To identify the molecular interactions between the atoms and molecules
- To derive the mathematical equations of enzyme kinetics
- To understand the metabolic pathways that occurs in the normal human life
- To elucidate the role of macromolecules for the growth and development of organisms

Course Outcomes

On successful completion of the course the students will be able to

1. Demonstrate and understand the fundamental biochemistry principles, including topics specific to chemistry and biochemistry
2. Acquaint knowledge in understanding the structure/function of biomolecules
3. Explain the metabolic pathways
4. Understand the regulation of biological/biochemical processes
5. Insight into protein structures and folding mechanism
6. Explain the applications of protein engineering in academia and industry

UNIT –I

Introduction: Atoms, molecules, chemical bonds: covalent and non-covalent, Van der Waals, electrostatic and hydrophobic interactions. Chemical foundation of biology: pH, pKa, acids, bases and buffers.

UNIT- II

Carbohydrates: Structure and functions, classification, physical and chemical properties. **Proteins:** Amino acids and peptides Structure and classification of amino acids. Classification and organization of proteins: – primary, secondary, tertiary and quaternary. Structure of peptide bond and its biological significance.

UNIT- III

Lipids: Lipids: Classification, structure and functions. Triglycerides; Phospholipids; Steroids and terpenes. Glycolipids and lipoproteins-structure and function. Role of lipids in biomembranes. **Nucleic acids:** Structure, properties and functions of nucleic acids, DNA, RNA and their types.

UNIT -IV

Enzyme catalysts: Basic principles and factors affecting enzyme activity. Enzyme kinetics – Michaelis – Menten equation. Mechanism of enzyme regulation. Co-enzyme, co-factors, difference between chemical and enzyme catalysis, enzyme inhibition.

UNIT -V

Metabolism: Glycolysis, gluconeogenesis, Tri Carboxylic Acid cycle, electron transport chain and oxidative phosphorylation, photophosphorylation- light reaction, dark reaction. **Hormones:** Structure and function; **Vitamins:** Types, structure and functions.

Textbooks

1. Palmer, T. and P. Bonner, 2008. Enzymes Biochemistry, Biotechnology, Clinical Chemistry. II Edition, First East West Press Pvt Ltd., New Delhi.

References

1. Lehninger, A, D. L. Nelson, M. Cox and M. M. Cox, 2009. Principles of Biochemistry. MPS Publishers, New York.
2. Zubay, G.L, 1995. Principles of Biochemistry. WCB Publishers, London.
3. Herg, J.M, J.L. Tymoczko and L. Stryer, 2002. Biochemistry. V Edition, WH-Freeman and Co, New York.
4. Voet, G. and A. Voet, 1995. Fundamentals of Biochemistry. II Edition, John Wiley and Sons, Inc. New York.
5. Murray, R.K, D.K. Granner, P.A. Mayes and V.W. Rodwell, 2003. Harper's Illustrated Biochemistry. XXVI Edition, McGraw-Hill Publishers, New York. (Online version).

Course Objectives

The main objectives of the course are

- To acquire skill on various experimental methods and techniques
- To analyze the given protein and sugar samples
- To design biochemical experiments using classical techniques and modern instruments
- To estimate calcium in urine samples
- To analyze the oil sample
- To quantify the lipids in the given sample

Course Outcomes

On successful completion of the course the students will be able to

1. Quantify the amount of sugar in the given sample
2. Quantify the amount of protein in the given sample
3. Perform the analysis of amino acids using paper and thin layer chromatography
4. Determine the iodine number, saponification value and acid number in a given oil sample
5. Gain skills on quantitative estimation methods for various biomolecules from natural sources
6. Prepare casein from milk sample

Experiments

1. Bio instruments – Introduction and demonstration
2. Quantification of sugars (Anthrone method)
3. Quantification of proteins (Lowry *et al* Method)
4. Quantification of total free amino acids
5. Quantification of lipids
6. Analysis of oils- Iodine number, Saponification value and Acid number
7. Quantification of Ascorbic acid
8. Paper Chromatography (Ascending and descending)
9. Thin Layer Chromatography (Amino acids)
10. Estimation of DNA (DPA method)
11. Estimation of RNA (Orcinol method)
12. Spot test for biomolecules
13. Preparation of casein from milk
14. Estimation calcium in urine

Textbooks

1. Boyer, R, 2000. Experimental Biochemistry. Benjamin Cummings, Redwood City, California, USA.
2. Palanivelu, P, 2001. Analytical Biochemistry and Separation Techniques. Kalaimani Printers, Madurai.

References

1. Sadasivam, S. and A. Manickam, 2002. Biochemical Methods. New Age International Pvt Ltd Publishers, New Delhi.
2. Wilson, K. and K.H. Goulding, 1986. Biologists Guide to Principles and Techniques of Practical Biochemistry. ELBS Edition, London.

Course Objectives**The main objectives of the course are**

- The molecular orbital theory, preparation and properties of inorganic compounds.
- Theory of covalent bond, polar effects and stereochemistry of organic compounds.
- About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
- Elements of photochemistry, chemical kinetics and chromatography.
- About the dyes, chemotherapy and vitamins.
- To know the principles of Column, Paper and Thin Layer Chromatography.

Course Outcomes**On successful completion of the course the students will be able to**

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. About the dyes, chemotherapy and vitamins.
6. Principles and applications of Column, Paper and Thin Layer Chromatography.

Unit-I

Chemical Bonding: Molecular orbital theory-linear combination of atomic orbitals-bonding and antibonding molecular orbitals-energy level diagram-bond order- M.O. configuration of H₂, N₂ and F₂ molecules. Diborane: Preparation, properties and structure. NaBH₄: Preparation and uses. Borazole: Preparation and properties. Interhalogen compounds: ICl, BrF₃, IF₅ - preparation, properties, uses and structure. Basic properties of iodine. Compounds of sulphur: Sodium hydrosulphite- preparation, properties, uses and structure. Per acids of sulphur: Preparation, properties, uses and structure.

Unit-II

Industrial Chemistry: Silicones: Synthesis, properties and uses. Fuels gases: Natural gas- water gas-semi water gas-carbureted water gas-producer gas- oil gas (Manufacturing details not required). Fertilizers: NPK fertilizer-ammonium sulphate-urea-superphosphate of lime- triple superphosphate-potassium nitrate-ammonium nitrate. Pollution: Water, air and soil pollution-sources and remedies-acid rain-ozone hole-greenhouse effect.

Unit- III**Covalent Bond and Stereoisomerism:**

Covalent Bond: Orbital overlap, hybridization and geometry of CH₄, C₂H₄ and C₂H₂. Polar effects: Inductive effect-electromeric effect- mesomeric effect- steric effect- hyperconjugation.

Stereoisomerism: Elements of symmetry-polarised light and optical activity-isomerism in tartaric acid-racemisation- resolution- geometrical isomerism of maleic and fumaric acids- keto-enol tautomerism of acetoacetic esters.

Unit- IV

Dyes, Chemotherapy and Vitamins: Dyes: Terms used chromophore, auxochrome, bathochromic shift and hypsochromic shift- classification of dyes – based on chemical structure and application-one example each for azo, triphenylmethane, vat and mordant dyes- preparation. **Chemotherapy:**

Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of penicillins and chloromycetin. **Vitamins:** Diseases caused by the deficiency of vitamins A, B1, B2, C and D-sources of these vitamins.

Unit- V

Elements of Photochemistry, Chemical Kinetics and Chromatography: Elements of Photochemistry: Photochemical Laws-Beer Lambert's law-Grotthuss-Draper law-Stark- Einstein law (statement only).

Chemical Kinetics: Rate-order-molecularity-pseudo first order reactions-zero order reactions-determination of order of reaction-measurement of order and rates of reactions- effect of temperature on reaction rate-energy of activation.

Chromatography: Principles and applications of Column, Paper and Thin Layer Chromatography.

Textbooks

1. Veeraiyan, V., & Vasudevan, A.N.S. (2005). *Text Book of Allied Chemistry* (2nd ed.). Chennai: Highmount Publishing House.
2. Puri, B.R., & Sharma L.R. (2002). *Principles of Inorganic Chemistry*. Jalandar: Shoban Lal & Company Ltd.
3. Bahl, B.S., & Arun Bahl, (2005). *Advanced Organic Chemistry*. New Delhi: S.Chand & Company Ltd.
4. Puri, Sharma & Pathania, (2003). *Physical Chemistry*. Jalandhar: Vishal Publishing Company Ltd.

Reference Books

1. Gopalan, R. & Sundaram, S. (2003). *Allied Chemistry* (3rd ed.). New Delhi: Sultan Chand & Sons.

Total hours/week: L:0 T:0 P:3**Marks: Internal: 40 External: 60 Total: 100****Course Objectives**

The student should know

- The molecular orbital theory, preparation and properties of inorganic compounds.
- Theory of covalent bond, polar effects and stereochemistry of organic compounds.
- Theory about important Aromatic or aliphatic
- About the preliminary test
- Elements of chemical confirmatory test.
- Understand the concepts of safe laboratory practices.

Course Outcomes

The student understands

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About importance of the preliminary test
4. About the chemical confirmatory test
5. Elements of photochemistry, chemical kinetics.
6. About the safety measures to handle the chemicals in the lab.

Experiments:

Systematic analysis of an organic compound, Preliminary tests, detection of elements present, aromatic or aliphatic, saturated or unsaturated, nature of the functional group, confirmatory tests-aldehyde, ketones, amines, diamide, carbohydrates, phenols, acids, esters & nitro compounds

Note: Each student analyzes minimum 6 compounds

Reference Books

1. Ramasamy, R. (2008). *Allied Chemistry Practical Book*. Karur: Priya Publications.
2. Thomas, A.O. (2010). *Practical Chemistry for B.Sc. Main Students*. Cannanore: Kerala, Scientific Book Centre.
3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2004). *Basic Principles of Practical Chemistry* (2nd ed.). New Delhi: S. Chand Publications.

Course Objectives

The main objectives of the course are

- To develop a sense of competitive spirit, co-operation, leadership, diligence, punctuality and team spirit
- To provide a backdrop for the development of their creative talents
- To train the students towards sustainable life style
- To improve the Interpersonal relationship
- To know the importance of family relationship
- To acquire tolerance and truthfulness

Course outcome

On successful completion of the course the students will be able to

1. Acquire knowledge in facing the interviews
2. Acquire knowledge of Time management
3. To know about Goal Setting
4. To know about Spiritualization
5. Able to create awareness about the values and their significance role
6. Imbibe the concept of discipline and freedom

Unit I

Concept of self, self-awareness, self-esteem and self-confidence. Concept of personality, determinants and disorganization of it. Personality development – meaning.

Unit II

Goal Setting – meaning and importance; steps in goal setting manners and etiquette – meaning need and importance; means to improve, Positive thinking.

Unit III

Discipline-meaning, concept of roles and responsibility; Time management – Meaning and steps for effective time management

Unit IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

Unit V

Family Relationship importance of it; Means to improve, Spiritualization – meaning. Its relationship with Altruism, sacrifice, self-control, tolerance and truthfulness.

Textbooks:

1. Karpagam University Study Material, 2015

Instruction hours/week: L:1 T:1 P:0

Course Objectives

The main objectives of the course are

- To impart knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- To adopt new faster methods of calculations.
- To acquire knowledge on coding and decoding
- To get knowledge on the calculation of simple and compound interest
- To develop interpersonal skills

Course outcome

On successful completion of the course the students will be able to

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculation
4. Do coding and decoding
5. Calculate profit and loss
6. Improve interpersonal skills

UNIT – I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT – II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding.

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest.

UNIT- IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills.

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்'; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
இரண்டு	II	5	3	40 / 60	100	5

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்த்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாகியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

- நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை, ஆசிரியர் - விழிக்கட பேதைப் பெருங்கண்ணனார்.
2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

- குறுந்தொகை: 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.
2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவன்னக்கன் தாமோதரனார்.

- ஐங்குறுநூறு: 1. நுண்ணோர் புகுவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

- அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு.

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,

சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை - மணிமேகலை வேண்ட,

மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாகியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மணிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலக்ஷ்மி.

2. தமிழர் வளர்த்த நூண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமார்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு, கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21, India

Course Objectives

The main objectives of the course are

- To acquire English language skills through literature
- To familiarize them with English literature
- To acquire Grammar knowledge
- To imbibe cultural values
- To get skill of making correct sentences
- To reflect originality on the application of soft skills and express in writing their views

Course Outcomes

On successful completion of the course the students will be able to

1. Learn to enjoy the ecstasy of literature
2. The select literary pieces will develop the confidence level of the learners
3. To get the social values
4. To know the importance of communication
5. Get sound knowledge in English
6. Communicate well for business purpose

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. *English for Communication*. 2006. Emerald Publishers: Chennai.

Total hours/week: L:4 T:1 P:0

Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To inculcate knowledge on fundamentals of microorganisms.
- To learn the structural organization, morphology and reproduction of microbes.
- To know the principles of Microscopy and advancements in Microscopy
- To deal with the study of genetic, metabolic strategies and ecology of microorganisms.
- To learn the basic knowledge of the main microbiological techniques to be applied in the laboratory.
- To develop understanding about microbial metabolism, growth, energy generation and disease caused.

Course Outcomes

On completion of the course, students are able to

1. Gain rigorous knowledge on historical perspective of Microbiology
2. Acquire basic knowledge on different structure of microbes.
3. Get Ideas on different type of microscope.
4. Acquire basic knowledge the different applications of microbiology in biotechnology.
5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms.
6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused.

UNIT - I

General Microbiology: Definition, history, scope, discovery and development of microorganisms, **Microscopy:** Bright field, dark field, phase contrast, fluorescence and confocal microscopy. Electron Microscope - SEM and TEM.

UNIT –II

Microbiological Techniques: Types of media preparation, methods of sterilization, techniques of pure culture, maintenance and preservation. Staining – types of stains and dyes, staining methods. Microbial growth.

UNIT –III

Microbial Physiology: Microbial growth, growth factors, Impact of environmental factors on growth, nutritional classification of microbes- energy production, oxidation, reduction reactions, aerobic and anaerobic.

UNIT – IV

Microbial Diversity: General structure of microbes-bacteria, viruses, algae, fungi and protozoans – Outline classification of each group and identification. Viruses – Structure, Classification and Replication.

UNIT - V

Microbial Diseases: Causative agent, pathology, diagnosis, control and treatment of Bacterial - TB, Cholera and Typhoid. Protozoan – Amoebiasis and Malaria. Viral - AIDS. Control of microorganisms – drugs, chemotherapy, antimicrobial agents.

Textbooks:

1. Cossart, P, P. Boquet, and S. Normark, 2005. Cellular Microbiology. American Society for Microbiology, New York.
2. Jay, J. M, M. J. Loessner, G. A. David, 2006. Modern Food. VII Edition. Springer Publications, New York.

References:

1. Pelzar, M.J, 2003. Microbiology. Tata McGraw-Hill Publishing Company Ltd, New York.
2. Prescott. L.M, 1996. Microbiology. III Edition, Wm. C. Brown Publishers, London.

Course Objectives**The main objectives of the course are**

- To understand the basic principles of microscopy ultra-structure of microbes along with staining and sterilization methods
- To understand various accessories for microbiology Practicals
- To acquaint the students with various aspects of basic and applied microbiology
- To understand the biochemical characterization of isolated microbes
- To develop practical biological skills such as staining, sterilization etc.
- To develop skills on primary screening of microorganisms

Course Outcomes**On completion of the course, students are able to**

1. Develop basic skill in aseptic techniques
2. Have outline knowledge on isolation, sub culture and maintenance of microbes
3. Gain experience in microbiological laboratory practices and skills in the design and execution of microbiology related research
4. Develop skills to prepare useful medias for microbial growth in the laboratory
5. Use of handling of glass wares, minor equipment for conducting experiments
6. Learn safety and precautionary measures for working with microbes in a laboratory

Experiments

1. Sterilization, Disinfection, and Antisepsis
2. Culturing and Preserving Microorganisms
3. Media preparation (Liquid, solid and semi-solid)
4. Isolation of organisms from soil, water and air
5. Pure culture technique – Pour plate, streak plate and Spread plate method
6. Staining technique - Simple staining, Gram's staining, Flagella staining Endospore staining, Lacto phenol cotton blue.
7. Biochemical analysis – IMVIC, Urease, Carbohydrate fermentation, TSI
8. Measurement of growth rate of bacteria
9. Plaque Assay for Bacteriophage
10. Motility – Hanging drop, Soft agar analysis

Texts

1. Bharucha, F.D. and A.I. Mehta, 2000. Handbook of Microbiological Methods and Media. Sevak Printers, Mumbai.
2. Cappuccino, J.G. and N. Sherman, 2004. Microbiology-A Lab Manual. Pearson Education, Singapore.

References

1. Dubey, R.B. and E. Maheswari, 2004. Practical Microbiology. S. Chand and Co. Publishers, New Delhi.
2. Goldman, E. and H. G. Lorrence, 2008. Practical Handbook of Microbiology. II Edition, CRC press, London.

Course Objectives

- To make the student to be conversant with the extraction of metals, coordination chemistry, preparation, properties uses and structure of naphthalene and heterocyclic compounds.
- To make the student acquire sound knowledge of electrochemistry, biological functions of amino acids and proteins.
- To educate students on chemistry of carboxylic acids, nitro compounds and carbohydrates.
- To impart basic understanding on Thermodynamics
- To educate students on topics Electrochemistry
- To educate on thermodynamic laws, entropy, enthalpy change and the principles of electroplating.

Course Outcomes

1. The students will be able to understand the metallurgy of metals and the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.
2. The students will be able to understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.
3. The students will be able to understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.
4. The students will be able to understand the concepts of first and second laws of thermodynamics.
5. The students will be able to understand the fundamentals of electrochemistry.
6. To expose students on radical analysis in inorganic mixtures; Determination of surface tension and viscosity of liquids.

Unit-I - Metals and Coordination Chemistry:

Metals: General methods of extraction of metals-method of ore dressing-types of furnaces-reduction methods-electrical methods-types of refining- Van Arkel process – zone refining.

Coordination Chemistry: Nomenclature – theories of Werner, Sidgwick and Pauling – chelation and its industrial importance -EDTA- haemoglobin – chlorophyll- applications in qualitative and quantitative analysis.

Unit-II - Aromatic Compounds and Heterocyclic Compounds:

Aromatic Compounds: Aromaticity – Huckel's $(4n+2)$ rule- aromatic electrophilic substitution in benzene- mechanism of nitration, halogenation, alkylation, acylation and sulphonation.

Naphthalene: Isolation, preparation, properties and structure.

Heterocyclic Compounds: Preparation and properties of pyrrole, furan, thiophene and pyridine.

Unit- III - Amino acids, Proteins and Carbohydrates:

Amino acids: Classification, preparation and properties. Peptides-preparation of peptides (Bergmann method only).

Proteins: Classification, properties, biological functions and structure.

Carbohydrates: Classification, preparation and properties of glucose and fructose -discussion of open chain and ring structures of glucose and fructose-glucose-fructose interconversion.

Unit- IV

Energetics: Type of systems- processes and their types – isothermal, adiabatic, reversible, irreversible and spontaneous processes- statement of first law of thermodynamics – need for the second law of thermodynamics- heat engine- Carnot cycle- efficiency – Carnot theorem- thermodynamics scale of temperature- Joule – Thomson effect- Enthalpy – Entropy and its significance- Free energy change.

Unit- V

Electrochemistry: Kohlrausch law- conductometric titrations- hydrolysis of salts- galvanic cells- EMF- standard electrode potentials- reference electrodes- electrochemical series and its applications- buffer solution- buffer solution in the biological systems -pH and its determination – principles of electroplating.

Textbooks

1. Veeraiyan, V., & Vasudevan, A.N.S. (2005). *Text Book of Allied Chemistry* (2nd ed.). Chennai: Highmount Publishing House.
2. Puri, B.R., & Sharma L.R. (2002). *Principles of Inorganic Chemistry*. Jalandar: Shoban lal & Company Ltd.
3. Bahl, B.S., & Arun Bahl, (2005). *Advanced Organic Chemistry*. New Delhi: S.Chand & Company Ltd.
4. Puri, Sharma & Pathania, (2003). *Physical Chemistry*. Jalandhar: Vishal Publishing Company Ltd.

Reference Books

1. Gopalan, R. & Sundaram, S. (2003). *Allied Chemistry* (3rd ed.). New Delhi: Sultan Chand & Sons.

Course Objectives

- The student on successful completion of the course should learn the principles of volumetric analysis
- To estimate the compounds by acidimetry, alkalimetry and permanganometry.
- Experimental practice of quantitative volumetric analysis.
- The objective of the titration is the determination of the concentration or the mass of the minimum formula from the titrated chemical material composing a pure liquid or a solution.
- The main objective of volumetric analysis is to determine the amount of a substance in a given sample.
- When dealing with volumetric analysis the concept of concentration cannot be avoided. Molarity i.e. moles per litre or decimeter is widely used unit of concentration.

Course Outcomes

1. Student will be able to learn the principles of quantitative analysis of inorganic compounds.
2. Student will be able to learn the estimation of sample present in a solution by volumetric analysis
3. Understand the concepts of quantitative analysis
4. Recognize the indicators, acid and bases used in volumetric analysis
5. Estimate the amount of substance present in a given solution
6. Utilize the mathematical skills doing calculations

Contents**VOLUMETRIC ANALYSIS****A. Acidimetry & Alkalimetry**

1. Estimation of sodium carbonate using standard sodium hydroxide.
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of sulphuric acid using standard oxalic acid.
4. Estimation of potassium permanganate using standard sodium hydroxide.

B. Permanganometry

1. Estimation of ferrous sulphate using standard Mohr's salt.
2. Estimation of oxalic acid using standard ferrous sulphate.
3. Estimation of calcium-direct method.

Reference Books

1. Ramasamy, R. (2008). *Allied Chemistry Practical Book*. Karur: Priya Publications.
2. Thomas, A.O. (2010). *Practical Chemistry for B.Sc. Main Students*. Cannanore: Kerala, Scientific Book Centre.
3. Venkateswaran, V., Veeraswamy, R., & Kulandaivelu, A. R. (2004). *Basic Principles of Practical Chemistry* (2nd ed.). New Delhi: S. Chand Publications.

Course Objectives**The main objectives of the course are**

- To study the definition and components of ecosystem
- To get knowledge on the classification of ecosystem
- To know about biodiversity and threats to biodiversity
- To gain adequate information about rain water harvesting and its importance
- To acquire knowledge on Environmental Protection Act
- To recognize Resettlement and Rehabilitation

Course Outcomes**On completion of the course, students are able to**

1. Explain the components of ecosystem
2. Describe the biodiversity and point out the biodiversity hot spots
3. Designate the threats to biodiversity
4. List out the effects of environmental pollution
5. Elucidate the solid waste management
6. Explicate the poaching of wildlife

Unit - I:

Eco system and natural resources: Environment - Definition – components – Ecosystem - Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources.

Unit - II:

Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit - III:

Biodiversity and its conservation: Introduction - Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit - IV:

Social issues and the environment: Urban problems related to energy - water conservation and management - Rainwater harvesting- water shed management. Resettlement and Rehabilitation. Natural resources and associated problems and sustainable utilization. Environmental Education.

Unit - V:

Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

Textbooks

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta,
2. Kotwal, P.c. and S. Banerjee, 2002. Biodiversity Conservation - In Managed forest and protected areas, Agrobios, India.

References

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, Rand Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Course Objectives**The main objectives of the course are**

- To impart knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- To adopt new faster methods of calculations.
- To acquire knowledge on coding and decoding
- To get knowledge on the calculation of simple and compound interest
- To develop interpersonal skills

Course outcome**On successful completion of the course the students will be able to**

7. Acquire knowledge in facing the interviews
8. Obtain acquaintance of time management
9. Imply new faster methods for calculation
10. Do coding and decoding
11. Calculate profit and loss
12. Improve interpersonal skills

UNIT – I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT – II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding.

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest.

UNIT- IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills.

Course Objectives

The main objectives of the course are

- To develop confidence to respond in English during situations where the use of English is imperative
- To grow fluency in actual conversation in the English language
- To develop speech skills necessary for confident and intelligent participations in Group discussions
- To develop knowledge about business communication
- To improve the hearing skills
- To enhance the reading skills
- To sequence the sentence appropriately

Course Outcomes

On completion of the course, students are able to

1. Explain the basics and purposes of listening skill
2. Understand the importance of speaking
3. Students developed the speaking skills on telephone, business and also in travel
4. Implement an effective vocabulary learning strategy
5. Make an effective communication
6. Translating short sentences and passages

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic).

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones) (Exercise based)

Reference Books

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. "Let's Communicate – Basic English for Everyone", Vaigarai Publications, 1st edition, Dindigul 2007.

Course Objectives**The main objectives of the course are**

- To study the bio-analytical tools and their applications
- To have sufficient knowledge on the separation of compounds from a mixture
- To recognize the working principle and instrumentation of spectrometer
- To understand the procedure for handling the instruments
- To study the applications of centrifugation
- To understand the gel documentation and application

Course Outcomes**On completion of the course, students are able to**

1. Know the working principle, maintenance, and calibrations of bioanalytical tools and technique
2. Estimate the number of biomolecules using the Bioanalytical tool
3. Implement the bioanalytical techniques to analyze the biomolecules
4. Explain the working principle of spectrophotometer
5. Appreciate the applications of the gel documentation
6. Acquaint knowledge on the results interpretations

UNIT – I

Analytical Devices: Triple beam – analytical and semi microbalance. pH meter: pH scale, methods of calculating pH from Henderson's equation. Types of electrode, measurement of pH, pH indicators. Conductivity meter: Principles, instrumentation and application.

UNIT – II

Colorimetry: Colour and absorption spectra, Beer's law and Lambert's law, principles, Instrumentation and applications. Spectrophotometry: component of the instrument, single beam, double beam, UV-visible spectrophotometer-Principle and instrumentation and application. Fluorimetry-Principle, Instrumentation and application.

UNIT – III

Centrifugation: Principles, types, analytical and preparative, density gradient and ultra centrifugation-instrument and applications- fractionation of cellular components.

UNIT – IV

Chromatography: Paper, TLC, HPTLC -Principles, instrumentation and applications. Column and ion exchange chromatography, GC and HPLC.

UNIT – V

Electrophoresis: Principles, instrumentation and application of agarose gel electrophoresis, native SDS-PAGE, Isoelectric focusing and immunoelectrophoresis. Gel documentation and application.

Textbooks

1. Holme, DJ. and Hazelpack, K, 1998. Analytical Biochemistry. III edition, Longman Publications, London.
2. Boyer.R, 2000. Modern Experimental Biochemistry, III Edition, Addison Wesley Longman, New Delhi.

References

1. David Friedfelder, 2001. Molecular Biology, V Edition Oxford Publishers, New York.
2. Keith Wilson and John Walker, 2006. Principles and Techniques of Biochemistry and Molecular Biology, VIth Edition, Cambridge University Press, India.
3. Switzer, R and Garritty.L, 1999. Experiment Biochemistry. III edition, W.H. Freeman and Company Publishers, New York.

Course Objectives

The main objectives of the course are

- To enable students to learn the basic structure of cells
- To know the structural organization of plasma membrane
- To understand the concept of cell signaling and signal transduction
- To emphasize the basic knowledge about genetic code and its concept
- To obtain the adequate knowledge on the structure and functions of biomolecules
- To gain the information about the DNA damage and repair mechanisms

Course Outcomes

The learners will be able to

1. Appreciate the unique features of plant and animal cells
2. Gain knowledge on the organization of the plasma membrane
3. Acquire knowledge about the concepts of genetic code
4. Achieve knowledge about the functions of nucleic acids and proteins
5. Obtain an in-depth knowledge on the structural organization of biomolecules
6. Explain about mutations and its types

UNIT – I

Cellular Organization: Cell theory, Classification cell types- Prokaryotic and Eukaryotic cells, structure and organization- plant and animal cell. Various types of cell division. Chromosome biology – histone and non-histone proteins, Recombination in models- Homologous and site-specific recombination.

UNIT – II

Membrane models, Composition, structure and functions of plasma membrane- functions: electrochemical gradients and action potentials, pumps, channels. transport of nutrients, ions –Active and passive. Cell signaling and Signal transduction.

UNIT – III

Genetic Material: DNA as genetic material, structure of Nucleic acids –DNA, supercoils, RNA- types – tRNA, mRNA, rRNA and Sn RNA, Genetic code and its concept, Anatomy of a gene, DNA replication and its models, DNA binding protein.

UNIT – IV

Protein synthesis: Control sequence- Promoter, operator, terminator, enhancers, silencers and attenuation, Transcription and translation. Operon concept- regulatory genes and structural, Lactose, tryptophan.

UNIT – V

DNA damage and repairs mechanisms: Types, Mutation and its types, Mutagens-Physical and chemical. Transposon and retrotransposon.

Textbooks

1. Lehninger and Nelson Cox. 1993. Principles of Biochemistry. CBS Publishers, New Delhi.
2. Bruce Alberts, D. Bray, J. Lewis, M. Raff, Roberts and J.D. Watson, 1994. Molecular Cell Biology, II Edition, Garland Publishing Inc., New York.

References

1. Gerald Karp, 2005. Cell and Molecular Biology- Concepts and Experiments, IV Edition, Wiley International Edition, New York.
2. Sambrook, J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning, a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York.
3. Watson, J.D, N.H. Hopkins, J.W. Roberts, J. Steitz and A.M. Weiner, 1987. Molecular Biology of Gene. IV Edition, The Benjamin Cummings Publishers Inc., California.

Course Objectives

The main objectives of the course are,

- To inculcate practical skill in handling Microscope
- To develop skills on identification of cells in plant and animal sources
- To detect the chromosomal aberration
- To analyze the membrane components
- To learn what are the solutions required for cell and molecular biology experiments and how to prepare it
- To understand the principles and applications of cell and molecular biology

Course Outcomes

The learners will be able to

1. Perform the experiments for isolation, purification and visualize the nucleic acid from various sources
2. Acquire skills on microtomy
3. Gain basic knowledge on sex chromatin
4. Know the protocol for fractionation of cellular components
5. To perform the chromosomal aberration experiment
6. Know how they control cellular activity and they respond to environment

Experiments

1. Identification of plant and animal cell types
2. Identification of microbial cell types
3. Fractionation of cellular components (Chloroplast, Mitochondria)
4. Cell membrane, separation and analysis of membrane components
5. Cell permeability
6. Chromosomal aberration (Onion root)
7. Microtomy
8. Preparation of sex chromatin
9. Mitotic preparation from onion root tip
10. Salivary gland chromosomes of *Chironomous* larvae

Textbooks

1. Nigam, A. and A. Ayyagari, 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill Publishing Company Private Ltd., India
2. Dealtry, G.B. and Rickwood, D, 1992. Cell Biology. LAB FAX. Bio Scientific Publishers, India.

References

1. Sambrook, J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning, a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York.
2. Watson, J.D, N.H. Hopkins, J.W. Roberts, J. Steitz and A.M. Weiner, 1987. Molecular Biology of Gene. IV Edition, The Benjamin Cummings Publishers Inc., California.

Course Objectives

The main objectives of the course are

- To know the scope of biostatistics
- To learn the knowledge about graphical and diagrammatic representation of Statistical data
- To gain adequate knowledge about the applications of biostatistics
- To learn the knowledge about collection, processing and presentation of data and testing of hypothesis
- To learn the knowledge about measures of central tendency, measures of dispersion
- To learn the knowledge about correlation analysis and regression analysis

Course Outcomes

On completion of the course, students are able to

1. Apply the statistical tool knowledge for research data analysis
2. Understand the concept of various hypothesis regarding data analysis
3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)
4. To perform analysis to determine the mean, median, mode and standard deviation of given sample/data
5. To perform analysis, determine the probability of given sample/data
6. To perform the t-test/F-Test and Chi-square test of given data

UNIT – I

Definitions – Scope of Biostatistics – Variables in Biology, collection, classification and tabulation of data – Graphical and diagrammatic representation.

UNIT – II

Measures of Central tendency – Arithmetic mean, median and mode. Measures of dispersion – Range, standard deviation, Coefficient of variation.

UNIT – III

Correlation – Meaning and definition – Scatter diagram – Karl Pearson's correlation coefficient. Rank correlation.

UNIT – IV

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – V

Test of significance: test based on means only: Both Large sample and Small sample tests- Chi square test- goodness of fit.

Textbooks

1. Pilai R. S. N., and Bagavathi V., 2002., Statistics, S. Chand & Company Ltd, New Delhi.

References

1. Jerrold H. Zar, 2003 Biostatistical Analysis, Fourth Edition, Pearson Education (Pte) Ltd, New Delhi.
2. Dr. P N. Arora, 1997, A foundation course statistics, S. Chand & Company Ltd, New Delhi.
3. Navanitham P. A, 2004, Business Mathematics and Statistics, Jai Publications, Trichy.
4. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

Course Objectives

The main objectives of the course are

- To gain mathematical approach for analyzing the data.
- To learn the knowledge about graphical and diagrammatic representation of Statistical data.
- To learn the knowledge about Scope and applications of biostatistics
- To learn the knowledge about collection, processing and presentation of data and Testing of hypothesis
- To learn the knowledge about Measures of central tendency, Measures of dispersion
- To learn the knowledge about Correlation analysis and regression analysis

Course Outcomes

On completion of the course, students are able to

1. Apply the statistical tool knowledge for research data analysis.
2. Understand the concept of various hypothesis regarding data analysis.
3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)
4. To perform analysis to determine the mean, median, mode by SPSS package
5. To perform analysis, determine the probability of given sample/data
6. To perform Karl Pearson's Correlation of given data

PRACTICAL

1. Mean for individual, discrete series using SPSS Package.
2. Mean for continuous series using SPSS Package.
3. Median for individual and discrete series using SPSS Package.
4. Median for continuous series using SPSS Package.
5. Mode for individual and discrete series using SPSS Package.
6. Standard deviation for individual and discrete series using SPSS Package.
7. Coefficient of variation for individual and discrete series using SPSS Package
8. Karl Pearson's Correlation using SPSS Package.
9. Rank Correlation Coefficient for United Rank using SPSS Package
10. Rank Correlation Coefficient for Tied Rank using SPSS Package.

References:

1. Navanitham P. A, 2004, Business Mathematics and Statistics, Jai Publications, Trichy.
2. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

Course Objectives

The main objectives of the course are

- To inculcate knowledge on fundamentals of microorganisms
- To learn the structural organization, morphology and reproduction of microbes
- To know the principles of Microscopy and advancements in Microscopy
- To deal with the study of genetic, metabolic strategies and ecology of microorganisms
- To learn the basic knowledge of the main microbiological techniques to be applied in the laboratory
- To develop understanding about microbial metabolism, growth, energy generation and disease caused

Course Outcomes

On completion of the course, students are able to

1. Gain rigorous knowledge on historical perspective of Microbiology
2. Acquire basic knowledge on different structure of microbes
3. Get Ideas on different type of microscope
4. Acquire basic knowledge the different applications of microbiology in biotechnology
5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms
6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused

UNIT – I

Scope of clinical Microbiology- Safety precautions in laboratory – Aseptic collections – transportation – handling of pathological specimens (blood, urine, sputum, pus and stool)- Antibiotic susceptibility testing (Kirby Bauer method).

UNIT – II

Definitions of pathogens, saprophytes and commensals – Infection- Sources and methods – Infectious disease cycle – Definitions of Endemics, Epidemics and Pandemics- Investigation of epidemics and its control.

UNIT – III

Gram Positive bacteria: Morphology, cultural characteristics, pathogenecity and laboratory diagnosis. *Staphylococcus aureus*, *Streptococcus pyogenes*, *Bacillus anthracis*, *Corynebacterium diphtheriae*.

UNIT – IV

Gram negative bacteria: Morphology, cultural characteristics, pathogenecity, and laboratory diagnosis, *E. Coli*, *Klebsiella pneumonia*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Vibrio cholera*.

UNIT – V

Normal microbial flora of the human body (skin, intestinal tract, genitourinary tract and respiratory tract) – Vaccines and Antibiotics.

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Baron, E. J. and S. M. Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Collee J. G., A. G. Fraser, B.P. Marmion and A. Simmons, 1996. Mackie and McCartney Practical Medical Microbiology 14th Edition. New York, Churchill Livingstone.
5. Thomas, P.A. 2007, Clinical Microbiology. Orient Longman Private Ltd, New Delhi.

Course Objectives

The main objectives of the course are

- To understand the basic principles of Analysis of Blood grouping
- To understand various accessories for clinical microbiology practical
- To acquaint the students with various aspects of analysis of Rh typing
- To learn the techniques of antibiotic sensitivity assessment
- To develop practical skills to perform WIDAL test

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in aseptic techniques
2. Perform blood grouping and Rh typing
3. Carry out antibiotic sensitivity test
4. Do WIDAL test
5. Learn safety and precautionary measures for working with microbes in a laboratory
6. Accomplish the processing of urine and csf

Practical

- Analysis of Blood grouping and Rh typing
- Collection and processing of sputum and stool
- Collection and processing of urine and csf
- Performance of WIDAL – slide and tube test
- Preparation of antibiotic disc.
- Antibiotic sensitivity testing – disc diffusion method
- Antibiotic sensitivity testing – well diffusion method

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Baron, E. J. and S. M. Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
3. Gunasekaran, P. 1996. Lab Manual in Microbiology. 1st Edition, New age international P. Ltd., Publishers, New Delhi.
4. Jayaram, J. 2002. Lab Manual in Biochemistry. New age international P. Ltd., Publishers, New Delhi.
5. Kannan, N. 2002. Laboratory Manual in General Microbiology. Panima Publishing Corporation, New Delhi.

Course Objectives

The main objectives of the course are

- To gain mathematical approach for analyzing the data
- To learn the knowledge about matrix Algebra
- To learn the knowledge about differential calculus
- To learn the knowledge about Integral calculus
- To learn the knowledge about probability theory
- To learn the knowledge about theoretical distribution

Course Outcomes

On completion of the course, students are able to

1. Apply the algebra for research data analysis
2. Understand the concept of Differential Calculus
3. Perform Integral Calculus
4. Perform analysis based on Probability theory
5. Perform analysis on the theoretical distribution
6. Perform analysis on First and Second order derivatives

UNIT- I

Matrix Algebra: Addition - Subtraction - Multiplication - Transpose – Inverse of a matrix- Solving Simultaneous Linear equations by matrix method.

UNIT- II

Differential Calculus: Meaning of derivatives - Simple Differentiation of Algebraic, Exponential, Logarithmic functions - Evaluation of First and Second order derivatives- Maxima and Minima of functions.

UNIT- III

Integral Calculus: Definite and Indefinite integrals - Methods of Integration - Integration by substitution - Integration by parts.

UNIT-IV

Probability theory: Axioms of Probability-Addition theorem - Multiplication theorem- conditional Probability - Baye's theorem.

UNIT- V

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

Textbook

1. Singaravelu.A.,2011, Engineering Mathematics Vol 1, Meenakshi Publications Arpakkam.
2. Manickavasagam Pillai.T.K, and S. Narayanan, 2002. "Calculus", Volume I, and Volume II, S.V Printers & Publishers, Chennai.
3. Gupta.S.P, 2001. "Statistical methods". Sultan Chand & Sons, New Delhi.

References

1. Navanitham.PA, 2006."Business Mathematics and Statistics". Jai Publishers, Trichy - 21.
2. Pillai.R.S.N, and V. Bagavathy, 2002. "Statistics", S. Chand & Company Ltd. New Delhi.

Course Objectives

The main objectives of the course are

- To understand the basic characteristics of Computers
- To understand classification and development of Computers
- To acquaint the students with various aspects of MS Office
- To understand the working principles of MS Word
- To develop practical skills of MS PowerPoint
- To develop skills on MS Excel

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in basics of operating in system
2. Have outline knowledge on development of Computers
3. Gain experience in practicing MS Office
4. Develop skills to prepare MS PowerPoint presentations
5. Use of handling of computers
6. Learn safety and precautionary measures while working with computers

Unit-I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers - the computer system- types of Input / Output and memory devices-computer software-categories of software.

Unit-II

Starting with MS Office Word - Working with Text - working with tables-Checking spelling and grammar- adding graphics to document- Mail merge- printing a document - Advanced features of MS Office Word- Keyboard shortcuts.

Unit III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

Unit IV

Starting with MS Office PowerPoint - Working with PowerPoint- Working with different views-Designing Presentations- Slide Show. - Printing in PowerPoint.

Unit-V

The Internet - Evolution of Internet - Owner of Internet - Anatomy of Internet - Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

Textbook:

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions.2011. Pearson, New Delhi.

15SSD401

SOFT SKILL DEVELOPMENT - II

2H – 1C

Total hours/week: L:1 T:1 P:0

Course Objectives**The main objectives of the course are**

- To impart knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate Time, Speed and Distance
- To adopt new faster methods of Data Sufficiency
- To acquire knowledge on Synonyms, Antonyms, Verbal Analogy
- To get knowledge on Resume Writing, Introduction to HR rounds
- To develop interpersonal skills

Course outcome**On successful completion of the course the students will be able to**

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculating data sufficiency
4. Do Verbal Analogy
5. Perform best resume writing
6. Improve interpersonal skills

UNIT-I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT-II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT-III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT-IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT – V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behavior

Course Objectives

The main objectives of the course are

- To train the students in understanding the concepts of communication
- To be familiar with the four basic skills of English
- To train students in developing their written communication
- To train students in developing their presentation skills
- To acquire the skill of making grammatically correct sentences
- To reflect originality on the application of soft skill views and express in writing their views

Course Outcome

On successful completion of the course the students will be able to

1. Students have acquired proficiency in communication
2. Students have become adept in written communication and presentation skills
3. Developed the skill of writing in English and that of public speaking
4. Establish and maintain social relationships
5. Develop communication skills in business environment
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Textbook

1. Juneja. P. Om and Aarati Mujumdar, *“Business Communication -Techniques and Methods”*, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007.Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman.2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Course Objectives

The main objectives of the course are

- To deliver the basic concepts of heredity in different living organisms
- To gain the information about the level of genome organization in various living organisms
- To obtain the knowledge about transmission of genetic information across generation at the individual and population level
- To understand how to identify and classify mutations in DNA
- To relate the structure and function of the DNA molecule to its functional role in encoding genetic material
- To describe the basic aspects of the flow of genetic information

Course Outcomes

On successful completion of the course the students will be able to

1. Acquire knowledge about the central theories and methodologies traditional, molecular and population genetics
2. Acquire information on sex- linked inheritance and associated diseases
3. Understand the role of genetics in breeding and natural selection
4. Apply the principles of inheritance as formulated by Mendel
5. Apply the Chromosome Mapping
6. Acquire knowledge about the relationship between genetic, physical, and cytogenetic maps

UNIT - I

Science of Genetics – Introduction, Scope and history of Genetics, Mendelian genetics: Mendel's principles - Laws of Segregation, independent assortment, applications of Mendel's principles.

UNIT- II

Non-Mendelian genetics- Incomplete dominance, over-dominance and co-dominance. Cytoplasmic inheritance, extranuclear inheritance (mitochondrial, chloroplast), non-chromosomal inheritance, maternal inheritance, uniparental inheritance, Chromosomal variation in Number & Structure, Chromosomal Mosaics, Polytenic chromosomes.

UNIT - III

Linkage and Crossing over: Chromosome theory of Linkage, kinds of linkage, linkage groups, types of Crossing over, mechanism of Meiotic Crossing over, kinds of Crossing over, theories about the mechanism of Crossing over, cytological detection of Crossing over, significance of Crossing over.

UNIT - IV

Chromosome Mapping: Haploid mapping (2 point & 3-point cross), Diploid mapping (Tetrad analysis), determination of linkage groups, determination of map distance, determination of gene order, cytological mapping.

UNIT - V

Human Cyto-Genetics: Human karyotype, Banding techniques, classification, use of Human Cyto-genetics in Medical science, Chromosomal abnormalities in spontaneous abortions, viable monosomies & trisomies, chromosomal deletions & duplications, genetics of chromosomal inversions & translocations, human traits, Genomic position effects on Gene expression.

Textbooks

1. Brown, T.A, 2007. Genomes III. Garland Science, London.
2. Friedfielter, D, 2007. Molecular Biology. Narosa Publishing House, New Delhi.
3. Gardner, G, 2001. Principles of Genetics. John Wiley and Sons Inc, New York.

References

1. Louise, G, 2004. Genetic Engineering. Gale Group Farmington Hills, New York.
2. Leland, H, 2008. Genetics: From Genes to Genomes. McGraw-Hill, New York
3. Lewin, B, 2004. Genes VIII. Pearson Education Inc., New Jersey.

Course Objectives**The main objectives of the course are**

- To understand the basic concepts of immunology
- To expose students to use these principles of immune system to combat infections
- To gain the information about the auto immune diseases
- To identify the cellular and molecular basis of immune responsiveness
- To describe the roles of the immune system in both maintaining health and contributing to disease
- To demonstrate a capacity for problem-solving about immune responsiveness

Course Outcomes**On successful completion of the course the students will be able to**

1. Gain about the various cells and organs involved in the immune system
2. Understand the molecular mechanisms of antigen-antibody interactions
3. And also, the molecular mechanisms behind the immune response evoked after infection by various pathogens
4. Learn the theoretical basis for the various immunological techniques
5. Apply immunological laboratory techniques to understand principles of antigen-antibody reaction
6. Use different immunological test to study the immune effector function and immune development

UNIT - I

Introduction: Historical background & Biological aspects of Immunology, Self and non-self recognition, specificity, memory of immune system. Primary & Secondary lymphoid organs: Thymus, Bone marrow, Lymph nodes, Spleen & MALT.

UNIT - II

Antigens: Essential features of Ag, haptens, Carrier molecule, Immunological valence, Antigenic determinants. Adjuvants: Freund's complete and incomplete.

Antibodies: Nature, Primary structure of immunoglobulins; Classification of Ig: Types – IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE (Origin, structural functions); Major Histocompatibility Complex (MHC): antigen processing and presentation; synthesis of antibody and secretion. **Theories of Ab formation:** Instructive, selective, clonal selection.

UNIT - III

Immunity: Active, Passive - Cell-mediated, Humoral, Immune response: primary and secondary response.

Phagocytosis - its mechanism; Null cells: Natural Killer cells; Interferons: Definition & its types; Complement system: Nature, components of complement pathway; Pathways: Classical and Alternative pathways.

UNIT - IV

Hypersensitivity Reactions (HS): Mechanism and pathogenicity - **Type I:** Allergies and anaphylaxis; **Type II:** Antibody mediated HS reactions; **Type III:** Immune complex mediated HS reactions, **Type IV:** Delayed type (or) cell-mediated HS reactions; **Type V:** Stimulatory HS reactions.

Auto immunity: Introduction, Auto recognition, classes of auto immuno diseases. (Hashimoto disease, thyrotoxicosis, Systemic lupus erythematosus, Autoimmune haemolytic anemia, Rheumatoid arthritis).

UNIT - V

Transplantation: Types and Graft Rejection; Immunosuppressant drugs (azathioprine, methotrexate, cyclophosphamide, cyclosporin-A, Steroids).

Hybridoma Technology: Production of monoclonal antibodies.

Textbook

1. Kuby, J, 2000. Immunology, WH Freeman & Co.
2. Weir, D.M, 1992. Immunological Techniques. Blackwell Scientific Publications, London

References

1. Roitt, I, 2002. Essential Immunology, (VI Edn.) Blackwell Scientific, Oxford.
2. Pathak, S. 2005. Immunology, (II Edn.) Capital Publishing Company, New Delhi.

Course Objectives

The main objectives of the course are,

- To train the students in mulberry cultivation, farm maintenance, seed Technology, Silkworm rearing, Silk Reeling.
- To know Technology of Mulberry cultivation and basic inputs of water, irrigation, fertilizers, and pest management
- To guide and give counseling to become entrepreneur.
- To know technology of Mulberry cultivation and basic inputs of water, irrigation, fertilizers, and pest management.
- To study the biology and varieties of mulberry silkworms and the basic techniques of silk production and construction of cocoons
- To follow proper technology of rearing silkworm larvae and using disinfection methods so that to get healthy cocoons.

Course Outcomes

The learners will be able to,

1. Acquire knowledge on the physiological aspects of mulberry
2. Know the physical agents like temperature and water, Growth and development
3. Understand the concept and establishment of separate mulberry garden for chawki and late age worms
4. Gather information about the primary, secondary and micronutrients in mulberry
5. Know the impact of nutrient deficiency on silkworm growth and development
6. Understand the genetics and inheritance of voltinism

UNIT – I

General Sericulture – Introduction to Sericulture-Origin and history of Sericulture, Components of Sericulture, Sericultural practices, Employment generation.

UNIT- II

Silkworm Biology - Characteristic features, Classification, Life cycle.

UNIT –III

Mulberry cultivation –soil, Importance, soil pH, organic carbon and NPK level, Propagation of mulberry-seedling, sapling, grafting and layering, other cultivation practices.

UNIT -IV

Silkworm rearing - Rearing house, Rearing appliances, Selection of silkworm races/breeds, Incubation-stgaes, Chawki rearing, Late age silkworm rearing, Identification, Harvesting.

UNIT – V

Silk technology and biotechnology - textile fibres, Physical and commercial characteristics of cocoons, marketing, sorting, Reeling, Raw silk properties, testing, grading. Introduction to by-products of sericulture industry, by- product utilization in mulberry; types of silk waste and pupal waste-oil extraction and cake preparation, Entrepreneurship Development

Textbook:

1. Dandin, S.B. Jayant Jayaswal and Giridhar, K. (Eds.) 2003. Handbook of Sericulture Technologies. CSB, Bangalore.

Reference:

1. Madan Mohan Rao, M. 1999. Comprehensive Sericulture Manual. PS Publications, Hyderabad.
2. Morohoshi, S. 2000. Development Physiology of Silkworms. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi and Calcutta
3. Simon R. Charlsley, 1982. Culture and Sericulture. Academic Press Inc. London.

15BTU411

GENETICS AND IMMUNOLOGY– PRACTICAL IV

5H – 3C

Total hours/week: L:0 T:0 P:5

Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To learn about prokaryotic and eukaryotic genetic system using modern techniques.
- To inculcate knowledge on Karyotype analysis
- To develop skills on immunodiffusion.
- To understand the fundamentals of genetics and immunology that deals with the practical aspects
- To gain knowledge on Mutagenicity testing
- To study the application of Mono and Dihybrid Cross

Course Outcomes

The learners will be able to

1. Gain rich knowledge on genetic model system used in research
2. Acquire basic knowledge on Karyotype analysis
3. Get Ideas on pedigree analysis for detection of genetic disorders
4. Assess immunodiffusion
5. Have hands on training for various immunological techniques
6. Describe the DOT-ELISA

Genetics

1. Peripheral blood lymphocyte cultures and metaphase preparation
2. Karyotype analysis of Human or Plant chromosomes.
3. Micronucleus test in Plant or animal
4. Comet assay
5. Mutagenicity testing in Tester Strains of *E. Coli*
6. Test for Mono and Dihybrid Cross

Immunology

7. Preparation of serum from blood.
8. Methods of immunization and bleeding.
9. Hemolysis.
10. Single radial immunodiffusion.
11. Double immunodiffusion.
12. Immunoelectrophoresis
13. DOT-ELISA

Textbooks:

1. Brown, T.A, 2007. Genomes III. Garland Science, London.
2. Friedfilter, D, 2007. Molecular Biology. Narosa Publishing House, New Delhi.

References:

1. Gardner, G, 2001. Principles of Genetics. John Wiley and Sons Inc, New York.
2. Louise, G, 2004. Genetic Engineering. Gale Group Farmington Hills, New York.
3. Hay, F.C. and M.R. Westwood, 2004. Practical Immunology. Blackwell Science Publishers, London.

4. Janeway, C.A, and P. Travers, 1994. Immunobiology. Current Biology Ltd., Garland Publishing Inc. Churchill Livingstone. London.
5. Kuby, J, 1994. Immunology. W.H. Freeman and Company, New York.
6. Talwar, G. P. and S. K. Gupta, 1992. A Handbook of Practical and Clinical Immunology. Vol 1 and 2, CBS Publications. India.
7. Weir, D.M, 1992. Immunological Techniques. Blackwell Scientific Publications, London.

Total hours/week: L:4 T:0 P:0

Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To understand the basic Fundamentals of Computer
- To expose students to use hardware and softwares for interpretation of data
- To gain the information about the C language
- To identify the various program tools for analyzing the data
- To describe the roles of the programs in both maintaining data and interpreting data
- To demonstrate a decision capacity for problem-solving about C programming

Course Outcomes:

The learners will be able to,

1. Gain about the various tools and programs involved in the Computer
2. Understand the hardware and software specifications for data interpretation
3. Know C programs for Decision making for various problems
4. Learn the theoretical basis for the various Arrays
5. Apply C Programming to understand the uniqueness of data
6. Use different test to study how programs are good at decision making with the data provided

UNIT -I

Introduction to computers: What is computer- Brief history of computers- Evaluation of computers- Organization/Components of computers - Computer languages- what is hardware and software? - Types of software- Processing of a computer program- what is operating system? - Classification of computers- Data representation- Algorithms and flow-charting.

UNIT-II

Hardware components: Input devices, output devices and memory devices- Hardware and software- Programs- Machine language- Assembly language- High-level language- Translators Operating system: DOS- UNIX- WINDOWS Computer languages: Low level and High-level languages.

UNIT- III

Overview of C: Introduction- Importance of C- Basic structure of C programs- Executing a C program- Constants- Variables and data types - Operators and expressions: Arithmetic- Relational- Logical- Assignment-Increment/Decrement- Conditional- Bit wise and special operators- Precedence of arithmetic expressions- Managing input and output operators.

UNIT -IV

Arrays: One-dimensional, Two-dimensional and Multidimensional arrays- Handling of character string- Decision-making and branching- IF- IF ELSE- Nesting of IF ELSE- ELSE IF ladder- SWITCH- Conditional operator- GOTO statement.

UNIT- V

Decision making and looping: WHILE statement- DO statement- FOR statement- Jumps in loops- Structures and unions- User defined functions- Return values and their types- Calling a function- Category of functions- no arguments and no return values- Arguments but no return values- Arguments with return values- Recursion.

References:

Govindaraju, S., M.Chandrashekar, A. Abdul Haq and T. R. Narayanan, 1996. Introduction to Computer Science. New Age International Publishers (P) Ltd, New Delhi.

Xavier, C., 1997. Introduction to Computers and Basic Programming. New Age International Publishers (P) Ltd, New Delhi.

Agor, R., 1999. Elements of Computer Science. V Edition, Birla publications, Calcutta.

Balagurusamy, E., 2000. Programming in ANSI C, III Edition, Tata McGraw- hill publishing company LTD, New Delhi.

Holmes, B.J., 1996. Programming with ANSI C, DP Publications LTD, England.

Course Objectives

The main objectives of the course are

- To understand the basic characteristics of C programming practical
- To understand structure of C programming
- To acquaint the students with various aspects of C programming
- To understand the ways to write C programming
- To develop practical skills of C programming
- To develop operations of C programming

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in basics of operating C programming in system
2. Have outline knowledge on development of C programming
3. Gain experience in practicing C programming
4. Develop skills to prepare C program
5. Use of Solving problems with C programming
6. Learn to use the quadratic equation using C programming

Practical

1. Find the Fibonacci series for a given limit.
2. Write a program to find the given number is prime or not.
3. Write a program to solve the given expression $(A^2+B^2)*C$
4. Write a program to find the given string is palindrome or not.
5. Write a program to find the roots for a given quadratic equation.
6. Write a program for arranging numbers in Ascending order using Bubble sort
7. Write a program for arranging names in alphabetical order.
8. Write a program to illustrate Switch statement.
9. Assume student's marks and Calculate grade for a student's mark.
10. Calculate the factorial value for a given number using function.
11. Find the given number is Armstrong or not.

REFERENCES

1. Govindaraju, S., M. Chandrashekar, A. Abdul Haq and T. R. Narayanan, 1996. Introduction to Computer Science. New Age International Publishers (P) Ltd, New Delhi.
2. Xavier, C., 1997. Introduction to Computers and Basic Programming. New Age International Publishers (P) Ltd, New Delhi.
3. Agor, R., 1999. Elements of Computer Science. V Edition, Birla publications, Calcutta.
4. Balagurusamy, E., 2000. Programming in ANSI C. III Edition, Tata McGraw-hill publishing company LTD, New Delhi.
5. Holmes, B.J., 1996. Programming with ANSI C. DP Publications LTD, England.

15BTU403B

ALLIED ELLECTIVE – II BIOPHYSICS

4H – 3C

Total hours/week : L :4 T :0 P :0

Marks : Internal : 40 External : 60 Total :100

Course Objectives

The main objectives of the course are

- To understand the basic principles of Bioseparation
- To understand various concepts of Chemical Equilibrium
- To acquaint the students with various aspects of Crystallography.
- To understand the Structural Studies of biomolecules.
- To develop practical instrumentation skills on Spectrometry.
- To develop skills on advance microscopy

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in aseptic techniques
2. Have outline knowledge on Bioseparation
3. Gain experience in practices and skills in Crystallography
4. Develop skills on Structural Studies of biomolecules.
5. Use of handling of glass wares, minor equipment for conducting experiments.
6. Learn safety and precautionary measures for practical instrumentation skills on Spectrometry.

UNIT -I

Separation Techniques: Bioseparation – batch filtration – continuous filtration – centrifugation – sedimentation velocity and equilibrium methods – reverse osmosis – ultra filtration – micro filtration.

UNIT-II

Chemical Equilibrium: Chemical Equilibrium – law of mass action – equilibrium constant – electrochemistry – electrolysis – Galvanic cell – fuel cells – Nernst equation – Chemical Thermodynamics – heat of reaction – entropy – enthalpy.

UNIT- III

Crystallography: Study of size, shape and molecular weight of macromolecules- X ray studies- Goniometer- Bragg's spectrometer – reciprocal lattice – isomorphous replacement – refinement of structure.

UNIT -IV

Structural Studies: NMR spectra – experimental arrangement – chemical shift – two-dimensional NMR- electron spin resonance technique – hyperfine structure – mass spectrometry.

UNIT- V

Spectrometry: visible, fluorescence, IR, UV and Raman spectroscopic studies – electron microscope – scanning, tunneling electron microscopes – atomic force microscope working and applications.

Textbooks

1. Sicasankar. B (2005). Bioseparations - principles and techniques Prentice - Hall of India Pvt. Ltd.
2. Vasanthapattabhi and Goutham N. (2003) Biophysics. Narosa Publishing house.

References

1. Raymon chan (1977). Physical chemistry with applications to biological systems. Macmillan Publishing Co., INC
2. Coggle J.E (1971). Biological effects of radiation Wykeham Publications (London) Ltd.

Course Objectives

The main objectives of the course are,

- To know about Internal friction of low liquids
- To expose students to know Interfacial surface tension
- To gain the information about Surface tension of liquids
- To identify the Specific rotatory power of biological solution
- To describe Specific heat capacity of liquids
- To understand how to verify Newton's law
- To understand the concepts of Thermal conductivity

Course Outcomes

On successful completion of the course the students will be able to

1. Gain about the concepts in Biophysics
2. Perform Thermal conductivity test
3. Know the resolving power of telescope
4. Learn the theoretical basis for Emissivity of a surface
5. Apply the concepts of Interfacial surface tension
6. Use different test to study how the Specific rotatory power of liquids

Practical

1. Internal friction of low liquids by Poiseuille's flow method
2. Internal friction of high viscous liquids by Stokes method
3. Interfacial surface tension between two liquids
4. Surface tension of liquids by capillary rise / drop weight method
5. Specific rotatory power of sugar solution using polarimeter
6. Specific rotatory power of biological solution using polarimeter
7. Specific heat capacity of liquids
8. Refractive index of liquids using spectrometer
9. Verification of Newton's law of cooling
10. Wave length of prominent lines of mercury spectrum using a plane transmission grating
11. Resolving power of a telescope
12. Emissivity of a surface - spherical calorimeter
13. Thermal conductivity of bad conductor by Lee's method
14. Thermal conductivity of rubber tubing
15. Thermal conductivity of good conductors.

References:

1. Ouseph C.C, U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan
2. (Printers & Publishers) Pvt. Ltd., Chennai
3. Singh S.P., 2003, Advanced Practical Physics - 1, 13th Edition, Pragathi Prakashan, Meerut
4. Singh S.P., 2000, Advanced Practical Physics - 2, 12th Edition, Pragathi Prakashan, Meerut
5. Gupta S.L. and V. Kumar, 2002, Practical Physics, 25th Edition, Pragathi Prakashan, Meerut

Course Objectives**The main objectives of the course are**

- To identify common infectious agents and the diseases that they cause.
- To evaluate methods used to identify infectious agents in medical microbiology lab.
- To recall microbial physiology including metabolism, regulation and replication of pathogenic microbes.
- To explain general and specific mechanisms by which an infectious agent causes disease.
- To recognize and diagnose common infectious diseases from the clinical presentation and associated microbiology.
- To describe the epidemiology of infectious agents including how infectious diseases are transmitted.

Course Outcomes**On completion of the course, students are able to**

1. Apply the biotechnology concept for controlling infectious agents.
2. Expertise on the concepts of metabolism, regulation and replication of pathogenic microbes.
3. Able to get knowledge on the toxins released by microbes.
4. Able to enter into a wide range of biotechnology industries with research enterprises.
5. Develop of non-toxic therapeutic agents from microbes
6. Able to get knowledge on Fungal and Protozoan infections

UNIT-I

Bacteriology Morphology, cultural characteristics, antigenic property, pathogenecity, laboratory diagnosis and Treatment. *Staphylococcus* sp., *Streptococcus* sp., *Bacillus* sp., *E. coli*, *Klebsiella* sp., *Proteus* sp., *Pseudomonas* sp.

UNIT-II

General Properties of Fungi - Medically important fungi - diagnosis of fungal disease -routine mycological techniques - antifungal agents.

UNIT-III

Superficial mycosis ~ Cutaneous mycosis - Systemic mycosis _ Opportunistic mycosis- Subcutaneous mycosis

UNIT-IV

Protozoan infections - *Entamoeba histolytica*, *Plasmodium falciparum*, *Leishmania donovani* – *Giardia intestinalis*, *Trichomonas vaginalis*.

UNIT-V

Helminthic infections - *Taenia solium*. *Trematodes* - *Schistosoma haematobium*, Nematodes- *Trichuris trichiura* - *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria Bancrofti*.

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Brook, G.F., J. S. Butel, A. Stephen and Morse, 2003. Medical Microbiology, 22nd Edition. Mc Graw Hill.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
5. Chatterjee, K.D., 1980. Parasitology in relation to medicine. 1th Edition, Chatterjee Medical Publishers, Calcutta.
6. Chunin, j., 2000. Parasitology. New York Publishers, London.

7. Dismukes, W.E., P.G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press, UK.
Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.

Course Objectives

The main objectives of the course are

- To obtain basic concepts of Identification of pathogenic bacteria
- To ascertain the diagnostics tools for infectious diseases
- To achieve a complete knowledge about staining and mounting
- To understand the observation of various Fungi
- To understand the observation of various parasites
- To recognize the importance of proper specimen collection and preparation.

Course Outcomes

On completion of the course, students are able to

1. Get hold of the knowledge on fundamentals of medical microbiology techniques.
2. Expertise on the concepts of infection, diagnosis and control assortment.
3. Acknowledge on the qualitative studies based on biomarker observations.
4. Apply methodologies of laboratory diagnostics to relevant states of health.
5. Be aware of characteristics signs of clinical manifestations.
6. Comprehend and analyse the mounted strains.

Practical

1. Identification of clinically important fungi - *Candida albicans*
2. Lacto phenol cotton blue mounting.
3. Identification of *Aspergillus* sp.
4. Identification of *Mucor* sp
5. Identification of *Rhizopus* sp.
6. Identification of *Fusarium* sp.
7. Identification of *Penicillium* sp.
8. Observation of parasites - *Entamoeba* sp. *Plasmodium* sps. *Ascaris* sp. *Taenia* sp.
9. Observation of parasites - Blood smear examination

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Brook, G.F., J. S. Butel, A. Stephen and Morse, 2003. Medical Microbiology, 22nd Edition. Mc Graw Hill.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
5. Chatterjee, K.D., 1980. Parasitology in relation to medicine. 1th Edition, Chatterjee Medical Publishers, Calcutta.
6. Chunin, j., 2000. Parasitology. New York Publishers, London.
7. Dismukes, W.E., P.G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press, UK.
8. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.

15SSD401

SOFT SKILL DEVELOPMENT - II

2H – 1C

Total hours/week: L:1 T:1 P:0**Course Objectives****The main objectives of the course are**

- To impart knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate Time, Speed and Distance
- To adopt new faster methods of Data Sufficiency
- To acquire knowledge on Synonyms, Antonyms, Verbal Analogy
- To get knowledge on Resume Writing, Introduction to HR rounds
- To develop interpersonal skills

Course outcome**On successful completion of the course the students will be able to**

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculating data sufficiency
4. Do Verbal Analogy
5. Perform best resume writing
6. Improve interpersonal skills

UNIT-I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT-II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT-III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT-IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT – V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behavior

Course Objectives

The main objectives of the course are,

- To learn the procedure for isolation nucleic acids and Protein.
- To learn the strategies for gene transfer in plants and animals.
- To acquire knowledge on genome mapping.
- To familiarize the student with emerging field of biotechnology
- To acquaint the students to versatile tools and techniques employed in recombinant DNA technology.
- To learn the history and recent developments in rDNA technology, Enzymes used in rDNA technology.

Course Outcomes

On completion of the course, students are able to

1. Outline the fundamental steps in a genetic engineering procedure.
2. Describe the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.
3. Explain the usefulness of plasmid preparations, how they are performed, and how the concentration and purity of plasmid samples can be determined.
4. Discuss cloning strategies and techniques used to probe DNA for specific genes of interest.
5. Conceptualize PCR technique in medical and forensic science.
6. Summarize various applications of rDNA technology in human health care and safety regulations.

UNIT - I

Introduction to r-DNA technology: Basic techniques – isolation and purification of nucleic acids. Restriction Enzymes, Enzymes used in cloning - DNA polymerases, RNA Polymerases, Reverse Transcriptase, Ligases, Taq polymerase, kinases, phosphatases, transferases, DNase, RNase.

UNIT - II

Cloning vectors – Plasmids: bacteriophage based, M13 phage based, phagemids. Cosmids, yeast artificial chromosomes, bacterial artificial chromosomes, Covalent linkage of DNA fragments to vector molecules: Linkers, Adapters, homopolymer tailing. Generation of genomic and cDNA libraries, Solid phase synthesis of DNA.

UNIT - III

Selection and screening of recombinant clones: Probe preparation - radiolabelled and non radiolabelled, Guessmers and degenerate probes. Sequence dependent and independent screening, southern-western, colony and plaque hybridization, *in situ* chromosomal hybridization, chromosome walking.

UNIT – IV

Expression and characterization of cloned DNA: Expression vectors, optimization of protein expression in heterologous systems, Fusion proteins, *In vitro* translation systems. RNAi vectors. Restriction mapping. DNA sequencing, PCR, VNTRs, DNA fingerprinting, SNPs, RFLPs.

UNIT - V

Applications of recombinant DNA technology: Production of recombinant proteins in bacterial and eukaryotic cells. Identification of genes responsible for human diseases, diagnostics, gene therapy. Genetically modified plants. Ethical, legal and social issues.

Textbook:

1. Winnacker, E.L, 2003. Genes to Clones. Panima Publishing House, New Delhi, India.
2. Brown, T.A. 2001. Gene Cloning. Blackwell Science, Germany.

References:

1. Glick, B.R. and J.J. Pasternak, 2002. Molecular Biotechnology. Panima Publishing House, New Delhi, India.
2. Primrose, S.B. 2001. Molecular Biotechnolgy. Panima Publishing House, New Delhi, India.

Total hours/week: L:4 T:1 P:0**Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course are,

- To learn the procedure for isolation, screening of industrial important microbes
- To derive industrially important products from microbes
- To acquire knowledge on proteins
- To learn the principle and applications of bioprocess technology
- To learn the fundamental calculation in bioprocessing
- To learn the schematic diagram of upstream and downstream processing for product recovery and purification

Course Outcomes

The learners will be able to

1. Gain overall knowledge of industrial biotechnology
2. Obtain information about the application of industrially important microbes
3. Know the screening, extraction and purification of enzymes
4. Designing of bioreactors and control necessary for maximizing production
5. Select and optimize media for maximum production of microbial metabolites
6. Designing of protocols for strain improvement and separation of molecules after fermentation process

UNIT - I

Industrially important microbes: Isolation, Screening, Strain improvement – mutation and recombination. Substrates for industrial fermentation.

UNIT - II

Concepts of basic modes of fermentation - Batch, Fed batch and Continuous fermentation. Bioreactor designs, Media formulation. Air and media sterilization, Aeration & agitation in bioprocess.

UNIT - III

Bioprocess control and monitoring: Temperature, pH, agitation, pressure, online measurement, on / off control, PID control, computers in bioprocess control system.

UNIT - IV

Downstream processing – Filtration, Centrifugation, cell disruption, chromatography, Liquid – liquid extraction, membrane process, drying crystallization, broth processing. Effluent treatment – disposal, treatment process, by- products.

UNIT - V

Bioprocess production: Amino acids, organic acids, nucleotides, nucleosides and related compounds, enzymes, vitamins, antibiotics and SCP. Fermentation economics, Immobilization of enzymes and microbial cells.

Textbooks:

1. Allman, A.R, 2007. Fermentation Microbiology and Biotechnology, Taylor and Francis, New York, USA.
2. Crueger, W. and A. Crueger, 2004. Biotechnology – A TextBook of Industrial Microbiology, Panima Publishing Corporation, New Delhi, India.

References:

1. Brian, M. and L. Harvey, 2008. Practical Fermentation Technology, John Wiley & Sons Inc., New Jersey, USA.
2. Frazier, W.C, 2004. Food Microbiology, TataMcGraw – Hill Publication, New York, USA.
3. Charles, W.B, 2010. Food Fermentation and Microorganisms. John Wiley & Sons Inc., New Jersey, USA.

Course Objectives

The main objectives of the course are,

- To offer students a good command of basic principles of food science and technology
- To Understand the various processes and protocols involved in the food industry.
- To Understand about food borne pathogens detection and enumeration
- To impart in-depth knowledge on the cutting-edge techniques and glimpse on food production techniques
- To Impart practical skills to the students to preserve the food materials
- To learn the nutritive value of foods

Course Outcomes

The students will be able to

1. Demonstrate a level of comprehension of concepts of food science
2. Critically evaluate issues or problems pertaining to food science
3. Perform the production of dairy products
4. Intensive knowledge acquisition in food borne pathogens
5. Have a grasp knowledge in food preservation
6. To identify the Nutritive value of foods

UNIT - I

Introduction: History and Scope of Food Biotechnology, Nutritive value of food, Role of microbes in food biotechnology – bacteria, fungi and yeast. Fermented foods – Types, Changes during Fermentation, Nutritive value of fermented foods.

UNIT - II:

Food Microbiology: Primary Sources of Microorganisms in food. Food borne Bacteria, Molds and Yeasts. Intrinsic and Extrinsic Parameters of food affecting microbial count. Detection of Microorganisms in food - SPC, Membrane filters, Dry films. Bacterial Toxin - Botulism and Staphylococcal toxin. Fungal Toxins - Aflatoxin.

UNIT - III

Dairy Biotechnology: Milk - Definition, Composition and Types. Fermented Milk Products - Butter, Yoghurt and Cheese. Preservation of milk by heat treatment - Pasteurization and Ultra High Temperature. Physicochemical characterization of milk. Milk Tests - Dye Reduction (MBRT and Resazurin)

UNIT - IV

Food Production: Food safety - HACCP System to food protection, Responsibility for food safety. Food Additives - Definition, Types and Functional characteristics. Natural Colors -Types, Applications, Advantages of natural colours. Sweeteners - Types and Applications.

UNIT - V

Food Spoilage and Preservation: Causes of Food Spoilage, Spoilage of Fruits, Vegetables, Meat, Soft Drinks, Eggs, Dairy products. Food Preservation through chemicals - Acids, Salts, Sugars, Antibiotics, Ethylene oxide, Antioxidants. Other Methods of Food Preservation -Radiations, Low and High temperature and Drying.

Textbooks

1. Adam, M.R. and Moss, M.O, 2003. Food Microbiology, New Age International Pub. New Delhi, India.
2. Frazier, W.C. and Westhoff, D.C, 2005. Food Microbiology, IV Ed., Tata Mc Graw Hill Pub. Company Ltd. New Delhi, India.

References:

1. Harrigan, W. F, 1998. Laboratory methods in Food Microbiology, III Ed. Academic Press, New York, USA.
2. Jay, J.M, 1992. Modern Food Microbiology, IV Ed. Chapman and Hall, New York, USA.

Course Objectives

The main objectives of the course are

- To obtain basic concepts of biotechnology to solve the environmental problems
- To ascertain the knowledge about solid waste management and wastewater treatment.
- To achieve a novel treatment strategy for waste to Bioenergy.
- To gain knowledge about the biological and biotechnological measures for restoring environment.
- To involve in the present scenarios and find valuable solutions for remedy
- To update about the management strategies followed up by the industries and government.

Course Outcomes

On completion of the course, students are able to apply their knowledge on

1. Bio-management of soil
2. Pollution and pollution control
3. Environmental significance of genetically modified microbes, plants and animals
4. Biofuel production
5. Treatment of municipal waste and Industrial effluents
6. Genetic engineering of bacteria and their potential for bioremediation

UNIT - I

Introduction: Introduction to Biotechnology. Role of Environmental Biotechnology. Market for Environmental Biotechnology. Microbes and metabolism. Fundamentals of biological intervention.

UNIT - II

Pollution and pollution control: Classifying pollution - toxicity; persistence; mobility; ease of control; bioaccumulation; chemistry. Pollution control strategies – dilution and dispersal, concentration and containment. Practical applications to pollution control – biofilters, biotrickling filters, bioscrubbers. 'Clean' Technology - process changes, biological control, bio-substitutions.

UNIT - III

Contaminated land and bioremediation: Remediation Methods - generalised categories, biological, chemical, physical, solidification/vitrification, thermal, Intensive and Extensive technologies. *In situ* techniques – Biosparging, Bioventing, Biofuel, Injection recovery. *Ex situ* techniques - Land farming, Soil banking, Soil slurry reactor. Bioenergy, use of bioremediation, Factors affecting the use of bioremediation.

UNIT - IV

Aerobes and effluents: Biological decomposition of organic carbon, Nitrogen and Phosphate removal. Biological removal, biotransformation, and biosorption of metal ions. Aerobic and Anaerobic Degradation of Xenobiotics. Bioaugmentation for degradation of Xenobiotics. Industrial sources of waste water. Wastewater management, Treatment strategies.

UNIT - V

Phytotechnology and Photosynthesis: Terrestrial phyto-systems (TPS) - Metal phytoremediation, Organic phytoremediation. Hydraulic containment. Aquatic phyto-systems (APS), Macrophyte treatment systems (MaTS), Nutrient film techniques (NFT), Algal treatment systems (ATS).

Textbooks:

1. Evans, G.M. and J. C. Furlong, 2003. Environmental Biotechnology: Theory and Applications. John Wiley & Sons Ltd, West Sussex, England.
2. Jördening, H.J. and J. Winter, 2005. Environmental Biotechnology. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.

References:

1. Agarwal, S.K, 2002. Environmental Biotechnology. APH Publishing Corporation, New Delhi, India.
2. Mara, D, 2003. The Handbook of Water and Wastewater Microbiology. Academic Press, London, England.

Total hours/week: L:5 T:0 P:0

Marks: Internal: 40 External: 60 Total:100

Course Objectives**The main objectives of the course are,**

- To give knowledge on Bioinformatics and its application
- To offer knowledge to assess biological databases
- To understand and to analyze protein/nucleotide sequences and to predict its 3D structure
- To understand the various online databases for submitting and retrieving data's
- To understand how the phylogeny plays a vital role in finding ambiguities.
- To get practiced with the tools and techniques for analyzing the data.

Course Outcomes**On completion of the course, students are able to**

1. Understand The relationship between sequence - structure - function of genes
2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences
3. Inculcate knowledge on building 3D structures of genes.
4. Locate and use the main databases at the NCBI and EBI resources
5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information
6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences

UNIT - I

Introduction: Definitions, Objectives, Scope, Applications of Bioinformatics, History and milestones of bioinformatics, Genome sequencing projects – Steps, Human Genome Project and other genome projects.

UNIT - II

Basic concepts of biomolecules and computers: Basic concepts of biomolecules – Protein and amino acid, DNA and RNA - Sequence, Structure and function.

Basic computer components - Hardware, software, operating systems, computer networks, programming, internet, browsers, search engines, email, databases.

UNIT - III

Biological databases: Types of databases, Sequence databases, Nucleic acid sequence databases - Primary (GenBank, EMBL, DDBJ), Secondary (UniGene, SGD, EMI Genomes, Genome Biology), Protein sequence database – Primary (PIR, SWISS-PROT), Secondary (PROSITE, Pfam), Structural databases (PDB, SCOP, CATH), Bibliographic databases and Organism specific databases.

UNIT - IV

Database searching and Sequence Alignment: Similarity searching programs-BLAST, Sequence alignment - Pair-wise and Multiple-sequence alignment (Methods and Algorithms), CLUSTAL-W, Protein structure alignment (Methods, algorithms- DALI) Phylogenetic analysis (Methods, algorithms).

UNIT - V

Gene prediction: Gene prediction in prokaryote and eukaryotes. Extrinsic approaches and Ab initio approaches. Predicting the protein secondary structure (Domain, blocks, motifs), Predicting protein tertiary structure (Homology, Ab-initio, threading and fold recognition) and visualization of predicted structure.

Textbooks:

1. Jin Xiong, 2006. Essential Bioinformatics, Cambridge University Press. UK.
2. Attwood, K. and J. P. Smith, 2003. Introduction to Bioinformatics. Pearson Education, Singapore.

References:

1. Rajaraman. V, 2003. Introduction to information technology. Prentice Hall of India Pvt. Ltd, New Delhi.
2. Lesk, A. M, 2002. Introduction to Bioinformatics. Oxford University Press, London.
3. Web resources: <http://www.ncbi.nlm.nih.gov/> ; <http://www.ebi.ac.uk/2can/databases/>

Course Objectives**The main objectives of the course are**

- To demonstrate the application of the unique properties of biomolecules at nano-scale level in different fields of biotechnology.
- To understand the principles that governs the structure at nano-scale level.
- To comprehend the function of biomolecules at nano-scale level.
- To conceptualize the biomolecules-based nanostructures
- To get a keen insight on applications of nanotechnology in medicine
- To foster the scientific knowledge in future of nanotechnology

Course Outcomes**On completion of the course, students are able to**

1. Demonstrate a level of comprehension of concepts in nanotechnology
2. Critically analyze the concept of atoms
3. Analyze clusters formation in Nano synthesis
4. Gain sound knowledge in nanomedicine
5. Intensive knowledge acquisition in biomedical fields
6. Have a grasp knowledge in Molecular nanotechnology

UNIT I: Definition of Nanoscale system – Feymann theory of Nanotechnology – Types of nanotechnology – Molecular Nanotechnology – Molecular and atomic size – Surface and dimensional space – Scope and opportunities at the Nanoscale.

UNIT II: Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology.

UNIT III: Biomolecules based nanostructures - DNA based Nanostructures- DNA-protein nanostructures- Methods- Self assembled DNA nanotubes—Nucleic acid Nanoparticles, DNA as a Biomolecular template-DNA branching-Metallization- Properties.

UNIT IV: Applications of nanobiotechnology in early medical diagnostics, drug targeting, drug delivery, nanosurgery and other biomedical field.

UNIT V: Future of bio-nanobiotechnology - advances for Molecular Nanotechnology, Nanotube synthesis - nanoscale assembler, applications.

Textbooks:

1. Niemeyer and Mirkin (ed). 2004. Nanobiotechnology: concepts, applications & perspectives. WILEY-VCH Verlag GmbH & Co. K aA, Weinheim
2. Jain, KK. 2005. Nanobiotechnology in molecular diagnostics: current techniques and applications. Taylor & Francis, UK.

References:

1. Wilson, M, Kannangara, K, Smith, G, Simmons, M, Raguse, B. 2005. Nanotechnology: Basic Science and Emerging Technologies. Overseas press, Taylor & Francis, UK.
2. Michael Wilson, 2007. Nanotechnology: Basic Science and Emerging Technologies. Cambridge University Press, UK.

Course Objectives**The main objectives of the course are**

- To understand the concepts of biological fertilizer production and entrepreneurs.
- To develop with the specific objective to acquaint and enrich the students with the basic knowledge of microbial inoculants production.
- To get trained to apply the aspects of fertilizer application
- Understanding basics of microbial fertilizers and its mechanism
- Visionary approach on students to make entrepreneur
- This paper helps to make the students to understand the microorganisms as potential biofertilizer organisms and the technology of inoculum production.

Course Outcomes**On completion of the course, students are able to**

1. Understand the concept of biofertilizer productions
2. Perform the production of microbial biofertilizers
3. Have a grasp knowledge in isolation of microbes
4. Get knowledge in mass cultivation of microbes
5. Having a chance to become an entrepreneurship
6. Get knowledge in composting waste

UNIT-I: Introduction to fertilizers - natural fertilizers, synthetic fertilizers, inorganic fertilizers, organic fertilizers, **Liquid fertilizers, bio-fertilizers** - importance, advantages and constraints.

UNIT-II: Characters of biofertilisers- Morphology of *Rhizobium*, *Azospirillum*, *Azotobacters*, blue green algae and phosphate solubilisers and maintenance - inoculant preparation.

UNIT-III: Isolation, culturing methods, enumeration and identification of microbial species - *Rhizobium*, *Azospirillum* *Azotobacters*, blue green algae and phosphate solubilisers.

UNIT-IV: Preparation of microbial inoculants - large-scale production of microbes - their application as biofertilizers - crop responses to biofertilizers.

UNIT-V: Azolla - distribution, morphological and biochemical characteristics - cyanobacterial symbionts - Azolla biofertilizer technology - organic matter and composting - method of processes, applications and limitations.

Textbook:

1. Jeswani, L.M. and Baldev, B. 1990. Advances in Pulse Production Technology. ICAR, New Delhi.
2. Daniel Sundararaj, D. and G. Thulasidas. 1993. Botany of Field Crops. (2nd Ed.) Macmillan India Ltd.

References:

1. Malsen, L.J.G.V. Somaatmadja, S. 1993 PROSEA - Plant Resources of South East Asia. No.1. Pulses. International Book Distributors, Dehradun, India.
2. Subba Rao, N.S. 2000 Biofertilizers in Agriculture. Oxford & IBH publishing Co., New Delhi, India.

Course Objectives

The main objectives of the course are

- To know the practical understanding of nucleic acid (DNA and RNA) isolation and their quantification
- To focus on cloning, construction of genomic DNA libraries followed by the library screening
- In-depth understanding of various techniques involved in gene amplification, DNA fingerprinting, labelling and detection of nucleic acid sequences
- To Concentrate on the importance of *E. coli* organisms and its growth, maintenance and isolation & amplification of nucleic acids
- To know about the fermentation, bioprocess development of recombinant DNA (rDNA) products
- To train in rDNA Techniques

Course Outcomes

On completion of the course, students are able to

1. Acquire practical knowledge of nucleic acids isolation
2. Acquire the knowledge about the methodology for biomolecule quantification separation in prokaryotes and eukaryotes.
3. Comprehend the basics of cloning which are necessary large-scale processing of rDNA products, southern blotting and hybridization.
4. Analyze the determination of water quality for a particular experiment
5. Understand different types of important enzymes production
6. Trained to get placed in Laboratory

List of Practicals

rDNA Technology

1. Estimation of DNA
2. Agarose Gel Electrophoresis
3. SDS-Polyacrylamide gel Electrophoresis method
4. Isolation of total DNA from plant tissue
5. Isolation of total DNA from microbes (*E. coli*)
6. Isolation of total DNA from animal tissue
7. Isolation of plasmid DNA
8. Isolation of RNA from yeast
9. Restriction digestion of DNA
10. Ligation of DNA
11. Amplification by PCR-Demonstration

Environmental Biotechnology

1. Water quality tests for pH
2. Determination of total solids
3. Determination of Chemical Oxygen Demand
4. Determination of Biological Oxygen Demand
5. Analysis of heavy metals (Iron/Chromium)

Food and Bioprocess Techniques

1. Isolation and identification of microbes from food samples
2. Wine production
3. Citric acid production
4. Production of Industrially important enzymes – protease, amylase
5. Immobilization of enzymes
6. Working of fermenters

Textbooks:

1. Aneja, K.R., 2004. Experiments in Microbiology, Plant Pathology and Biotechnology, IV Ed., New Age International Pvt. Ltd. Publishers, New Delhi, India.
2. Glover, D.M. and Hames, B, D., 1995. DNA Cloning – A Practical Approach, IRL Press, Oxford, England.

References:

1. Brook, S. J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning – A Laboratory Manual, Cold Spring Harbor Laboratory Press, New York, USA.
2. Dubey, R.C. and E. Maheshwari, 2004. Practical Microbiology, S. Chand & Co. Publishers, New Delhi, India.

15BTU506

ANIMAL HOUSE MANAGEMENT

0H-4C

Total hours/week: L:0 T:0 P:0

Marks: Internal: 00 External: 100 Total:100

Course Objective**The main objectives of the course are**

- To manifest the significance of CPCSEA guidelines to the student
- Acquiring the depth knowledge in developing animal houses with superior facilities
- Understand and adapt to the policies pertaining to animal house management.
- Learning the record keeping and practicing SOP guideline in house management services
- To gain adequate knowledge on production of transgenic animals
- To emphasize the molecular genetics in animal production.

Course Outcomes**On completion of the course, students are able to**

1. Conceptualize the CPCSEA guidelines
2. Able to accomplish animal houses with adequate knowledge
3. Portfolio the policies and adhere to the governance of animal house management
4. Follow the SOP in animal houses
5. Understand the production methodology of transgenic animals
6. Get vast idea on molecular genetics of animal production

UNIT - I

Animal procurement: Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA) guidelines. Methods of transportation, quarantine and stabilization according to species.

UNIT - II

Physical Facilities: Building materials - efficient and hygienic operation of animal facilities. Corridor(s) - movement of personnel as well as equipment. Utilities - water lines drain pipes, electrical connections - service panels. Animal room doors, exterior windows, floors and floor drains, walls and ceilings, storage areas, sanitizing equipment and experimental area. Environment: Temperature and humidity, ventilation, power and lighting, noise control.

UNIT - III

Animal husbandry: Caging/Housing system, Sheltered or Outdoor housing, social environment, food, bedding, water, sanitation and cleanliness, waste disposal, pest control. Precautions while handling animals - common injuries and ailments in animals. Emergency situations: escaping animals - use of fire extinguishers

UNIT - IV

Record keeping: Animal house plans, staff, technical and non-technical, health record of staff & animals, Standard Operating Procedures (SOPs) for animals, Breeding stock, purchase or sales records, Animal Ethics Committee Meetings, Death record, Clinical Record of sick animals, Training record of staff involved in animal activities, water reports.

UNIT - V

Laboratory animal ethics: Transgenic animals, maintenance, disposal, breeding and genetics.

References:

CPCSEA Guidelines for Laboratory Animal Facility, Govt. of India. www.cpcsea.com

Course Objective**The main objectives of the course are**

- To manifest the significance of Sericulture guidelines to the student
- Acquiring the depth knowledge in developing rearing houses with superior facilities
- Understand and adapt to the policies pertaining to rearing house management.
- Learning the record keeping and practicing SOP guideline in house management services
- To gain adequate knowledge on production of good quality silk threads
- To emphasize on production of good quality mulberry plants.

Course Outcomes**On completion of the course, students are able to**

1. Conceptualize the sericulture guidelines
2. Able to accomplish rearing houses with adequate knowledge
3. Portfolio the policies and adhere to the governance of rearing house management
4. Follow the SOP in rearing houses
5. Understand the production methodology of mulberry plants
6. Get vision on production of good quality mulberry plants.

UNIT – I

Introduction: Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture.

UNIT – II

Biology of Silkworm – Life cycle of *Bombyx mori*, Structure of Silk gland and Secretion of silk.

UNIT -III

Rearing of Silkworms: Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology; Early age and Late age rearing, Types of mountages, Spinning, Harvesting and storage of cocoons.

UNIT -IV

Pests and Diseases: Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of Silkworm diseases; protozoan, viral, fungal and bacterial control and prevention of pests and diseases.

UNIT -V

Entrepreneurship in Sericulture: Prospectus of Sericulture in India; sericulture industry in different states, employment, potential in mulberry and non- mulberry sericulture. Visit to various sericulture centers.

References:

1. Ullal, S. R. and Narasimhanna, M. N. 1981. Handbook of Practical Sericulture: Bangalore.
2. Handbook of silkworm rearing: Agriculture and Technical Manual-1, 1972. Fuzi Pub. Co. Ltd., Tokyo, Japan
3. Narasimhanna, M. N. 1988. Manual of Silkworm Egg Production; CSB, Bangalore.

Course Objectives

The main objectives of the course are

- To impart the knowledge on basic tissue culture techniques
- To apply the state of art knowledge of subject for the production of transgenic animals and production modern drug delivery or vaccination methods.
- To become familiarize with the ethical practices in animal biotechnology
- To understand the concept of transgenic animal production
- To grasp knowledge on molecular techniques in animal reproduction
- The students will learn overall the basic concept in cell culture.

Course Outcomes

On completion of the course, students are able to

1. To understand principles of animal culture, media preparation.
2. To explain Invitro fertilization and embryo transfer technology.
3. To get insight in applications or recombinant DNA technology in
4. production of therapeutic proteins in transgenic animals.
5. To explain the Organ culture and its types
6. To handle and maintain the animal in animal houses

UNIT - I

Scope of Animal Tissue Culture: Laboratory design: aseptic techniques – handling instruments: Microscopes, Clean-bench, etc., and bio safety.

UNIT - II

Animal Cell Culture Media: Natural and artificial media – their constituents; Physicochemical properties of media; Serum supplemented and serum-free media; Sterilization methods.

UNIT - III

Primary Cell Culture: Methods of tissue disaggregation - isolations of tissues from chick embryo, mouse and human; Continuous and established cell cultures; Cell separation and characterization; Organ culture- types.

UNIT - IV

Specialized techniques: Cytotoxic assays; cell fusion methods; *in situ* hybridization; somatic cell fusion; Microinjection – DNA transfer; lipofection; electroporation.

UNIT - V

Transgenic Animals: Production and applications; transgenic animals: mouse, cow, sheep, fish, hen; Expression of bovine growth hormone; production of human proteins in milk and meat.

Textbooks:

1. Freshney, R.I, 2004. Animal Cell Culture: A Practical Approach (V Edn.), John Wiley & Sons, NY.
2. Davies, J.M, 2002. Basic Cell Culture, Oxford University Press, Oxford.

References:

1. Ranga M.M, 2002. Animal Biotechnology, Agrobios India Limited.
2. Primrose, S.B, R.M. Twyman & R.W. Old, 2000. Principles of Gene Manipulation, Blackwell Scientific Publications, London.

Total hours/week: L:5 T:0 P:0

Marks: Internal: 40 External: 60 Total:100

Course Objectives**The main objectives of the course are,**

- To introduce biotechnological methods for production of transgenic plants.
- To give knowledge about various methods of gene transfer in plants.
- To cognize and get the knowledge on micro propagation to protect endangered plants.
- To explain the basics of the physiological and molecular processes that occur during plant growth and development and during environmental adaptations
- To use basic biotechnological techniques to explore molecular biology of plants
- To understand the processes involved in the planning, conduct and execution of plant biotechnology experiments

Course Outcomes**On completion of the course, students are able to**

1. Understand the growth conditions required to culture the plants in *invitro* conditions.
2. Inculcate the deep understanding of Gene expression system of plants
3. Acquire knowledge on producing Transgenic plants
4. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments
5. Learn the structure and organization of plant genome
6. Learn the basic techniques for hybridization in producing transgenic plants

UNIT - I

Theory and methods: Introduction of plant tissue culture and cell suspension culture; Physico-chemical conditions for propagation of plant cells and tissues; Composition of media, nutrient and hormone requirement, Continuous culture, techniques for immobilization of plant cells, continuous product recovery system using immobilized plant cell system.

UNIT - II

Product and recovery: Primary and secondary metabolic products (phytochemicals) of plant cells, biosynthesis of secondary metabolites of biotechnological importance, **biotransformation** for product development and selection of cell culture, process technology with salient features for specific products.

UNIT -III

Genetic engineering A: Structure and organisation of plant genome, regulation of plant genome expression, transcriptional, translational and post transcriptional regulation of plant genome. Transposons, chloroplast and mitochondrial genome.

UNIT - IV

Genetic engineering B: Transfer of nucleic acid to plant cells - Direct transformation by electroporation and particle gun bombardment. - Agrobacterium, Ti plasmid vector Theory and techniques for the development of new genetic traits, conferring resistance to herbicide, pesticide, plant pathogens. Plant engineering towards development of enriched food products, plant growth regulators.

UNIT - V

Applications: Transgenic plants, herbicides and pest resistant plants; Molecular farming / pharming: carbohydrates, lipids, therapeutic proteins, edible vaccines, purification strategies; Oleosin partition technology.

Textbooks:

1. Singh, B.D. 1998. Text Book of Biotechnology, Kalyani Publishers, India.
2. Neal Stewart, C. 2008. Plant Biotechnology & Genetics. John Wiley & Sons Inc., NJ.

References:

1. Slater, A., W. Nigel & M.R. Fowler. 2008. Plant Biotechnology, Oxford University Press, Oxford.

Course Objectives

The main objectives of the course are,

- Students obtain deeper knowledge and understanding about the subject tissue engineering and tissue engineering
- Students will learn about key technologies used in tissue engineering and regenerative medicine
- Students will deal with the basic and clinical aspects of stem cell research
- To analyze the conversion of stem cell types into a variety of suitable tissues
- To understand the potential of stem cells for the regeneration of a wide range of tissues and organs
- To make acumen in biomaterials in tissue engineering

Course Outcomes

On completion of the course, students are able to

1. To isolate the stem cells
2. To demonstrate the Stem cell differentiation
3. To grasp knowledge on extra cellular matrix
4. To understand the production of bioreactors
5. To theorize the biomaterials used in tissue engineering
6. To have a grasp knowledge in nerve regeneration

UNIT - I

Tissue engineering – Introduction, organization and complexity of vertebrate body. Elements of tissue development – Tissue types, dynamics, repair.

UNIT - II

Biochemical process in cells – cell biology, cell growth, cell culture: primary cells vs. cell lines, sterile techniques, plastics, enzymes, reactors and cryopreservation, cell differentiation and migration. Cell morphology, number, viability, motility, and division – mitotic cell cycle, cell death – biological apoptosis.

UNIT - III

Cell-extracellular matrix interactions; cell-cell interactions: Different cell types, staining, growth factors (receptor- ligand binding) and chemokines in signaling (eg. G-proteins). Growth factor delivery and applications (angiogenesis) in tissue engineering. Cell junctions in tissues, malfunctions in direct cell-cell contact signaling and response to stimuli.

UNIT - IV

Isolation of cells: methods of cell separation and their characteristics. Stem cells. **Biomaterials for tissue engineering:** metals, ceramics, polymer (synthetic and natural) and polymer scaffold processing, biodegradable materials, native matrix.

UNIT - V

Bioreactors in Tissue engineering: Bone & Cartilage Tissue Engineering. **Cell & Tissue engineering case studies:** Basic wound healing, artificial skin, blood vessels, pancreas & liver. Regeneration of bone and muscle. Nerve regeneration.

Textbook:

1. Palsson, B.O. and Sangeeta N. Bhatia. 2003. Tissue Engineering. Prentice Hall, UK.

References:

1. Lanza, R., R. Langer & J. Vacanti. 2007. Principles of Tissue Engineering (3rd edn.), Academic Press, USA.
2. Ravi, B. 2014. Introduction to Tissue Engineering: Applications & challenges. Wiley Publishing, UK.
3. Fisher, J.P., A.G. Mikos, J.D. Bronzino & D.R. Peterson. 2012. Tissue Engineering: Principles and practices. CRC Press, UK.
4. Wong, J.Y., J.D. Bronzino & D.R. Peterson. 2012. Biomaterials: Principles and practices. CRC Press, UK.
5. Websites: <http://web.mit.edu/langerlab/>;
6. <http://faculty.virginia.edu/laurencin/index.htm>

15BTU603B

CORE ELECTIVE – II

APPLIED BIOTECHNOLOGY

5H – 4C

Total hours/week: L:5 T:0 P:0

Marks: Internal: 40 External: 60 Total:100

Course Objectives**The main objectives of the course are,**

- To understand the fundamental basis of biotechnology
- To conceptualize the application of biotechnology in industrial sectors
- To comprehend the basic techniques in biofertilizers productions using fungi
- To get adequate knowledge on mushroom cultivation
- To acquire basic domain knowledge on dairy products manufacturing process
- To get exposure on beverages.

Course Outcomes**On completion of the course, students are able to**

1. To perpetuate the formulation and production of biofertilizers
2. To demonstrate the mushroom cultivation
3. To perform the fermented drinks (alcoholic)
4. To execute the production of cheese, yoghurt
5. To theorize the biotechnological approaches in food biotechnology
6. To have a grasp knowledge in food canning and processing

UNIT – I

Biofertilizers: Definition and advantages, Strain selection – Inoculum development – Mass production – Packaging – Quality control of different Biofertilizer (Rhizobium, Phosphate solubilizers, Azotobacter, Mycorrhizae, Azolla)

UNIT - II

Mushroom cultivation: Spawning of edible mushrooms, methods of cultivation, Agaricus (button) and Plerotus (Dhingri, Oyster mushroom), Volvariella (paddy Straw mushroom), nutritive value of mushroom.

UNIT - III

Beverages: Definition and types, non alcoholic and alcoholic and natural, **Non alcoholic:** Processing of tea, coffee, cocoa. **Alcoholic:** Fermented and distilled, their preparation and sources.

UNIT - IV

Production of dairy products: Cheese. Yoghurt, buttermilk, Pickles – Dill pickles, slippery pickles, soft and black pickles.

UNIT - V

Fermented foods: Meat, Poultry and Sea Foods Food Preservation – Tin preservation, Salt preservation, Freeze preservation and food packing methods.

Textbooks:

1. Frazier, W.C., 2004. Food Microbiology. Tata McGraw Hill Publishing, New York.
2. Prescott, S.C. and C.G. Dunn, 1999. Industrial Microbiology. ABI-Publishing Company, West Port, New York.
3. Aneja, K.R., 2005. Experiments in Microbiology. Plant pathology, Tissue culture and Mushroom Production Technology. III Edition. New Age International Publishers, New Delhi.

Course Objectives

The main objectives of the course are,

- To understand the ethno pharmacological principles of plants
- To conceptualize the pharmacognosy of herbals
- To comprehend the basic techniques in phytochemical analysis of plants
- To get adequate knowledge on analytical evaluation of drugs
- To acquire basic domain knowledge on medicinal plant biotechnology
- To get exposure on plant tissue culture.

Course Outcomes

On completion of the course, students are able to

1. To perpetuate the natural product drug discovery process
2. To learn the ideology of siddha medicines
3. To identify the medicinally important plants and its pharmacological values
4. To elucidate the bioactive molecules from plant extracts
5. To theorize the biotechnological approaches in plant genetics
6. To have a grasp knowledge in plant tissue culture

UNIT-I: Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

UNIT-II: Pharmacognosy - systematic position - chemical constitution and medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka.

UNIT-III: Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs.

UNIT-IV: Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds, fatty acids, tannins, glycosides and volatile oils).

UNIT-V: Medicinal Plant Biotechnology: Genetics - mutation - polyploidy. Plant tissue culture source - Historical developments - types of cultures - phytopharmaceuticals in tissue cultures.

References:

1. Chopra, R.N, Nayar, S.L, Chopra, I.C. 1956. Glossary of Indian medicinal plants, C.S.I.R, New Delhi, India.
2. Kanny, Lall, Dey and Raj Bahadur, 1984. The indigenous drugs of India. International Book Distributors, India.
3. Agnes Arber, 1999. Herbal plants and Drugs Mangal Deep Publications, India.
4. Sivarajan, V.V, Balachandran Indra. 1994. Ayurvedic drugs and their plant source. Oxford IBH publishing Co, UK.

Course Objectives

The main objectives of the course are,

- To understand the practical aspects of plant and animal biotechnology
- To familiarize the practical concepts in animal tissue cell culture
- To comprehend the basic techniques in plant tissue culture
- To get adequate hands on exposure in cell lines
- To get expertise in molecular techniques related to plants and animals
- To get knowledge on the use of cell lines and preservation methods

Course Outcomes

On completion of the course, students are able to

1. To demonstrate the plant tissue culture
2. To execute the DNA extraction from plants and animal
3. Perform the preparation of Culture media
4. To prepare primary cell culture from animal sources
5. To cryopreserve the cell lines
6. To quantify the cells by dye exclusion method

Animal Biotechnology

1. Preparation of Animal Tissue Culture Medium
2. Preparation of Primary culture
3. Quantification of cells by trypan blue dye exclusion method.
4. Identification of leukocyte subsets and total count
5. Cryopreservation of cell lines

Plant Tissue Culture Techniques

1. Culture media preparation
2. *In vitro* germination of seeds
3. Callus induction and differentiation
4. Isolation of protoplasts
5. Micro propagation
6. Artificial seed production

Textbooks

1. Aneja, K R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. IV Edition, New age international Pvt. Ltd. Publishers, New Delhi.
2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, New York.

References

1. Aneja, K R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. IV Edition, New age international Pvt. Ltd. Publishers, New Delhi.
2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, New York.

Course Objectives

The main objectives of the course are,

- To emphasize the introductory knowledge on marketing strategies in biological field
- To acquire Entrepreneurial spirit and resourcefulness
- To familiar with various uses of human resource for earning dignified means of living Understanding the concept and process of entrepreneurship
- To acquire entrepreneurial quality, competency and motivation
- To learn the process and skills of creation and management of entrepreneurial venture
- To expose the students in various bio-entrepreneurship and marketing approaches.

Course Outcomes

On completion of the course, students are able to

1. Gain rich knowledge on Bioentrepreneurship
2. Acquire basic knowledge on different biotechnological industries origin and development.
3. Get new vista on production of industrial fermented foods.
4. Instigate the use of natural resources for industrial production of foods
5. Understand the concept of biofertilizers.
6. Comprehend the basis of vaccine production

UNIT -I

Introduction to Biotechnology related industries – Immunological, Pharmaceutical and Agriculture based industries.

UNIT - II

Plant Tissue Culture industry, Food industries, Enzyme production industries, Biomedical industries.

UNIT -III

Preparation of wine, Beer, sauerkraut, pickle preparation – soft pickle preservation industries.

UNIT -IV

Biofertilizer – Rhizobium, azospirillum, blue green algae, Single cell protein.

UNIT -V

Vaccine- types of vaccine, dose of vaccine, duration of vaccine, production industries, scope and major requirements of vaccine production industries.

Text:

1. Aneja, K.R, 2005. Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom Production Technology. III Edition, New Age International Publishers, New Delhi.

References:

1. Ignacimuthu, S, 2004. Plant Biotechnology. Oxford and IBH Publishing House, New Delhi.
2. Prescott and Dunn's, 1984. Industrial Microbiology, 4th Edition, Gerald Reed, AVI Publishing Company Inc. Connecticut, USA.
3. Goldsby, R.A, Kindt, J.T, Osborne, B.A, Kuby, W.H.J. 2004. Immunology. V Edition, Freeman and Company, USA.

Total hours/week: 10Hrs**Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course is

- The hands-on training through one full semester project with thesis gives special expertise within one of the research areas represented at The Department of Biotechnology.

Course Outcomes

On completion of the course, students are able to apply their knowledge on

1. This dissertation programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education and research

KARPAGAM ACADEMY OF HIGHER EDUCATION
DEPARTMENT OF BIOTECHNOLOGY
M.Sc. Biotechnology Curriculum (2015 – 2016 Batch)

Code	Course	Objectives and Outcomes		Ins*			Marks			Exam Hrs	Credit
		PEO's	PO's & PSO's	L	T	P	CIA	ESE	Total		
SEMESTER – I											
15BTP101	Biochemistry	I	a, b	4	0	0	40	60	100	3	4
15BTP102	Microbiology	I, II	a, b, c, d	4	0	0	40	60	100	3	4
15BTP103	Cell Biology and Molecular Genetics	I, II	a, d	4	0	0	40	60	100	3	4
15BTP104	Bioinstrumentation and Biostatistics	II, III	d, e, f	3	1	0	40	60	100	3	4
15BTP105	Food Biotechnology	I, II	a, d	4	0	0	40	60	100	3	4
15BTP111	Biochemistry, Cell Biology and Molecular Genetics – Practical I	I, II, III	a, b, d, f	0	0	4	40	60	100	6	2
15BTP112	Microbiology and Food Biotechnology Practical – II	I, II, III	a, b, c, d, f	0	0	4	40	60	100	6	2
	Seminar presentation			2	-	-	-	-	-	-	-
Semester total				21	1	8	280	420	700		24
SEMESTER – II											
15BTP201	Recombinant DNA Technology	II, III	d, e	5	0	0	40	60	100	3	5
15BTP202	Fermentation Technology	II, III	d, e	4	1	0	40	60	100	3	5
15BTP203	Environmental Biotechnology	II, III	d, e	4	0	0	40	60	100	3	4
15BTP204	Core Elective – I	IV	g	4	0	0	40	60	100	-	4
15OEP201	Open Elective – I	IV	g, i	-	-	-	-	-	100	-	3
15BTP211	Recombinant DNA Technology Practical – III	II, III	d, e, f	0	0	5	40	60	100	6	3
15BTP212	Fermentation Technology and Environmental Biotechnology Practical – IV	II, III	d, e, f	0	0	5	40	60	100	6	3
	Seminar presentation			2	-	-	-	-	-	-	-
Semester total				19	1	10	240	460	700		27

SEMESTER – III											
15BTP301	Plant Biotechnology	II, III, IV	d, g, h	4	0	0	40	60	100	3	4
15BTP302	Animal Biotechnology	II, III, IV	d, g, h	4	0	0	40	60	100	3	4
15BTP303	Immunotechnology	IV	g	3	1	0	40	60	100	3	4
15BTP304	Genomics and Proteomics	II, III, IV	d, e, f, g	4	0	0	40	60	100	3	4
15BTP305	Core Elective – II	IV	g	4	0	0	40	60	100	3	4
15BTP311	Plant Biotechnology Practical – V	IV	g	0	0	4	40	60	100	6	2
15BTP312	Animal Biotechnology and Immunotechnology Practical – VI	IV	g	0	0	4	40	60	100	6	2
	Seminar presentation			2	-	-	-	-	-	-	-
Semester Total				21	1	8	280	420	700		24
SEMESTER – IV											
15BTP491	Project and Viva Voce		d, g, i	-	-	-	80	120	200	-	15
Semester total				-	-	-	80	120	200	-	15
G. Total				61	3	26	880	1420	2300		90

Open Elective

15OEP201	Mushroom Technology
----------	---------------------

Core Electives

Core Elective – I		Core Elective – II	
15BTP204A	Nano Biotechnology	15BTP305A	Biosafety and IPR
15BTP204B	Pharmaceutical Biotechnology	15BTP305B	Bioinformatics
15BTP204C	Bioenergy Technology	15BTP305C	Industrial Toxicology
15BTP204D	Medicinal Plant Biotechnology	15BTP305D	Tissue Engineering
15BTP204E	Live Stock Management	15BTP305E	System Biology

Additional Courses

Code	Course(s)	Hrs / Week	Marks			Exam / Hrs	Credit
			CIA	ESE	Total		
15BTP306	Bioentrepreneurship	-	-	100	100	3	4
15BTP401	Research Methodology	-	-	100	100	3	4

Blue – Employability Green – Entrepreneurship Red- Skill Development

Master of Science in Biotechnology 2015, Karpagam Academy of Higher Education, Coimbatore – 641 021 India.

PROGRAMME OUTCOMES (POs)

- a) Graduates will be able to have knowledge on the basic and applied theories.
- b) Providing a broad educational and analytical knowledge necessary to make the students for appearing in competitive examinations
- c) Ability to design and conduct experiments as well as to interpret the results.
- d) An expert to work on Biotechnological concepts and allied fields (immuno, medical, microbial, Food, agricultural, environmental, plant and animal) with modern tools and techniques towards product and process development for academic, industrial and research application.
- e) Generating the graduates with an ability to identify, formulate and solve to deliver process/product with professional, societal and ethical responsibilities.
- f) Graduates will be able to visualize and work on multidisciplinary laboratory problems.
- g) Graduates will be able to update the current knowledge of interdisciplinary subjects related to biotechnology

PROGRAMME SPECIFIC OUTCOMES (PSOs)

To enable the student to emerge as:

- h) Biotechnologist to recognize the societal need and lifelong learning.
- i) Proficient to demonstrate entrepreneurial and leadership skills with life-long learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I: The post-graduates of Biotechnology will be able to acquire in-depth knowledge of the basic and applied subjects of Biotechnology and allied fields.

PEO II: The post-graduates of Biotechnology are equipped to design, analyze, conduct and interpret the experiments and data for the development of process/product within the realistic constraints.

PEO III: The post-graduates of Biotechnology will be able to acquire the knowledge and ability to use the concept of theories, practical skills and recent technological tools in solving any technological and professional issues independently in a global and societal context.

PEO IV: The graduates of Biotechnology will continue learning to update and to become an entrepreneur in a competitive world of technology and also contribute to all forms of life.

MAPPING OF PEOs AND POs

PEOs			Programme Outcome (s)						
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
PEO I	x	x							
PEO II			x	x					
PEO III					x	x			
PEO IV							x	x	x

Course Objectives

The main objectives of the course are,

- To study the qualitative and quantitative determination of the biochemical substances
- To study the structure and functions of macromolecules
- To identify the molecular interactions between the atoms and molecules
- To derive the mathematical equations of enzyme kinetics
- To understand the metabolic pathways that occurs in the normal human life
- To elucidate the role of macromolecules for growth and development of organisms

Course Outcomes

On successful completion of the course, the learner will be able to

1. Demonstrate and understand the fundamental biochemistry principles including topics specific to chemistry and biochemistry
2. Acquire knowledge in understanding the enzyme structure/function
3. Understand the metabolic pathways and the regulation of biological/biochemical processes
4. Get insight into protein structures and folding mechanism
5. Applications of protein engineering in academia and industry
6. Acquire knowledge about the carbohydrates and its metabolisms

UNIT - I

Introduction: Chemical basis of life; Composition of living matter; Water – properties, pH, ionization and hydrophobicity; Emergent properties of biomolecules in water; Biomolecular hierarchy; Macromolecules; Molecular assemblies; Structure-function relationships.

UNIT - II

Biomolecules: Structure and properties of carbohydrates, fatty acids amino acids, proteins. Structure and properties of purines, pyrimidines, nucleosides, nucleotides, polynucleotides, Ribonucleic acids and deoxy ribonucleic acids, nucleoprotein complexes.

UNIT - III

Enzymology: Enzymes classification and nomenclature, Mechanism of action, regulation of enzymatic activity, enzyme kinetics – Michaelis Menton equation, Line Weaver Burk plot and Eadie Hoffstee and Haneswoll equation, enzyme inhibition.

UNIT - IV

Metabolism: Biosyntheses and degradation of fatty acids and cholesterol, Biosyntheses and degradation of amino acids, peptides and proteins; Biosyntheses and degradation of Purines, pyrimidines and nucleic acids.

UNIT - V

Bioenergetics: TCA Cycle, glycolysis, gluconeogenesis, Pentose phosphate shunt, Embden Meyerhof pathway, urea cycle, interconnection of pathways, Metabolic regulation, Bioenergetics: Respiratory chain, TP cycle, energy rich compounds.

TEXT BOOKS

1. Nelson, D. L. and M. M. Cox, 2006. Lehninger Principles of Biochemistry. III Edition, CBS Publishers, New Delhi.
2. Jain, J. L., 2002. Fundamentals of Biochemistry -V Edition, S. Chand & Co., New Delhi.

REFERENCES

1. Zubay, G.L., W. W. Parson, D. E. Vance, 1995. Principles of Biochemistry. MC Brown Publishers, Oxford.
2. Murray, R. K., D. K. Granner, P. A. Mayes and V. W. Rodwell, 2003. Biochemistry, McGraw Hill Companies Inc, Boston.
3. Voet, G. and A. Voet, 2004. Fundamentals of Biochemistry. III Edition, John Wiley and Sons, Inc. New York.
4. Murray, R.K., D.K. Granner, P.A. Mayes and V.W. Rodwell, 2006. Harper's Illustrated Biochemistry. XXVI Edition, McGraw-Hill Publishers, New York. Online version available.

Course Objectives

The main objectives of the course are,

- To inculcate knowledge on fundamentals of microorganisms
- To learn the structural organization, morphology and reproduction of microbes.
- To know the principles of Microscopy and advancements in Microscopy
- To understand the classification of microorganisms
- To know about the microbiological scientists and their experimental proof
- To understand the application of microorganisms in different fields of life sciences

Course Outcomes

On successful completion of the course, the learner will be able to

1. Gain rigorous knowledge on historical perspective of Microbiology
2. Acquire basic knowledge on different structure of microbes
3. Get Ideas on different type of microscope.
4. Acquaint knowledge on the scientific proofs in microbiology
5. Understand the mechanisms of microorganisms in causing diseases
6. Get a brief idea about the host-pathogen interactions

UNIT - I

Microbial Diversity: Definition, history, scope, discovery and development of microorganisms. Diversity-Bacteria, fungi, algae - distribution, reproduction and characteristics divisions. Autotrophic and heterotrophic utilization.

UNIT - II

Microscopy Techniques: Principles, types and applications of light, phase contrast, fluorescence, scanning and transmission electron microscopy, cytophotometry and flow cytometry, fixation and staining. Types of media preparation, methods of sterilization, techniques of pure culture, maintenance and preservation. Staining – types of stains and dyes, staining methods. Microbial growth.

UNIT - III

Microbial metabolism: Common nutrient requirements, nutritional types, uptake of nutrients, culture media, isolation of pure cultures. Microbial growth, growth curve, measurement of microbial growth, continuous culture, influence of environmental factors on growth, control of microorganisms by physical and chemical agents.

UNIT - IV

Biomass production: Production of carbohydrates - higher alkanes and methanol; Edible mushrooms and its types. Oyster, paddy straw, button and medicinal mushroom production and its applications.

UNIT - V

Microbial Diseases: Causative agent, pathology, diagnosis, control and treatment of Bacterial - TB, Cholera and Typhoid. Protozoan – Amoebiasis and Malaria. Viral - AIDS. Control of microorganisms – drugs, chemotherapy, antimicrobial agents.

TEXTBOOKS

1. Black, J.G., 2002. Microbiology Principles and Explorations. John Wiley and Sons Publishing, NewYork.
2. Prescott, L.M., J.P Harley and D.A. Klien, 2005. Microbiology. McGraw - Hill Publishing Company, Boston, NewYork.
3. Talaro, K.P., 2009. Foundations in Microbiology. McGraw - Hill Publishing Company, New York.

REFERENCES

1. Prescott and Dunn's 1984 Industrial Microbiology, 4th Edition, Gerald Reed,AVI Publishing Company Inc. Conneticut
2. Atlas, R.M., 1997. Principles of Microbiology. WCB McGraw Hill, 1333 Burr Ridge Parkway, Burr Ridge, Illinois 60521 USA.
3. Pascale, C. 2005. Cellular Microbiology. American Society for Microbiology, New York.
4. Hui, Y.H., L. M. Goddik, A. S. Hansen, J. Josephsen, W. K. Nip, P.S. Stanfield and F. Toldra, 2004. Handbook of Food and Beverage Fermentation Technology. Taylor and Francis, London.
5. Pelczar,M.J., E.C.S. Chan and N. R. Krieg, 1993. Microbiology: Concepts and Applications. McGraw-Hill, USA.
6. Roland, V.G., 2005.Applied Food Microbiology. Star Publishing Co., London.

Course Objectives

The main objectives of the course are,

- To enable students to learn the basics of prokaryotic and eukaryotic cells
- To Understand how the cellular components are used to generate and utilize energy in cells
- To prepare students for subsequent biological courses that require an understanding of the physiology of organisms such as cell division, enzyme activity etc.
- To understand the genetic variability and traits of an individual
- To gain the information about the level of genome organization in various living organisms
- To obtain the knowledge about transmission of genetic information across generation at the individual and population level

Course Outcomes

On successful completion of the course, the learner will be able to

1. Understand the unique features of plant and animal cells
2. Illustrate how the cellular components are used for various cellular activities
3. Acquire knowledge about the central theories and methodologies in traditional, molecular and population genetics
4. Acquire information on sex- linked inheritance and associated diseases
5. Understand the principles of gene expression
6. Illustrate the effect of chromosomal abnormalities in human diseases

UNIT - I

Cell Organization: Structure of prokaryotic and eukaryotic cells, cellular organelles – Plasma membrane – Properties and functions, cell wall, mitochondria, chloroplast, peroxisomes, golgi complex, Endoplasmic reticulum and lysosome. Cell division.

UNIT - II

Nucleic Acid - Replication –Types of replication, Transcription and post transcriptional Modification, Translation and post translational modification, regulation of gene expression.

UNIT - III

Genetics: Mendelian and Non-Mendelian principles. Genetic recombination, Genetic mapping, linkage and crossing over. Mutations- Types of Mutation, Genetic analysis of Mutations, DNA repair Mechanisms.

UNIT - IV

Transposons: Types of bacterial transposons, Transposition, Detection of Transposition in Bacteria, Excision of Transposons, Types of Transposons in Eukaryotic cells.

UNIT - V

Bacterial genetics - Gene transfer in Bacteria, Transformation, Transduction and Conjugation. Bacteriophages - General properties, Structure, Lytic and Lysogenic phages, Role of phages as vectors.

TEXT BOOKS

1. Gardner, E.J., 2001. Principles of Genetics. VIII Edition. John Wiley and Sons, New York.
2. Karp, G., 2005. Cell and Molecular Biology: Concepts and Experiments. John Wiley and Sons, Inc. London.
3. Maloy SR, Cronan Jr. JE, Freifelder D 2006. Microbial Genetics. Jones and Bartlett Publishers, Sudbury, Massachusetts.

REFERENCES

1. Cooper, G. M., R. E. Hausman, 2004. Cell: A Molecular Approach. Sinauer Associates, Inc. Sunderland.
2. Glick, B.R and J.J. Pasternak. 2003. Molecular Biotechnology. III Edition, Panima Publishing Corporation, New Delhi.
3. Frifielder, D., 2001. Molecular Biology. II Edition, Narosa Publishing House, New Delhi.
4. Lodish B., 2004. Molecular and cell biology. V Edition, Freeman and company, New York.
5. Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P. 2002. Molecular Biology of the Cell. IV Edition. Garland Publishing. New York

Course Objectives

The main objectives of the course are,

- To impart technical information on Instrumentation related to Biotechnology
- To know the working principle of instruments in biotechnology
- To understand the procedure for handling the instruments
- To understand the analytical experiments like GC-MS, LC-MS etc.
- To impart the knowledge of basic statistical methods to solve problems
- To attain strong knowledge on the applications of biostatistics and its relevant software

Course Outcomes

On successful completion of the course, the learner will be able to

1. Understand the working principles of instruments
2. Know the working principle, maintenance, and calibrations of bioanalytical tools and technique
3. Quantify the biomolecules using the bioanalytical tool
4. Implement the bioanalytical techniques to analyze the biomolecules
5. Have sufficient scientific understanding of the basic concepts in instrumentation used in biotechnology
6. To implement the statistical knowledge in analyzing the biological data used in modern biology and biotechnology research

UNIT - I

Colorimetry: Colour and absorption spectra, Beer's and Lambert's law. Principle of photoelectric colorimeter, Spectroscopy – Properties of electromagnetic radiations, Instrumentation and applications of – UV Visible light spectroscopy, Spectrofluorimeter, atomic spectroscopy, NMR spectroscopy and MALDI – TOF, Mass spectroscopy GC – MS, IR and FTIR.

UNIT - II

Centrifugation: Principle, types of centrifuges, Principles and applications of analytical and preparative centrifuge, density gradient and ultra centrifuge. **Chromatography:** Principles, Type – Paper, thin layer, ion exchange, affinity, gel filtration, HPLC and HPTLC

UNIT - III

Electrophoresis: Principle, instrumentation and applications of agarose gel electrophoresis, sodium dodecyl sulphate – polyacrylamide gel (SDS-PAGE), native PAGE, isoelectric focusing, immuno, pulse field, gel, capillary, 2D electrophoresis, gel documentation, **PCR methods.**

UNIT - IV

Biostatistics: Data collection, classification and presentation of tabulation. Measures of central tendency – mean, median and mode. Measures of dispersion – mean deviation, standard deviation, standard error and analysis of variance.

UNIT - V

Applications of biostatistics: Probability and probability distribution – theorems, binomial, poisson and normal distribution. Correlation and regression – simple correlation, correlation coefficient, simple and linear regression analysis. Test of significance -F, t, DMRT and chi-square test. Statistical and graphical software.

TEXT BOOKS

1. Glover.T. and H.Mitchell, 2002. An Introduction to Biostatistics. Mc Graw- Hill Co. Inc., Boston.
2. Friedfelder,D., 2001. Physical Biochemistry. V Edition, Oxford Publishers. New York.

REFERENCES

1. Sharma, B.K., 2004. Instrumental Methods of Chemical Analysis. XXIV Edition, Goel Publishing House, Meerut.
2. Chatwal, G.R and S.K. Anand, 2003. Instrumental Methods of Chemical Analysis. V Edition, Himalaya Publishing House, Mumbai.
3. Boyer, R., 2000. Modern Experimental Biochemistry. III Edition, Addison Wesley Longman. New Delhi.
4. Wilson, K. and J. Walker, 2006. Principles and Techniques of Biochemistry and Molecular Biology. Cambridge University Press, India.
5. Plummer, D.T., 1988. An Introduction to Practical Biochemistry. Tata McGraw-Hill, NewDelhi.
6. Sawhney, S.K. and R. Singh, 2000. Introductory practical Biochemistry. Narosa Publishing House, New Delhi.
7. www.pdfgeni.com/.../research-methodology--spss-pdf.html.

Course Objectives

The main objectives of the course are,

- To introduce the fundamental knowledge of food science and technology
- To integrate different aspects of technologies involved in food processing and product development
- To understand the methods and techniques involved in food production, processing, preservation, packaging, labelling, quality management, and distribution
- To emphasize on the importance of food safety, food quality, plant sanitation, packaging, marketing in food industry
- To transform raw materials into edible and nutritious food items
- To Acquire knowledge about the food preservation methods

Course Outcomes

On successful completion of the course, the learner will be able to

1. Understand the principles and current practices of processing techniques and the effects of processing parameters on product quality
2. Understand the principles that make a food product safe for consumption
3. Get experience on food processing and preservation
4. Develop new methods to improve their productivity and profitability
5. Able to seek Governments and non-governmental public advocates to offset global hunger
6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation

UNIT - I

Introduction: History and Scope of Food Biotechnology, Nutritive value of food, Role of microbes in food biotechnology – bacteria, fungi and yeast. Fermented foods – Types, Changes during Fermentation, Nutritive value of fermented foods.

UNIT - II

Food Microbiology: Primary Sources of Microorganisms in food. Food borne Bacteria, Molds and Yeasts. Intrinsic and Extrinsic Parameters of food affecting microbial count. Detection of Microorganisms in food - SPC, Membrane filters, Dry films. Bacterial Toxin - Botulism and Staphylococcal toxin. Fungal Toxins - Aflatoxin.

UNIT - III

Dairy Biotechnology: Milk - Definition, Composition and Types. Fermented Milk Products - Butter, Yoghurt and Cheese. Preservation of milk by heat treatment - Pasteurization and Ultra High Temperature. Physicochemical characterization of milk. Milk Tests - Dye Reduction (MBRT and Resazurin)

UNIT - IV

Food Production: Food safety - HACCP System to food protection, Responsibility for food safety. Food Additives - Definition, Types and Functional characteristics. Natural Colors -Types, Applications, Advantages of natural colours. Sweeteners - Types and Applications.

UNIT - V

Food Spoilage and Preservation: Causes of Food Spoilage, Spoilage of Fruits, Vegetables, Meat, Soft Drinks, Eggs, Dairy products. Food Preservation through chemicals - Acids, Salts, Sugars, Antibiotics, Ethylene oxide, Antioxidants. Other Methods of Food Preservation -Radiations, Low and High temperature and Drying.

TEXT BOOKS

1. Adam, M.R. and Moss, M.O., 2003. Food Microbiology, New Age International Pub. New Delhi, India.
2. Frazier, W.C. and Westhoff, D.C., 2005. Food Microbiology, IV Ed., Tata Mc Graw Hill Pub. Company Ltd. New Delhi, India.

REFERENCES

1. Harrigan, W. F., 1998. Laboratory methods in Food Microbiology, III Ed. Academic Press, New York, USA.
2. Jay, J.M., 1992. Modern Food Microbiology, IV Ed. Chapman and Hall, New York, USA.

Course Objectives

The main objectives of the course are,

- To train the students on handling various experimental methods and techniques in biochemistry, cell biology and molecular genetics
- To analyze the given biological samples from biochemical stand points
- To handle the instruments with safety precautions
- To develop practical skills such as identification of cell types, cellular component and cell division, etc.
- To apply knowledge of modern techniques in cellular biology
- To grasp the structures of prokaryotic and eukaryotic cells, exclusively their membranes, and organelles

Course Outcomes

On completion of the course, students are able to

1. Acquire skills to quantitatively estimate various biomolecules and to carryout enzyme kinetics
2. Be efficient in handling the instruments
3. Acquaint knowledge on the working principle and the techniques
4. Understand the unique features of plant cells and animal cells
5. Gain knowledge on the fractionation of cellular components
6. Gain insight into the most significant molecular and cell-based methods to understand the biological concepts

List of Practicals

BIOCHEMISTRY

1. Quantification of proteins – Lowry *et al*/ Bradford method
2. Quantification of sugars – Anthrone method
3. Total free amino acids
4. Quantification of lipids
5. Quantification of Ascorbic acid
6. Membrane based separation (e.g. Microfiltration/ Ultrafiltration)
7. Thin Layer Chromatography (Amino acids / fatty acids/ sugar/ nucleic acids)
8. Effect of pH, temperature, substrate concentration (any one enzyme - catalase / SOD by OD method))

CELL BIOLOGY

1. Identification of cell types- Microbe/plant /Human
2. Fractionation of cellular component – Nuclear Components, Mitochondria, Chloroplast.
3. Sucrose Fractionation of Castor Bean
4. Lipid Solubility of Membranes
5. Cell permeability – RBC/plant cells.

MOLECULAR GENETICS

1. Drosophila Giant Chromosome preparation
2. Nuclear staining (Giemsa / acridine orange / feulgen)
3. Metaphase preparation and karyotyping (Human leucocytes/ onion root tip)
4. Conjugation
5. Transduction

REFERENCES

1. Boyer, R., 2000. Experimental Biochemistry. Benjamin Cummings, Redwood City, California, USA.
2. Palanivelu, P., 2001. Analytical Biochemistry and Separation Techniques. Kalaimani Printers, Madurai.
3. Sadasivam. S. and A. Manickam, 2002. Biochemical methods. New Age International Private Limited Publishers, New Delhi.
4. Wilson, K. and K.H. Goulding, 1986. Biologists Guide to Principles and Techniques of Practical Biochemistry. ELBS Edition, London.

MICROBIOLOGY AND FOOD BIOTECHNOLOGY - PRACTICAL II

Total hours/week: L:0 T:0 P:4

Marks: Internal:40 External:60 Total: 100

Course Objectives

The main objectives of the course are,

- To understand the concept of microbial diversity and characterization of microbes
- To get familiarity with products obtained from microorganisms
- To understand methods of preservation of pharmaceutical products
- To impart knowledge on detection of microbes in food, risk assessment in food and food safety
- To gain experience in microbiological laboratory practices and skills in the design and execution of microbiology related research
- To provide foundation in various methods to cultivate the microbes and maintenance of the microorganism

Course Outcomes

On completion of the course, students are able to,

1. Comprise out line knowledge on isolation, sub culture and maintenance of microbes
2. Work well on their own as well as a part of a team, effective communication skills and a discerning approach to food items
3. Express genuine interest in science and to know the importance of high standards of cleanliness, commitment, enthusiasm and motivation
4. Understand nutritional requirements of bacteria
5. Able to understand basic and advanced techniques of various instrumentation like pH meter, spectroscopy, colorimetric, and microscopy
6. Develop adequate skills in microbial product synthesis and purification

List of Practicals**Microbiology**

1. Pure culture technique - pour spread, loop out technique and streaking, preservation
2. Staining technique - Simple, grams, negative, endospore and fungal
3. Motility - Flagellar staining, hanging drop and soft agar analysis
4. Isolation of Mutants - physical and chemical
5. Growth curve
6. Biomass estimation

Food Biotechnology

1. Isolation and identification of microbes from food samples
2. Wine production
3. Citric acid production
4. Production of Industrially important enzymes – protease, amylase
5. Immobilization of enzymes
6. Working of fermentors

REFERENCES

1. Cappuccino, P. and D. Sherman, 2004. Microbiology-A Lab Manual. Pearson Education, Singapore.
2. Dubey, R. and E. Maheswari, 2004. Practical Microbiology. S. Chand and Co, New Delhi.
3. Goldman, E. and Green, L.H. 2008. Practical Handbook of Microbiology. II
4. Edition, CRC press, London
5. Kannan, P., 2002. Laboratory Manual in General Microbiology. Palani Paramount Publishers, Palani, Tamilnadu.
6. Murray, R., W.A Wood. and N.B. Krieg, 1984. Methods for General and Molecular Bacteriology. American Society for Microbiology, Washington D.C.
7. Heidcamp, W.H. 1995. Cell Biology Laboratory Manual. Saint Peter, Minnesota.
8. USA. <http://homepages.gac.edu/~cellab/index-1.html>.

Course Objectives

The main objectives of the course are,

- To familiarize the students with the basic concepts in genetic engineering
- To acquaint the students with versatile tools and techniques employed in genetic engineering and recombinant DNA technology
- To enlighten the applications of genetic engineering
- To gain knowledge on methods of gene cloning
- To understand the mechanisms of hybridization techniques
- To learn different aspects of recombinant gene expression systems

Course Outcomes

On completion of the course, students are able to

1. Express adequate knowledge in principles and methods of genetic engineering and their applications
2. Discuss various types of cloning vectors and their application
3. Have good knowledge of application of recombinant DNA techniques in life sciences research
4. Explain the significance of model organisms in recombinant DNA technology
5. Describe recombinant gene expression systems
6. Gain knowledge on the principles of analytical techniques such as PCR and RAPD

UNIT - I

Tools in Genetic Engineering: Nucleic acid manipulating enzymes- restriction- nucleases, ligases, polymerases, modification enzymes - kinases, phosphatases, adapters and linkers. Polynucleotide tailing.

UNIT - II

Cloning Vectors: Plasmid - conjugative and non conjugative plasmid, **Types of Plasmid- Natural plasmids, Artificial plasmid- pBR322 and PUC series.** Phage vectors. Plant Vector – Ti plasmid. Animal viral vectors - Retroviral viral vectors, Shuttle vectors, cosmid, phagemid, phasmid. Artificial chromosomes –BACs, YACs.

UNIT - III

Gene transfer methods: Physical, chemical and biological methods of gene transfer- prokaryotes - eukaryotes. Screening and analysis of recombinants, DNA and RNA probes – construction. Analysis of cloned foreign genes. Hybridization techniques – Southern Blotting, Northern Blotting and Western Blotting.

UNIT - IV

Analytical Techniques: PCR, RAPD, RFLP, AFLP, SSCP, protein engineering- site directed mutagenesis, PCR mediated. Alteration of restriction sites, Molecular diagnosis and therapy of cancer, DNA based detection of microbial infection/ contamination.

UNIT - V

Application: Antisense technology, RNAi technology, terminator gene technology, gene therapy- *in vivo* and *ex vivo*. Gene delivery systems - viral and non viral; DNA marker technology in plants, DNA fingerprinting, genetically engineered biotherapeutics and vaccines.

TEXT BOOKS

1. Glick, B.R. and J.J. Pasternack, 2009. Molecular Biotechnology. Panima Publication, NewDelhi.
2. Primrose, S.B., R. M. Twyman and R. W. Old, 2006. Principles of Gene Manipulation, VII Edition, Blackwell Science Publishing Company, Germany.

REFERENCES

1. Brown, T.A., 1999. Genome. II Edition. Wiley-Liss, New York
2. Brown, T.A., 2006. Gene cloning - An introduction. III Edition, Stanley thrones Publishers Ltd, New York.
3. Winnacker, E.L., 2003. From Genes to Clones. Panima Educational Book Agency, New Delhi.
4. Watson, J.D., M. Gilman and J. Witkowski, 2000. Recombinant DNA. II Edition, Freeman Publication, New York.

Course Objectives

The main objectives of the course are,

- To understand the fermentation process for food manufacturing
- To learn about the microbial metabolism, the use of starter cultures, the process of food transformation
- To know the technological and nutritional impact of fermentation in different foods
- To make the students to understand various techniques involved in the characterization of the microorganism in fermentation and downstream processing
- To understand the technologies which have been adopted for downstream processing
- To Acquire knowledge about the fermented products

Course Outcomes

On completion of the course, students are able to

1. Acquaint knowledge on the designing of fermenter
2. Process the kinetics that will enable them to manipulate it for improvement
3. Discuss the impact of kinetics during fermentation process
4. Understand the nutritional impact of fermentation in different foods
5. Impart knowledge on the various process involved in the fermentation technology
6. Acquaint knowledge on the use of microbes and their role in fermentation process

UNIT - I

Introduction: Isolation and screening of industrially important strains- primary and secondary screening. Strain improvement, mutation, selection of mutants, recombination – bacteria, fungi and actinomycetes, assay and fermented products. Fermentations- submerged, solid state.

UNIT - II

Media: Media formulation – sterilization – batch and continuous sterilization, sterilization of air, fibrous filters. Microbial kinetics: batch, fed-batch and continuous cultures, phases of batch growth. kinetics of cell growth, product formation, substrate utilization, product inhibition kinetics, yield concept and productivity.

UNIT - III

Design of fermenter: Types – CSTR, Tower, Jet loop, Air lift fermenter, Fluidized bed reactor, bubble column, packed bed. Fundamentals of process control and monitoring – on line and off line analysis, feed back control, PID controller, computer aided control.

UNIT - IV

Kinetics: Transport phenomena – Rheological properties, determination of O₂ mass transfer, heat transfer, role of aeration and agitation, factors affecting O₂ transfer. Production of chemicals – alcohol, antibiotics – Penicillin and Streptomycin, Single cell proteins.

UNIT - V

Downstream processing: Cell distribution methods for intracellular products; foam separation, precipitation. filtration – micro and ultra-filtration; Solvent extraction, Liquid extraction, chromatographic separation, dialysis, centrifugation, distillation, drying, crystallization, turbidity analysis and cell yield determination. Fermentation products- available in market.

TEXT BOOKS

1. Stanbury P F., A Whitaker and S J Hall, (1997) “Principles of Fermentation Technology”, Adithya Book Pvt Ltd, Chennai.
2. James E Bailey and David Follis, (1999) “Biochemical Engineering Fundamentals”, 2nd Edition, Mc Graw Hill Book Company. Boston.

REFERENCES

1. Wulf Crueger and Anneliese Crueger, (2004) Textbook of Industrial Biotechnology, 2nd Edition, Panima Publishing Corporation, New Delhi.
2. Pauline M Doran, (1995) Bioprocess Engineering, Academic press, New York.
3. Doran P.M. (1995) Bioprocess Engineering Principles, 2nd Edition, Academic Press, London.
4. Shuler ML and Kargi F (2008) Bioprocess Engineering Basic concepts, 2nd Edition, Prentice Hall, Upper Saddle River, NJ.

Course Objectives

The main objectives of the course are,

- To understand the basic concepts of ecosystem and waste management
- To realize the importance of microbes as a source of food biomass, fuel and to understand the methodologies available for treatment of solid wastes
- To integrate the appropriate aspects of pollution, its control measures and various treatment strategies
- To study the physic-chemical parameters with regards to environmental pollution
- To impart knowledge on the conservation strategy of numerous organisms
- To understand the environmental stress related factors

Course Outcomes

On completion of the course, students are able to

1. Comprehend the various biotechnological approaches to environmental management
2. Learn the strategies for obtaining energy from various natural sources and for energy conservation
3. Understand the concept of bioremediation to handle environmental toxins
4. Analyze the harmful effects of waste water disposal to the environment and the biotechnological solutions
5. Able to develop strategies for the conservation of existing organisms
6. Acquaint knowledge on the environmental impact assessment

UNIT - I

Introduction: Introduction to Biotechnology. Role of Environmental Biotechnology. Market for Environmental Biotechnology. Microbes and metabolism. Fundamentals of biological intervention.

UNIT - II

Pollution and pollution control: Classifying pollution - toxicity; persistence; mobility; ease of control; bioaccumulation; chemistry. Pollution control strategies – dilution and dispersal, concentration and containment. Practical applications to pollution control – biofilters, biotrickling filters, bioscrubbers. 'Clean' Technology - process changes, biological control, bio-substitutions.

UNIT - III

Contaminated land and bioremediation: Remediation Methods - generalised categories, biological, chemical, physical, solidification/vitrification, thermal, Intensive and Extensive technologies. *In situ* techniques – Biosparging, Bioventing, Injection recovery. *Ex situ* techniques - Land farming, Soil banking, Soil slurry reactor. Use of bioremediation, Factors affecting the use of bioremediation.

UNIT - IV

Aerobes and effluents: Biological decomposition of organic carbon, Nitrogen and Phosphate removal. Biological removal, biotransformation, and biosorption of metal ions. Aerobic and

Anaerobic Degradation of Xenobiotics. Bioaugmentation for degradation of Xenobiotics. Industrial sources of waste water. Treatment strategies.

UNIT - V

Phytotechnology and Photosynthesis: Terrestrial phyto-systems (TPS), **phytoremediation of metals and pollutants**. Organic phytoremediation. Hydraulic containment. Aquatic phyto-systems (APS), Macrophyte treatment systems (MaTS), Nutrient film techniques (NFT), Algal treatment systems (ATS).

TEXT BOOKS

1. Evans, G.M. and J. C. Furlong, 2003. Environmental Biotechnology: Theory and Applications. John Wiley & Sons Ltd, West Sussex, England.
2. Jördening, H.J. and J. Winter, 2005. Environmental Biotechnology. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.

REFERENCES

1. Agarwal, S.K., 2002. Environmental Biotechnology. APH Publishing Corporation, New Delhi, India.
2. Mara, D., 2003. The Handbook of Water and Wastewater Microbiology. Academic Press, London, England.

Course Objectives

The objectives of the course are to make the students to

- Obtain fundamental concepts of nanobiotechnology
- Offer a strong knowledge in the interface between chemistry, physics and biology on the nano structural level with a focus on biotechnological usage
- Provide advanced training in the area of nanobiotechnology
- Understand the interaction of nanomaterials with biological molecules and cells
- Learn nanomaterials and their use with biocomponents to synthesize and address larger systems
- Produce highly skilled individuals suited for the fast-changing requirements of today's advanced workforce

Course Outcomes

On successful completion of the course, students will be able to:

1. Recognize the role of bionanotechnology as an interdisciplinary tool and to understand how to use these new tools in to solve problems in biological systems
2. Demonstrate knowledge and understanding of biomolecules and biomolecular interactions, and the relationship between molecular dynamics, nanoscale physics and macroscopic system behaviour
3. Explain biophysical mechanisms in the context of nanobiotechnology application areas
4. Analyze and discuss the engineering requirements of multidisciplinary technology based on biology
5. Explain the challenges of commercializing new technologies
6. Demonstrate technical and cognitive skills associated with nanobiotechnology

UNIT - I

Nanotechnology: Definition, The fundamental Science behind nanotechnology- electrons, atoms and ions, molecules, metals, biosystems Nanoanalysis

UNIT - II

Microfluidics and Lab-on-a-chip: Materials of Microfluidic Components. Silicon, Glass, polymers, fluid structure, fabrication methods. Surface modifications, Spotting, Detection mechanics.

UNIT - III

Natural Nano scale sensors. Biosensors. Biomedical applications: drugs, drug delivery, molecular motors. Neuro electronic interfaces, Nanoluminescent tags, imaging and mapping. Defined networks of Neuronal cells *in vitro*, physiology of information processing within Neuronal Networks, Topographical patterning, Photolithographic patterning, Photochemical patterning.

UNIT - IV

Microcontact printing of proteins: Strategies for printing proteins on surfaces, Contact processing with hydrogel stramps, Affinity contact printing, Micro contact printing polypeptides and proteins, Printing one type of biomolecules, substrates, resolution and contrast of patterns, Activity of printed molecules, Printing multiple types of proteins, Molds and stamps, Surface chemistry, Characterization of printed patterns.

UNIT - V

Applications of Nanotechnology: Nanoparticles in bio- degradation, nanomaterial-based adsorbents for water treatment, possible mutagenic properties of nanoparticles, nanoparticle bioaccumulation. Nanoparticles in biomedical and clinical applications.

TEXT BOOKS

1. Niemeyer, C.M. and C. A. Mirkin, 2004. Nanobiotechnology Concepts, Application and Properties. Wiley – Vch Publishers, New york.

REFERENCES

1. Rao, C.N.R., 2006. The Chemistry of Nanomaterial: Synthesis, Properties and Applications. Vol I and III, Springer on line book.
2. Muralidharan, V.S. and A. Subramanian, 2009. Nanoscience and technology. CRC Press, New Delhi.
3. Ratner, M. and Ratner, D. 2005. Nanotechnology- a Gentle Introduction to the Next Big idea. Pearson Education, Inc. London.
4. Dinh, T.V. 2007. Nanotechnology in Biology and Medicine: Methods, Devices and Applications. CRC Press. New Delhi.

Course Objectives

The objectives of the course are to make the students to

- Obtain basic skills necessary for employing biotechnology principles in together with various pharmaceutical parameters
- Understand novel formulation approaches for better delivery of biotechnology derived drugs, such as reverse micelles, liposomes, microemulsions and microencapsulation
- Attain knowledge on the delivery of peptides and proteins by the parenteral, oral, transdermal and nasal routes of administration
- Recognize novel biotechnology products and their use in therapeutics and diagnostics.
- Comprehend the physical and chemical properties of the solution/colloidal/dispersion that influence physical stability of the bioactive macromolecule with emphasis on aggregation behavior, its identification and its impact on bioactivity
- Learn about special storage, handling, reconstitution and administration conditions and techniques for drug delivery systems containing bioactive macromolecules

Course Outcomes

On successful completion of the course, students will be able to

1. Evaluate different pharmaceutical parameters of current biotechnology products
2. Determine parameters related to stability and formulation of biotechnology products
3. Discuss the quality control procedures related to biotechnology products
4. Demonstrate novel formulation methods for better delivery of biotechnology derived drugs
5. Evaluate different techniques related to separation and purification of cell types; conduct techniques for measuring cell turnover and growth, conduct cytotoxicity assays
6. Join pharmaceutical biotechnology lab and industries as a research assistant

UNIT - I

Introduction: Classification of Pharmaceuticals - Solutions, suspensions, tablets, capsules. Drugs and its sources, Routes of Drug Administration, Absorption and Bioavailability, Distribution, Drug metabolism, Drug theories, Drug Receptor interactions, Pro-drug concept.

UNIT - II

Biotechnology and health: Drug design; drug development; random screen up, target identification and validation, drug discovery, drug delivery. Drug abuse, self-poisoning. pharmacogenomics, biochip.

UNIT - III

Biotechnology and Pharmacy: Genetically engineered protein and peptide agents, novel drug delivery systems – non convectional routes of administration, Anti-AIDS drug development,

oncogenes as targets for drugs, Multi-drug resistance, vaccine development and role of genetic engineering in controlling infectious diseases, gene therapy, and stem cell therapy.

UNIT - IV

Enzyme Technology: Sources of enzymes, extraction and purification: Applications pharmaceutical, therapeutic and clinical. Production of amyloglucosidase, glucose isomerase, amylase and trypsin, Techniques of immobilisation of enzymes and their applications in the industry. Reactors for immobilised systems and perspective of enzyme engineering.

UNIT - V

Novel Drug Delivery Systems: Introduction to the drug carrier, liposomes as a drug carrier, biodegradable polymers as a drug carrier. Modified Drug Release: The sustained release, first order release approximation, multiple dosing.

TEXT BOOK

1. Jay P Rho, Stan G Louie 2003. Hand book of Pharmaceutical Biotechnology, Pharmaceutical products press, New york.
2. <http://munatih-alsahab.blogspot.com/2009/03/fundamentals-of-medicinal-chemistry.html> (E- book)
3. Ajay K. Banga, (2004). Therapeutic Peptides and Proteins: Formulation, Processing, and Delivery Systems, 2nd Ed. Mercer University, Macon, Georgia, USA.

REFERENCES

1. Satoskar, R. S., S. D. Bhandhakan and S. S. Alinaoure, 2000. Pharmacology and Pharmacotheraoeutics. 17th Edition, Popular Prakashan Publishers, Mumbai.
2. Bhagvan, N.V., 2002. Medical Biochemistry. Academic Press, New York.
3. Harvey, R.E., Lipin and W. C. Walters, 2002. Pharmacology. 4th ED. Kluwer Company, New York.
4. Daan, J. A., Crommelin and R. D. Sindelar, 2002. Pharmaceutical Biotechnology. III Edition, Routledge Taylor and Francis Inc, New York
5. Sethi, P.D., 2005. Quantitative Analysis of Drugs in Pharmaceutical Formulations. III Edition, CBS Publishers and Distributers. New Delhi.
6. Manfred E. Wolff. 2000. Burger's Medicinal Chemistry and Drug Discovery. 5th Ed. Wiley and Sons, USA.
7. Daan Crommelin, Robert D Sindelar, 2002. Pharmaceutical Biotechnology, Taylor and Francis Publications, New York.

Course Objectives

The objectives of the course are to make the students to

- Provide an overview of the basic process of bioenergy
- Understand different strategies to convert biomass to biofuels
- Obtain knowledge on the available technologies and how these could meet the growing demand for energy in the future
- Understand biomass biodegradability and bioconversion rate in relation to energy yields
- Describe biochemical processes of biomass conversion to bioenergy production with focus on fermentation and anaerobic digestion
- Understand technological potentials of biogas, bioethanol, biofuel and biohydrogen

Course Outcomes

On successful completion of the course, students will be able to

1. Demonstrate bioenergy production processes adequate to diverse biomass characteristics
2. Discuss state-of-the-art technologies of generating biofuels from sustainable bioresources
3. Discuss and propose feasible biofuel technologies and biofuel products from selected biomasses
4. To illustrate a bio-energy thermo-chemical conversion process
5. Design biogas reactor capacity and propose optimal and economically viable technical operational condition
6. Demonstrate sequential bioethanol and biogas production and compare bioethanol and biogas scenarios with respect to energy recovery

UNIT - I

Biofuel: Introduction, features, undesirable features, Energy crops – wood, sugar and starch crops, hydrocarbon producing crops. Modes of utilization of biomass.

UNIT - II

Biogas: Substrate, digester, microorganisms, process of biogas production, factors affecting biogas yield, precautions, advantages and disadvantages.

UNIT - III

Bioethanol: Introduction, bioethanol vs. petrol, production of bioethanol – yeast, sugar and starch crops, ethanol recovery.

UNIT - IV

Biodiesel: Introduction, lipids as a source of biodiesel – algae, sunflower, rapeseed, linseed, soybean, jatropha, peanut, biodiesel from hydrocarbons. Biobutanol – *Clostridium*, molasses.

UNIT - V

Biohydrogen: Single cell microbial oil, Hydrogen as fuel – production - methods - electrolysis of water, gasification, biological agents. Biohydrogen production – anaerobic fermentation, photolyses and photosynthetic methods.

TEXT BOOKS

1. Mazumdar, B. 2003 A Textbook of Energy Technology. McGraw-Hill, Inc., New York.
2. Shepard, Marion L., 2000 Introduction to Energy Technology. McGraw-Hill, Inc, Newyork

REFERENCES

1. Grant, W.D. and P.E.Long, 2001. Environmental Microbiology. Blakie publications, Glasgow.
2. Reddy, G. M., M.N. Reddy, D.V.R. Saigopal and K.V. Mallaiah, 2007. Laboratory Experiments in Microbiology, II Edition. Himalaya Publishing House, Mumbai.

Course Objectives

The objectives of the course are to make the students to

- Learn about the biochemical parameters used in the identification and utilization of medical plants
- Understand the extraction procedures of phytochemicals
- Exploit and explore the medicinal values of plants
- Gain knowledge about various drugs, its effects, drug metabolism, drug receptors, drug tolerance, dependence and resistance with therapeutic monitoring of drugs
- Understand comprehensive information and insights in pharmaceutical biotechnology and the development of biopharmaceuticals in pharmaceutical industry
- Obtain scientific knowledge of designing and mechanism of action of drugs

Course Outcomes

On successful completion of the course, students will be able to

1. Know the biosynthesis of primary and secondary metabolites involved in plants
2. Understand the concept of phyto-chemical extraction and principles involved in DNA and chemical fingerprinting techniques
3. Know about applications of phyto-constituents in development of drug
4. Validate the results obtained using the techniques involved in photochemical analysis
5. Imparting a comprehension of basic skills necessary for employing biotechnology principles
6. Understand and evaluate the different pharmaceutical parameters of the current and future biotechnology related products on the market

UNIT - I

Phytochemistry: Biosynthesis of primary and secondary metabolites - alkaloids, terpenoids, Phenolic compounds and coumarins. Classification of alkaloids and phenolic compounds.

UNIT - II

General extraction and isolation techniques: Alkaloids and phenolic compounds from plants. Techniques involved in extraction of phytochemicals – Perculation, Soxhlet extraction, reflux and other methods.

UNIT - III

Biotechnology of medicinal plants: Production of secondary metabolites from cultured plant cells, elicitation, immobilization and biotransformation. DNA bar coding. DNA fingerprinting of medicinal plants – DNA isolation and fingerprinting techniques.

UNIT - IV

Bioactive studies: Anticancer, antidiabetic, anti-inflammatory, hepatoprotectives, antimicrobials from medicinal plants. Antioxidants of plant origin – Reactive Oxygen Species (ROS). Toxicity studies on medicinal plant products and herbal formulations.

UNIT - V

Pharmacognosy: Authentication of medicinal plants – Organoleptic and other pharmacognostic studies. Anatomical studies. Organic cultivation of medicinal plants

REFERENCES

1. Harborne, J.B. 1998. *Phytochemical methods to modern techniques of plant analysis* Chapman and Hall, London.
2. Trease GE, Evans, M.C. 1979. *Textbook of Pharmacognosy* 12th ed. Balliere-Tindal, London.
3. Irfan A. Khan and Atitya Khanum. 2004. *Role of Biotechnology in medicinal and Aromatic plants*, Vols. I-X. Ukaaz Publications, Hyderabad.

Course Objectives

The objectives of the course are to make the students to

- To familiarize with aspects of animal farming, problems and prospectus, principles of housing, breeding, feeding and health care of animals
- The student should be able to apply principles and concepts to make management decisions
- The course will present and explore options available to livestock producers in techniques
- The students will gain experience with different livestock management practices
- To explain the methodology of selection and breeding systems for genetic improvement of livestock
- To educate about basic principles of animal physiology and their applications in improving farm animals

Course Outcomes

On successful completion of the course, students will be able to

1. This course is designed to provide an overview and understanding of common and routine livestock management techniques, facilities and decision making
2. Students will know how to palpate cattle, to administer vaccinations, minor surgical techniques, freeze branding, hoof care, proper restraint, and safety in working with animals
3. Students are expected to show proficiency in all topics presented on the course outline.
4. This course will provide adequate knowledge about the animal breeding techniques to students
5. Gain knowledge about various drugs to treat animal diseases
6. Gain knowledge commercial production of livestock and its maintenance

Unit - I

Introduction to livestock: Importance of livestock management; characteristics of a good farm manager; livestock population and its trends; role of farm animals in the national economy; **types and breeds of livestock; principles of farm animal management;** importance and objectives of housing; farm sanitation and waste disposal; transportation of farm animals; quarantine measures; behaviour and welfare of farm animals.

Unit - II

Animal physiology and behaviour: Functional histomorphology male and female reproductive system; Endocrine glands- Concepts in hormone function. Blood and its components constituents' properties and functions of blood. Importance of animal behaviour studies - Patterns of behaviour - Daily and seasonal cycles of behaviour. Environmental modification of behaviour - Developmental changes in behaviour - Genetic differences in behaviour.

Unit - III

System of housing and hygiene: Housing - General principles, planning, layouts for livestock farm of different sizes indifferent climatic zones, Farm structures. Hygiene: air hygiene, Composition of air, Air pollution – Factors, Assessment, control measures; water hygiene, Importance of water - Impurities – Sterilization - Hygienic requirements and standards for drinking water- Quantity of water - Methods of watering.

Unit - IV

Nutrients and Feedings: Fundamental concepts of Digestion and metabolism of Carbohydrate, Fat and Protein in different species of animals. Gluconeogenesis, Recent advances in glucogenic precursors on acetate utilization. NPN metabolism, measures of feed energy, feeding standards, commercially available feeds.

Unit - V

Breeding Management and disease control: Breeding seasons - fitness of purchase for first breeding - methods of detection of heat - Natural Service and artificial insemination - Care of the pregnant Animals - Breeding stock - Use of teaser- Culling. Common diseases and their control measure. Management of specific pathogen free and gnotobiotic animals, concepts to related to welfare of laboratory animals; Transportation of Laboratory animals – marketing of meat and fur. Importance and applications of laboratory animals.

REFERENCES

1. Applied Nutrition: (Livestock, Poultry, Human, Pet, Rabbit and Laboratory Animal Nutrition). IBH & Oxford. Ronald N & Penman S. 1991.
2. A Manual for Small Scale Rabbit Production. South Asia Publ.
3. McDowell LR. 2003. Minerals in Animal and Human Nutrition. Reed Elsevier India.
4. Peter RC. 2005. Applied Animal Nutrition Feeds and Feeding. Pearson Prentice Hall.
5. Bouenger EG. 1994. Animal Behaviour. WB London.
6. Sastry NSR & Thomas CK. 2006. Livestock Production and Management. Kalyani.
7. Wathes CM & Charles DR. 1994. Livestock Housing. CABI.

Course Objectives

The objectives of the course are to make the students to

- This paper will help in develop entrepreneurship among the students
- To identify the edible and nonedible mushrooms
- Enable the students to identify edible and poisonous mushrooms
- Provide hands on training for the preparation of bed for mushroom cultivation and spawn production
- Give the students exposure to the experiences of experts and functioning mushroom farms
- Help the students to learn a means of self-employment and income generation

Course Outcomes

On successful completion of the course, students will be able to

1. Appreciate the importance of embarking on self-employment and has developed the confidence and personal skills for the same.
2. Identify business opportunities in chosen sector / sub-sector and plan and market and sell products / services
3. Start a small business enterprise by liaising with different stake holders
4. Effectively manage small business enterprise
5. Take up Mushroom Cultivation and run it profitably
6. Selection of important types of Mushroom and their cultivation

UNIT - I

Introduction: Historical Development, Fungal Habitat, Mushroom Taxonomy, Types of Mushrooms, Cultivation Modalities - Parasitic, Mycorrhizal, Saprobic and Opportunistic.

UNIT - II

Mushroom Cultivation: Methods in mushroom cultivation- Paper Sack Capture, Raised Bed Mushroom Culture, Compost Making, Log Mushroom Culture, Mycorrhizal Mushrooms, Straw Bale Culture, Making, Mycelial Mats and Mycoremediation.

UNIT - III

Substrate Preparation: Phase-I Composting - Windrow formation – Temperature – Oxygen Requirement – Bed preparation for Spawn production. Phase-II Composting - Elimination of ammonia – Pasteurization of composting – Spawn production – Spawning.

UNIT - IV

Mushroom Fermentation: Substrate Fermentation – Carbon to Nitrogen ratio (C/N) – water - Acidity requirement. Applying and Stacking Mushroom Culture in Developing and Established Farms and Gardens. Choosing Mushroom species.

UNIT - V

Fruit bodies - Mushroom formation - Fruiting body formation – Picking and packaging -Processing problems - Pest Management - Marketing Mushrooms - Market Demand - Market Research- Adding Value to Fresh Mushrooms and value-added products.

TEXT BOOKS

1. James, M.J., 2000. Modern Food Microbiology. IV Edition, CBS Publishers and distributors, New Delhi.
2. Frazier, W.C. and Dennis C.W., 2002. Food microbiology. IV Edition, TATA McGraw-Hill Publishing Company Limited, New Delhi.

REFERENCES

1. Aneja, K.R., 2005. Experiments in microbiology, plant pathology, tissue culture and mushroom production technology. Iii edition, new age international publishers, new delhi.
2. Beausrjour and Marie, T., 1999. Mushrooms in the garden. Mushroom the journal. Fall. P. 17–19.
3. Franklin, G., 1996. Truffle cultivation in North America. Garland gourmet mushrooms and truffles, Inc., Hills Borough, NC. 41 p.

Course Objectives

The objectives of the course are to make the students to

- Be familiarize with practical knowledge in the emerging field of biotechnology: Recombinant DNA technology
- Perform basic molecular biology techniques including DNA and RNA isolation from microbes, plants and animals
- Acquaint versatile tools and techniques employed in recombinant DNA technology such as restriction and digestion, ligation, transformation and PCR
- Obtain practical knowledge on blotting techniques
- Acquire knowledge on quality and quantity checking of nucleic acids
- Comprehend the applications of recombinant DNA technology in human health care

Course Outcomes

On successful completion of the course, students will be able to

1. Carry out DNA and RNA isolation from microbes, plants and animals
2. Perform recombinant DNA techniques including restriction-digestion, ligation, transformation and PCR
3. Carry out versatile recombinant DNA techniques
4. Perform quality and quantity checking of nucleic acids
5. Demonstrate various blotting techniques
6. Join in research and clinical labs as a project/ research assistant

List of Practicals

1. Isolation of total DNA from Microbes (*E. coli*)
2. Isolation of total DNA from plant
3. Isolation of total DNA from animal cells
4. Isolation of plasmid DNA
5. Isolation of total RNA from Yeast
6. Quality and quantity checking of Nucleic acids
7. Restriction digestion of DNA
8. Ligation of DNA
9. Transformation of plasmid DNA using calcium chloride
10. Amplification by PCR
11. SDS-Polyacrylamide gel electrophoresis method
12. Southern blotting
13. Northern blotting
14. Western blotting

REFERENCES

1. Glover, D.M. and B.D. Hames, 2000. DNA Cloning a Practical Approach. IRL Press, Oxford.
2. James, J.G. and V.B. Rao, 2001. Recombinant DNA Principles and Methodologies. Marcel Dekker Publications, NewYork.
3. Maliga, P., 2000. Methods in Plant Molecular Biology. A Laboratory Course Manual, Cold Spring Harbour Laboratory Press, NewYork.
4. Brook, J.S., E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning: A Laboratory Manual. Cold Spring Harbor Laboratory Press, New York.

Course Objectives

The objectives of the course are to make the students to

- Be familiarize with practical knowledge in fermentation and environmental biotechnology fields
- Perform isolation and secondary screening of industrially important microorganisms
- Acquaint versatile tools and techniques employed in fermentation biotechnology such as enzyme immobilization, wine production and downstream processing
- Obtain practical knowledge on basic environmental techniques such as water quality test
- Gain hands on experience in quantifying chemical and biological oxygen demand
- Comprehend the protocol to analyze heavy metals

Course Outcomes

On successful completion of the course, students will be able to

1. Carry out isolation and screening of industrially important microorganisms
2. Perform analytical techniques including thermal death point and thermal death time
3. Explain the principles of enzyme immobilization, wine production and downstream processing
4. Describe the basic knowledge about testing the water quality via pH analysis
5. Perform various techniques to quantify total solids, chemical oxygen demand and biological oxygen demand
6. Join as a technician in quality control section in fermentation-based industries and environmental analysis labs

List of Practicals

Fermentation Technology

1. Isolation and secondary screening of industrially important microorganisms.
2. Auxotrophic mutants
3. Thermal death point and Thermal death time.
4. Production of amylase and protease.
5. Enzyme immobilization
6. Wine Production and alcohol determination by chromic acid method
7. Down stream processing by Solvent extraction,
8. Partial purification by Ammonium sulphate precipitation,
9. Partial purification by Dialysis
10. Quality checking by SDS PAGE

Environmental Biotechnology

1. Water quality tests for pH
2. Determination of total solids
3. Determination of Chemical Oxygen Demand
4. Determination of Biological Oxygen Demand
5. Analysis of heavy metals (Iron/Chromium)

REFERENCES

1. Aneja, K.R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. New Age International, New Delhi.
2. Metcalf, L. and R. Eddy, 2005. Waste Water Engineering. Tata McGraw Hill, New Delhi.
3. Palvannan,T., S. Shanmugam and T. Sathishkumar, 2005. Laboratory Manual on Biochemistry, Bioprocess and Microbiology. SciTech Publications India Pvt. Ltd, Chennai.

Course Objectives

The objectives of the course are to make the students

- To provide various techniques and aspects regarding Plant biotechnology
- To equip students with theoretical knowledge regarding the techniques and applications of Plant Biotechnology and Genetic Engineering
- To provide comprehensive training in the plant biotechnology and its application for increasing agricultural production, environment improvement, human, nutrition and health
- To get a career in Industry/R&D/Academic
- To learn about genome organization in plants, basic techniques in tissue culture and its applications
- To acquire knowledge about the genetic transformation in plants, metabolic engineering, production of pharmaceuticals and industrial products and plant molecular farming

Course Outcomes

On successful completion of the course, students will be able to

1. Describe the genome organizations in plants
2. Elaborate on the plant cell and tissue culture systems
3. Explain the genetic transformation techniques in plants
4. Demonstrate the application of genetic transformation techniques in plants
5. Evaluate the importance of metabolic engineering and molecular farming in plants
6. Join as a project assistant in Phyto pharma Industries

UNIT - I

Introduction: Principles of Plant Breeding: Important conventional methods of breeding – self, cross pollinated and vegetatively propagated crops. Non-conventional methods. Polyploidy, Genetic variability. Genome organization in plants – mitochondria and chloroplast. Cytoplasmic male sterility.

UNIT - II

Micropropagation: Tissue culture media – composition and preparation, Callus and suspension culture, somoclonal variation, micropropagation, organogenesis, somatic embryogenesis, Embryo culture and embryo rescue. Haploidy; protoplast fusion and somatic hybridization; cybrids; anther, pollen and ovary culture for production of haploid plants and homozygous lines. Plant hardening transfer to soil, green house technology.

UNIT - III

Plant Genome Organization – Chloroplast, Mitochondria, and Nucleus Strategies in bioconversion. Production of pharmaceutical compounds. Mass cultivation of plant cells. Secondary metabolite Production from Suspension Culture, Bioreactors – Photo bioreactor. Production of secondary metabolite in plants, stages of secondary metabolite production, uses of tissue culture techniques in secondary metabolites.

UNIT - IV

Plant genetic Engineering: Methodology; Plant transformation with Ti plasmid of *Agrobacterium tumefaciens*; Ti plasmid derived vector systems, Ri plasmids; Physical methods of transferring genes to plants - Microprojectile bombardment, Electroporation; Manipulation of gene expression in plants; Production of marker free transgenic plants.

UNIT - V

Application of Genetic transformation: Productivity and performance: herbicide resistance, insect resistance, virus resistance, fungal resistance, nematode resistance, Induction of abiotic stress and cold stress. Delay in fruit ripening, terminator seed technology, plantibodies, edible vaccines - primary and secondary metabolite modification, biopolymers, plant-based enzyme engineering.

TEXT BOOKS

1. Slater, A., N.W. Scott and M. R. Fowler, 2008. Plant Biotechnology. Oxford University Press, Oxford.
2. Ignacimuthu, S., 2004. Plant Biotechnology. Oxford and IBH Publishing House, New Delhi.

REFERENCES

1. Chawla H.S 2002. Introduction to Plant Biotechnology Oxford and IBHP Publishing Co.Pvt. Ltd. New Delhi.
2. Kumar, U., 2008. Plant Biotechnology and biodiversity conservation. Agrobios, Jodhpur.
3. Stewart, N.C., 2008. Plant Biotechnology and Genetics. John Wiley & Sons, Inc., New Jersey.
4. Halford, N. and N. G. Halford, 2006. Plant Biotechnology: Current and Future Applications of Genetically Modified Crops. John Wiley & Sons, New Jersey.
5. Nirmala, C.B., G. Rajalakshmi and C. Karthik, 2009. Plant Biotechnology. MJP Publication, Chennai.

Course Objectives

The objectives of the course are to make the students to

- Provide an experience for the students in an interdisciplinary research program connecting animal genomics with animal reproduction and biotechnology
- Introduce biotechnological methods for production of transgenic animals
- Give knowledge about various methods of gene transfer in animals
- Cognize and get the knowledge on techniques to protect endangered animals
- Explain the basics of the physiological and molecular processes for animals facing environmental adaptations
- Use basic biotechnological techniques to explore molecular biology of animals
- Understand the processes involved in the planning, conduct and execution of animal biotechnology experiments

Course Outcomes

On successful completion of the course, students will be able to

1. Understand the growth conditions required to culture the animals in *in vitro* conditions.
2. Inculcate the deep understanding of Gene expression system of animals
3. Acquire knowledge on producing Transgenic animals
4. Inculcate the deep knowledge on the processes involved in planning, conduct and execution of animal biotechnology experiments
5. Discuss the structure and organization of animal genome
6. Work as a research assistant in animal biotechnology industries

UNIT - I

Animal cells: culture media, types of media, balances salt solutions. Physical, chemical and metabolic functions of different constituents of culture medium; role of carbon dioxide, serum, growth factors, glutamine in cell culture; serum and protein free defined media and their applications.

UNIT - II

Cell culture: Types, disaggregation of tissue, primary culture, established culture; suspension culture, organ culture, three-dimensional culture and tissue engineering, feeder layers; cell synchronization; cryopreservation. Biology and characterization of cultured cells, tissue typing; cell – cell interaction; measuring parameters of growth; measurement of cell death – apoptosis and its determination.

UNIT - III

Molecular cell techniques: cell transformation- physical, chemical and biological methods; manipulation of genes; cell and organism cloning; green fluorescent protein and its application. Gene therapy.

UNIT - IV

Embryology: Collection and preservation of embryos; culturing of embryos; gametogenesis and fertilization in animals; types of cleavage pattern; role of maternal contributions in early embryonic development; *In vitro* fertilization and stem cell research.

UNIT - V

Transgenics: Transgenic animals; production and application; transgenic animals as models for human diseases; transgenic animals in live- stock improvement; expression of the bovine growth hormone; transgenics in industry. Ethical issues in animal biotechnology.

TEXT BOOKS

1. Ranga, M. M., 2003. Animal Biotechnology, II Edition, Agrobios India, Jodhpur.India.
2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. IV Edition, John Wiley Publications, New York.

REFERENCES

1. Glick, B.R. and J.J.Pasternack,2003. Molecular Biotechnology. 3rd ED. Blackwell Science, U.K .
2. Gordon, I., 2003. Laboratory Production of Cattle Embryos. II Edition, CAB International. New Delhi.
3. Houdebine, L.M., 1997. Transgenic Animals: Generation and Use. V Edition, CRC Press, New york.
4. Jenkins, N., 1999. Animal Cell Biotechnology Methods and Protocol. Humana Press, Totowa, New Jersey and Panima Publishing Corporation, New Delhi.
5. Yagasaki, K., Y. Miura, M. Hatori and Y. Nomura, 2008 .Animal Cell Technology: Basic and Applied Aspects. Vol. 13 .Springer-Verlag, New York.
6. Primrose, S. B., R. M. Twyman and R. W. Old, 2001. Principles of Gene Manipulation. VI Edition, Blackwell Science Publishing Company, Germany.
7. Portner,R., 2007. Animal Cell Biotechnology: Methods and Protocols. Vol. 24 Springer-Verlag, New York, LLC

Course Objectives

The objectives of the course are to make the students to

- Expose the students with the immune system of human body
- Understand about our immune system and the immune response of cells and organs
- Obtain key concepts on gene-re-arrangement of immunoglobulin and T-cell receptor genes, and antigen processing and presentation.
- Comprehend the principles of immunological techniques like hybridoma technology and catalytic antibodies synthesis
- Understand strong fundamental knowledge in tumor immunology
- Attain the principles involved in vaccine technology including recombinant vaccines
- Recognize the basic concepts in bone marrow and other organs transplantation

Course Outcomes

On successful completion of the course, students will be able to

1. Demonstrate various immunological process including innate and adaptive immunity, cells and organs of immune system, antigen and antibody interaction, immunogenicity and antigenicity, epitopes and antibody structure
2. Describe the organization of Ig genes, class switching in constant regions of genes and expression and regulation of Ig genes
3. Recognize how antigens are processed, presented and immune activation occurs via B- and T- cells activation
4. Appreciate the underlying mechanisms of auto-immune diseases and allergic reactions
5. Illustrate the role of immune system in tumor formation
6. Apply the knowledge of this course in research and pharmacological industries

UNIT - I

Introduction: History and scope, Immunity – types, Antigen and Antibody - biology, structure and functions, super antigens, antigen- antibody interactions, primary and secondary immune response. Humoral and cell mediated immunity.

UNIT - II

Immune system: Hematopoiesis and differentiation, Lymphocytes, Lymphoid organs: Primary and secondary lymphoid organs. Antigen recognition and presentation, activation of B and T lymphocytes, cytokines and their role in immune regulation. **Complement system** - Classical and alternate pathway.

UNIT - III

Transplantation: MLR, MHC and HLA typing, bone marrow transplantation, organ transplants, immunosuppressive therapy. Hybridoma technology and monoclonal antibodies, immuno-diagnosis and application of monoclonal antibodies in biomedical research, human monoclonal antibodies and catalytic antibodies, Xeno transplantation from various species

UNIT - IV

Hyper sensitivity reactions, auto immune disorders. Tumour immunology: Tumour antigens, immune response to tumours, cancer immunotherapy. Immunodeficiencies – primary and secondary.

UNIT - V

Vaccines: Vaccine technology including DNA vaccines, identification of B and T epitopes for vaccine development. Immuno diagnosis of infectious diseases, immuno screening of recombinant library.

TEXT BOOKS

1. Goldsby, R.A., T. J. Kindt, B. A. Osborne and W.H. J. Kuby, 2004. Immunology. V Edition, Freeman and Company; USA.
2. Tizard, I.R., 2004. Immunology, V Edition, Saunders College Publishing, New York.

REFERENCES

1. Abbas, A.K., A. H. Lichtman and S. Pillai, 2007. Cellular and Molecular Immunology: With student consult Online Access. Elsevier Science, Australia
2. Abbas, A.K., A. H. Lichtman, D.L. Baker, 2008. Basic Immunology: Functions and Disorders of the Immune System. Elsevier Health Sciences, Australia
3. Roitt, I., J. Brstoff and D. Male, 2002. Immunology. III Edition, Mosby Yearbook Europe Ltd, London.
4. Goldsby, R. A., T.J. Kind and B.A. Osborne, 2004. Immunology. V Edition, Freeman and Company, New York.
5. Turgeon, M. L. 2008. Immunology and Serology in Laboratory Medicine. Elsevier Health Sciences, Australia
6. Surendranath, A. and R. Narain, 2004. Immunobiotechnology. Dominant Publishers and Distributors, New York.

Course Objectives

The objectives of the course are to make the students to

- Teach the students a thorough knowledge on genome and proteome identification, analysis and applications.
- Educate students on stand-alone and online software for genetic studies.
- Import the basic and recent developments in the field of genome sequencing, genome mapping, proteomic data analysis
- Develop the knowledge on gene sequencing methods.
- Know the structure and interactions of proteins.
- Describe advanced genomics and proteomics technologies and the ways in which their data are stored
- Use bioinformatics techniques to query examples of genomic and proteomic databases to analyse cell biology
- Describe the different types of genome variation and their relationship to human diseases

Course Outcomes

On successful completion of the course, students will be able to

1. Have a clear understanding on the application of genetic markers in genome mapping.
2. Application of 2D technique to analyze the structure of protein.
3. Analyze the genomic and proteomic data.
4. Acquire knowledge and understanding of fundamentals of genomics and proteomics, transcriptomics and metabolomics and their applications in various applied areas of biology.
5. Discuss how biological systems information relating to genes, proteins and cellular structures can be used to model living cells, and even to create new synthetic cells.
6. Solve problems in new or little-known situations within broader (or multidisciplinary) contexts related to the field of study.

UNIT - I

Genome Sequencing: Gene and pseudogenes, Gene structure, Genomes, Sequencing Genomes- methodology, chain termination method, chemical degradation method, automated DNA sequencing, shotgun sequencing and assembly of contiguous DNA sequence. cDNA and Genomic library construction.

UNIT - II

Genomic Mapping: Different types of genome maps and their practical uses, Genetic and Physical mapping techniques. Map resources. Practical uses of genome maps. Genetic Markers - Mini and Micro satellite, STS and EST, SNPs.

UNIT - III

Gene Expressions and Microarrays: Expression systems - Bacteria, Yeast and Viral. Concepts of microarrays, spotter analysis, Normalization –total intensity, using regression techniques, ratio statistics. Clustering Gene expression profiles-hierarchical, single-linkage, complete linkage, and average linkage. Tools for microarray analysis- MADAM, spot finder, SAGE Applications of Microarrays- Bioinformatics challenges in micro array design and analysis.

UNIT - IV

Experimental Proteomics: Proteome analysis- 2D gel electrophoresis: general strategy, immobilized pH gradients, sample preparation, isoelectric focusing, staining, transfer of proteins from gels, image acquisition and analysis of gels. 2DE databases.

UNIT - V

Analytical Proteomics: RP-HPLC, Mass Spectrometry – ESI MS and MALDI techniques and applications. Characterization of protein complexes – Protein - DNA, Protein-protein interactions, yeast two-hybrid system and protein micro arrays – biomarkers.

TEXT BOOKS

1. Brown, T.A., 2002. Genomes. John Wiley & Sons, Singapore.
2. Cantor, C.R. and C. L. Smith, 1999. Genomics: The Science and Technology behind the Human Genome Project, John Wiley and Sons, Singapore.
3. Primrose, S.B. and R. M. Twyman, 2003. Principles of Genome Analysis. Blackwell Publishing, Oxford.
4. Reiner, W. and T. Naven, 2002. Proteomics in Practice. Wiley – VCH, Weinheim.

REFERENCES

1. Gibson, W. and V. Muse, 2003. A Primer of Genome Science. Sinauer Associates Inc. Publishers, Sunderlands, New York.
2. Stekal, D., 2003. Microarray Bioinformatics. Cambridge University Press, Cambridge.
3. Liebler, L.H., 2001. Introduction to Proteomics, Tools for the New Biology. Humana Press, New Jersey.
4. Richard, P. S., 2004. Proteins and Proteomics. A Laboratory Manual. Cold Spring Harbor Laboratory Press, New York.
5. Pennington, S. and M.J. Dunn, 2001. Proteomics: From Sequence to Function. Bios Scientific Pub.Ltd. Oxford.
6. Bourne, P.E. and H. Weissig, 2003. Structural Bioinformatics. John Wiley & Sons, Singapore.

Course Objectives

The objectives of the course are to make the students to

- Introduce basic concepts of safety that is essential for different disciplines of science and procedures involved and protection of intellectual property and related rights
- Discuss about various aspects of biosafety regulations and IPR concerns arising from the commercialization of biotech products
- Understand balanced integration of scientific and social knowledge in sustainable development
- Attain the benefits of GM technology and related issues
- Identify and discuss the issues and concepts salient to the research process
- Recognize and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project

Course Outcomes

On successful completion of the course, students will be able to

1. Interpret basics of biosafety and its impact on all the biological sciences and the quality of human life
2. Recognize importance of biosafety practices and guidelines in research
3. Apply intellectual property law principles including copyright, patents, designs and trademarks to real problems and analyze the social impact of intellectual property law and policy
4. Comprehend the importance of protection of new knowledge and innovations and its role in business
5. Gain more insights into the regulatory affairs
6. Demonstrate knowledge of research processes such as reading, evaluating, and developing, and to identify, explain, compare, and prepare the key elements of a research proposal and report

UNIT - I

Biosafety: Introduction; Historical Background; Biological Safety Cabinets; Primary Containment for Biohazards; Biosafety Levels; Biosafety Levels of Specific Microorganisms; Recommended Biosafety Levels for Infectious Agents. Cartagena protocol on biosafety.

UNIT - II

Biological risk assessment: Biosafety guidelines for Genetically Modified Micro organisms (GMM) and Plants (GMP)-Risk assessment and contained use of GMM and GMPs-guidelines for research activities-import and shipment quality control of biologicals produced by rDNA technology. Guidelines for environmental release of GMM, GMP and GLP.

UNIT - III

Intellectual Property Rights: Types of IP: Patents, Trademarks, Copyright and Related Rights. **Agreements and Treaties:** History of GATT and TRIPS Agreement; Madrid Agreement; Hague Agreement; WIPO Treaties; Budapest Treaty; PCT; Indian Patent Act 1970 and recent amendments

UNIT - IV

Research methodology: Scope and significance – Types of Research – Research Process – Characteristics of good research – Problems in Research – Identifying research problems. Research Designs – Features of good designs, Report writing – Introduction, review of Literature, Result interpretation, bibliography.

UNIT - V

Sampling Design: Meaning – Concepts – Steps in sampling – Criteria for good sample design. Scaling measurements – Techniques – Types of scale.

TEXT BOOKS

1. Martin. M.W. and Schinzinger.R. 2003. Ethics in engineering, 3rd Edition, Tata McGraw-Hill, New Delhi.

REFERENCES

1. Bareact, 2007. Indian Patent Act 1970. Acts and Rules, Universal Law Publishing Co. Pvt. Ltd.
2. Kankanala, C., 2007. Genetic Patent Law and Strategy. I Edition, Manupatra Information Solution Pvt. Ltd., India.
3. Biosafety issues related to transgenic crops, DBT guidelines, Biotech Consortium India Limited, New Delhi
4. http://www.actahort.org/members/showpdf?booknr=447_125
5. <http://www.biomedcentral.com/content/pdf/1472-6939-2-2.pdf>
6. <http://www.wipo.int/portal/index.html.en>
7. http://www.ipr.co.uk/IP_conventions/patent_cooperation_treaty.html

Course Objectives

The objectives of the course are to make the students to

- Give knowledge on Bioinformatics and its applications
- Offer knowledge to assess biological databases
- Understand and to analyze protein/nucleotide sequences and to predict its 3D structure
- Understand the various online databases for submitting and retrieving data
- Attain how the phylogeny plays a vital role in finding ambiguities
- Get practiced with the tools and techniques for analyzing the data

Course Outcomes

On successful completion of the course, students will be able to

1. Understand The relationship between sequence - structure - function of genes
2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences
3. Inculcate knowledge on building 3D structures of genes
4. Locate and use the main databases at the NCBI and EBI resources
5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information
6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences

UNIT - I

Introduction: Definitions, Objectives, Scope, Applications of Bioinformatics, History and milestones of bioinformatics, Genome sequencing projects – Steps, Human Genome Project and other genome projects.

UNIT - II

Basic concepts of biomolecules and computers: Basic concepts of biomolecules – Protein and amino acid, DNA and RNA - Sequence, Structure and function.

Basic computer components - Hardware, software, operating systems, computer networks, programming, internet, browsers, search engines, email, databases.

UNIT - III

Biological databases: Types of databases, Sequence databases, Nucleic acid sequence databases - Primary (GenBank, EMBL, DDBJ), Secondary (UniGene, SGD, EMI Genomes, Genome Biology), Protein sequence database – Primary (PIR, SWISS-PROT), Secondary (PROSITE, Pfam), Structural databases (PDB, SCOP, CATH), Bibliographic databases and Organism specific databases.

UNIT - IV

Database searching and Sequence Alignment: Similarity searching programs-BLAST, Sequence alignment - Pair-wise and Multiple-sequence alignment (Methods and Algorithms), CLUSTAL-W, Protein structure alignment (Methods, algorithms- DALI) Phylogenetic analysis (Methods, algorithms).

UNIT - V

Gene prediction: Gene prediction in prokaryote and eukaryotes. Extrinsic approaches and Ab initio approaches. Predicting the protein secondary structure (Domain, blocks, motifs), Predicting protein tertiary structure (Homology, Ab-initio, threading and fold recognition) and visualization of predicted structure.

TEXT BOOKS

1. Jin Xiong, 2006. Essential Bioinformatics, Cambridge University Press.
2. Attwood, K. and J. P. Smith, 2003. Introduction to Bioinformatics. Pearson Education, Singapore.

REFERENCES

1. Rajaraman. V., 2003. Introduction to information technology. Prentice Hall of India Pvt. Ltd, New Delhi.
2. Lesk, A. M., 2002. Introduction to Bioinformatics. Oxford University Press, London.
3. Web resources: <http://www.ncbi.nlm.nih.gov/> ; <http://www.ebi.ac.uk/2can/databases>

Course Objectives

The objectives of the course are to make the students to

- Acquire knowledge and learn the terminology of the field of Industrial toxicology, understand and be able to describe in detail the toxicological effects of certain dangerous substances
- Describe the relationship of dose - response, and the principle of determining the theoretical expertise on the mutagenic, teratogenic and carcinogenic effects of toxic substances
- Obtain knowledge of current legislation on health protection while working with chemical agents, carcinogenic and mutagenic factors, and biological factors
- Learn about toxic effects of elements and their compounds
- Understand the classification of substances under the new legislation
- Gather and critically interpret toxicological information from diverse resources for human health hazard and risk assessment

Course Outcomes

On successful completion of the course, students will be able to

1. Describe toxicology as a discipline in the overall health sciences framework
2. Explain the basic concepts of chemical hazard and exposure as determinants of chemical toxicity
3. Describe key pathways and mechanisms of chemical absorption, distribution, metabolism, storage and excretion in the human body
4. Explain dose-response relationships as the basis of toxicity
5. Outline the derivation of reference dose and other related measures of occupational exposure
6. Describe the scientific basis of occupational exposure assessments and practical methods for their determination

UNIT - I

Introduction: Scope, Divisions of Toxicology, General principles of toxicology, - Classification of Toxic Agents. Mechanism of action of toxicants, Routes of exposure-absorption and translocation.

UNIT - II

Toxicokinetics: Absorption, Distribution, Metabolism and Excretion, Factors influencing Toxicity, Dose-effect and Dose response relationship- LD50, LC50.

UNIT - III

Human Toxicology: Pollution induced biochemical, hematological and pathological changes, Immunotoxicity, genotoxicity and carcinogenic effects

UNIT - IV

Ecotoxicology: Influence of ecological factors on the effects of toxicity; Pollution of the Ecosphere by industries; degradable and non-degradable toxic substances; food chain. Eco-system influence on the fate and transport of toxicants.

UNIT - V

Regulatory issues and testing: Bacterial mutation assays, Mammalian cell mutation assays, in vitro chromosome aberration assays, In vivo carcinogenicity assays and comet assay.

REFERENCES

1. Finkol, A.J. 1983. Hemitton and Hardy's Industrial toxicology. John Wright, PSG Inc. Boston. London.
2. Rand and Petrocelli, 1985. Fundamentals of aquatic toxicology. Hemisphere publishing corporation, Washington.
3. Murthy A.S., 1999. Toxicity of pesticides to fish. CRC Press Inc. Florida.
4. Omkar, 1988. Concepts of toxicology. Shoban lal Nagir, Chand & Co, Delhi.

Course Objectives

The objectives of the course are to make the students to

- Give an overview of fundamental concepts in tissue engineering and regenerative medicine
- Understand tissue growth and development as well as the tools and theoretical information necessary to design tissues and organs
- Recognize the need of controlling all factors related to biomaterials architecture such as cell biology, biochemistry pathways, and surface characterization and modification
- Comprehend various physical and chemical stimuli that control the structure of biomaterials
- Get knowledge in which cell types are available to be used in tissue engineering applications
- Understand the relevance of the extracellular matrix and its interaction with materials

Course Outcomes:

On successful completion of the course, students will be able to

1. Describe and use the fundamental tools and techniques used in tissue engineering
2. Compare and contrast various strategies for repairing tissues
3. Show mastery of fundamental topics in tissue engineering including stem cells, plasticity, trans differentiation, and cloning
4. Describe and the developments of biomaterials for regenerative therapies and tissue engineering
5. Discuss and give an example of how biomaterials are used to fabricate devices for clinical use
6. Illustrate the basic concepts of cell culture and critical components of bioreactor/tissue design

UNIT - I

Tissue engineering: Introduction to tissue engineering; Basic definition; Cell sources and stem cells; Cell isolation and selection; Tissue preservation; Tissue types; Structure and organization of tissues; Epithelial, connective; vascularity and angiogenesis; Extracellular matrices; Cell-matrix interactions; development and use in therapeutic and *in-vitro* testing.

UNIT - II

Cell culture types and morphology: cell biology, Isolation, cell growth, Different cell types, progenitor cells and differentiations, different kind of matrix, cell-cell interaction. sterile techniques, plastics, enzymes, reactors and cryopreservation and migration; cell expansion, cell transfer, cell storage and cell characterization, Bioreactors.

UNIT - III

Cell analysis: Different cell types, staining, hormones, growth factors (receptor- ligand binding) and chemokines in signaling (eg. G-proteins). Growth factor delivery and applications (angiogenesis) in tissue engineering. Cell junctions in tissues, Growth factor delivery in tissue engineering and Cell surface markers.

UNIT - IV

Scaffold and transplant: Engineering biomaterials, Degradable materials (collagen, silk and polylactic acid), porosity, mechanical strength, 3-D architecture and cell incorporation. Engineering tissues for replacing bone, cartilage, tendons, ligaments, skin and liver.

UNIT - V

Bioreactors in Tissue engineering: Importance of tissue engineering, applications in pharmaceuticals industry. Case study and regulatory issues: Case study of multiple approaches: cell transplantation for liver, musculoskeletal, cardiovascular, neural, visceral tissue engineering. Ethical, FDA and regulatory issues of tissue engineering.

TEXT BOOK

1. Palsson, B.O., Sangeeta N. Bhatia. 2003. Tissue Engineering. Prentice Hall.

REFERENCES

1. Lanza, R., R. Langer & J. Vacanti. 2007. Principles of Tissue Engineering (3rd edn.), Academic Press.
2. Ravi, B. 2014. Introduction to Tissue Engineering: Applications & challenges. Wiley Publishing.
3. Robert. P.Lanza,,Principles of tissue engineering, Robert Langer & William L. Chick, Academic press.
4. Fisher, J.P., A.G. Mikos, J.D. Bronzino & D.R. Peterson. 2012. Tissue Engineering: Principles and practices. CRC Press.
5. Wong, J.Y., J.D. Bronzino & D.R. Peterson. 2012. Biomaterials: Principles and practices. CRC Press.
6. <http://web.mit.edu/langerlab/>
7. <http://faculty.virginia.edu/laurencin/index.htm>

Course Objectives

The objectives of the course are to make the students to

- Understand the new concept of system biology applied to the area of biotechnology
- Build the knowledge in computational methods in biotechnology
- Acquire requisite skills for the design and development of high throughput screening and to retrieve and submit the data, genome database and other databases and analysis
- Learn the computational tools for applying biotechnology in research
- Study the techniques involved in structural and functional proteomics
- Utilize the bioinformatics tools to design and development of novel drugs

Course Outcomes

On successful completion of the course, students will be able to

1. Understand the basic concepts of System Biology
2. Differentiate various Metabolic Networks and Models in System Biology
3. Understand the various databases available for data collection and interpretation
4. Understand the scope and applications of tools
5. Utilize the computational tools for applying biotechnology in research
6. Study and deduce the molecular characterization of human genome

UNIT - I

Introduction to Systems Biology: Introduction to Systems Biology. Need for System Analysis in Biology. Basic Concepts in System Biology: Component vs System, Links and Functional States, Links to Networks, Hierarchical Organization in Biology.

systems, scales, static/dynamic, approaches, limitations, reductionism; central dogma; mathematical models; computational analysis; statistics of prokaryotes and eukaryotes.

UNIT - II

Metabolic Networks and Models in System Biology: Basic Features of Metabolic Networks. Reconstruction Methods of Metabolic Networks. Models as Dynamical Systems. Parameter Problem. Meanings of Robustness.

UNIT - III

Systems Biology Databases KEGG (Kyoto Encyclopedia of Genes and Genomes). BRENDA (Braunschweig ENzyme DAtabase). BioSilico. EMP (Embden-Meyerhof-Parnas). MetaCyc and AraCyc. SABIO-RK (System for the Analysis of Biochemical Pathways - Reaction Kinetics). BioModels.

UNIT - IV

Tools for System Biology: Cell Designer. Ali Baba. Cell Profiler. JDesigner. Bio-SPICE (Biological Simulation Program for Intra and Inter Cellular Evaluation). SBML (Systems Biology Markup Language). SBGN (Systems Biology Graphical Notation). SBML-SAT (SBML based Sensitivity Analysis Tool).

UNIT - V

Premises & Promises of Systems Biology: Premise of Systems Biology. Promise of Systems Biology. Challenges of Systems Biology. Applications of Systems Biology.

TEXT BOOK

1. Bernhard O. Palsson (2006). Systems Biology: Properties of Reconstructed Networks. Cambridge University Press, New York.

REFERENCES

1. Björn H. Junker, Falk Schreiber (2008). Analysis of Biological Networks. John Wiley & Sons, Inc., Hoboken, New Jersey.
2. Huma M. Lodhi, Stephen H. Muggleton. Elements of Computational Systems Biology. John Wiley & Sons, Inc., Hoboken, New Jersey.
3. Cánovas M., J.L. Iborra and A. Manjón (2006). Understanding and Exploiting Systems Biology in Biomedicine and Bioprocesses. CajaMurcia Foundation, Spain.
4. Brown T. A., Genomes, 2nd Edition, BIOS Scientific Publishers, Ltd., Oxford, UK, 2002.
5. Sensen, C.W Essentials of Genomics and Bioinformatics, Wiley-VCH, 2002 5. S.R.Pennington and M.J.Dunn, Proteomics, Viva Books Pvt. Ltd., New Delhi, 2002.
6. <http://www.systemsbiology.org>
7. <http://www.systems-biology.org>

Course Objectives

The objectives of the course are to make the students

- To learn various bio-entrepreneurship and marketing approaches
- To know about the entrepreneurship including identifying a business opportunity in the area of biotechnology through resource generation and launching a biotech business, growing and nurturing the organization as well as harvesting the rewards.
- To familiarize students with the scope of issues and decisions that managers in biotechnology face as their company progresses from its earliest stages to self-sustainability
- To give students the vocabulary to participate and contribute to the business side of scientific enterprises
- To provide a general procedural road map for bioscience students who are interested in starting their own companies

Course Outcomes

On successful completion of the course, students will be able to

1. Differentiate between Wage employment, Self-employment and Entrepreneurship
2. Understand, appreciate and develop the self-confidence for embarking on self-employment
3. Understand and internalize entrepreneurial competencies and know their importance for becoming a successful entrepreneur.
4. Candidate will be able to mobilize resources required for starting the enterprise
5. Trainee is able to appreciate need for continuous growth and expansion of an enterprise

UNIT - I

Accounting and Finance: Starting a venture; Bank loan; Sources of financial assistance; Business proposal; Statutory and legal requirements for starting a company. Budget planning and cash flow management; accounting practices: balance sheet, P&L account, and double entry bookkeeping; Estimation of income, expenditure, profit, income tax.

UNIT - II

Marketing: Assessment of market demand for potential product(s) of interest; Market conditions, segments; Prediction of market changes; Identifying needs of customers including gaps in the market, packaging the product; Market linkages, Advertising.

UNIT - III

Information Technology: IT for business administration; IT in improving business performance; Available software for better financial management; E-business setup and management.

UNIT - IV

Human Resource Development: Leadership skills; Managerial skills; Organization structure, pros & cons of different structures; Team building, teamwork; Appraisal; Rewards in small scale set up.

UNIT - V

Entrepreneurship and R&D

Support mechanism for entrepreneurship in India. Knowledge centers like universities and research institutions; Role of technology and upgradation; Assessment of scale of development of Technology; Managing Technology Transfer; Regulations for transfer of foreign technologies; Technology transfer agencies.

TEXT BOOKS

1. Kotler, P. and G. Armstrong, 2001. Principles of Marketing. Prentice Hall. USA.
2. Dogramatzis, 2001. Pharmaceutical Marketing: A Practical Guide by. IHS Health Group, USA

REFERENCES

1. Armstrong, G., M. Harker, P. Kotler and R. Brennan, 2009. Marketing: An Introduction Financial Times Prentice Hall, USA.
2. Kotler, P. 2010. Principles of Marketing Management. 13th Ed. Prentice-Hall India Pvt. Ltd., New Delhi.
3. Kotler, P. and K.L. Keller, 2006. Marketing Management. Prentice Hall, USA
4. Ramasamy, V.S. and S. Namakumari, 2005 Marketing Management. IV Edition Macmillan, New Delhi.
5. O'Brian, J. and A. Montazemia, 2004. Management Information Systems. McGraw-Hill Ryerson, Cannada.
6. <http://www.sba.gov/smallbusinessplanner/start/financestartup/index.html>
7. <http://www.azhttp.com/2007/08/23/small-business-internet-marketing-services>
8. http://www.marketingteacher.com/Lessons/lesson_emarketing.htm

Course Objectives

The objectives of the course are to make the students to

- Understand the new concept of plant biotechnological techniques applied to the area of biotechnology
- Gain hands-on experience and to learn the principles behind plant biotechnology
- Know the process involved in isolation, separation, manipulation of plant tissues
- Apply the technology in research and development and pharmaceutical industries
- Execute the recent technology involved in plant tissue culture
- Describe the principles of gene manipulation.

Course Outcomes:

On successful completion of the course, students will be able to

1. Acquaint with principles, technical requirement, scientific and commercial applications in plant biotechnology
2. Support methodologies in plant tissue culture
3. Be able to describe basic principles and techniques in genetic manipulation and genetic engineering
4. Be able to describe gene transfer technologies in plants
5. Be able to describe techniques and problems in plant cloning
6. Become motivated to set goals towards pursuing higher-level positions, such as lab manager and key scientist in plant biotechnological research institutes and industries

List of Practicals**Plant Tissue Culture Techniques**

1. Sterilization Techniques in tissue culture
2. Laboratory organization in plant tissue culture.
3. Media Preparation
4. *In-Vitro* Germination of Seeds
5. Micropropagation
6. Callus induction, differentiation and regeneration
7. Suspension culture
8. Embryo Culture
9. Synthetic seed production.
10. Protoplast Isolation
11. Agrobacterium mediated gene transformation

REFERENCES

1. Aneja, K R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. IV Edition, New age international Pvt. Ltd. Publishers, New Delhi.

Course Objectives

The objectives of the course are to make the students to

- Gain hands-on experience and to learn the principles behind animal biotechnology
- Know the process involved in isolation, separation, manipulation of animal cells
- Apply the technology in research and development and pharmaceutical industries
- Obtain practical knowledge on basic immunological techniques such as serum/plasma preparation and ABO blood grouping
- Gain hands on experience in immunological tools used in diagnosis, such as immunoelectrophoresis, ELISA and WIDAL test
- Comprehend the applications of recombinant DNA technology and Immunological techniques in human health care

Course Outcomes

On successful completion of the course, students will be able to

1. Support methodologies in animal cell culture
2. Describe basic principles and techniques in genetic manipulation and genetic engineering in animals
3. Explain the preparation of antigens and antibody in the blood sample
4. Describe the basic knowledge about antigen and antibody interaction
5. Perform various techniques like Immunoelectrophoresis, and ELISA etc.
6. Join in research and clinical labs as a project/ research assistant.

List of Practicals**Immunology**

1. ABO blood grouping
2. Preparation of serum from blood
3. Methods of immunization
4. Methods of bleeding
5. Hemolysis
6. Single radial immunodiffusion
7. Double immunodiffusion
8. Immunoelectrophoresis
9. Rocket Immunoelectrophoresis
10. Counter Current Immunoelectrophoresis
11. WIDAL test
12. DOT-ELISA

Animal Biotechnology

13. Preparation of Animal Tissue Culture Medium
14. Preparation of Primary culture
15. Quantification of cells by trypan blue dye exclusion method.
16. Identification of leukocyte subsets and total count.
17. Cryopreservation of cell lines
18. MTT assay

REFERENCES

1. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, New York.
2. Hay, F.C. and M.R. Westwood, 2004. Practical Immunology. Blackwell Science Publishers, London.
3. Weir, D.M., 1992. Immunological Techniques. Blackwell Scientific Publications, London.

Course Objectives

The objectives of the course are to make the students to

- To understand the importance of the methodological approach to research.
- To acquire the required skills to approach a research project in a scientifically sound manner, from forming the hypothesis to publication of the research findings.
- To understand the importance of research methodology concepts and to put them in practice while working on dissertation projects.
- To acquire the technical writing skills and presentation skills apart from practically utilizing all aspects of research methodology that they had learnt earlier.
- To be able to integrate all aspects of the research project into a dissertation of print form as can be evaluated by internal and external experts

Course Outcome

Upon completing this course, each student will be able to

1. Demonstrate knowledge of research processes (reading, evaluating, and developing);
2. Perform literature reviews using print and online databases;
3. Identify, explain, compare, and prepare the key elements of a research proposal/report;
4. Define and develop a possible biotechnology research interest area using specific research designs;
5. Compare and contrast quantitative and qualitative research paradigms, and explain the use of each in biotechnology research;
6. Describe, compare, and contrast descriptive and inferential statistics, and provide examples of their use in biotechnology research;
7. Describe sampling methods, measurement scales and instruments, and appropriate uses of each;

UNIT- I

Analysis and Identification of research requirements: Prioritization of research area. Review of work done in identified area, choice of research topic – Methodology experiment design.

UNIT - II

Dissertation writing: Guidelines for review of literature - Materials and methods, results and discussion. Interpretation of results, summary, presentation of references and appendix.

UNIT - III

Experiment design: Regarding observation, Types of observation, Data collection – Presentation and analysis of collected data. Preparation of result reports and Publication of research findings in peer reviewed journals, impact factor, **citation and its calculation.**

UNIT - IV

Methods of data collection and analysis: Frequency distribution. Measures of central tendency – Mean, median and mode; Measures of dispersion – Standard deviation, standard error, and variance. Correlation and regression – simple correlation, correlation co-efficient, simple and linear regression analysis. Test of significance.

UNIT - V

Objective and roll of higher education - Important characteristics of an effective Lecture - Quality teaching and learning, Project, Brain storming, case Discussion, and assignment, Self evaluation, Question banking – Electronic media in education.

REFERENCES

1. Sandhu, T. 1990. *Research Techniques in Biological Sciences*. Anmol Publishers, New Delhi.
2. Palanivelu, P. 1999. *Analytical Biochemistry and Separation Technique*. 3rd Ed, 21st Century Publications, Madurai.
3. Sundar Rao, P.S.S and Richard, J. 2006. *Introduction to Biostatistics and Research Methods*. PHI Publications, New Delhi.
4. Kothari, C. R. 2004. *Research Methodology – Methods and Techniques*. 2nd Ed. New Age International Pvt. Ltd, New Delhi.
5. Attwood, T. K. and Parry Smith, D. J. 2002. *Introduction to Bioinformatics*. Pearson Education Ltd, Singapore.

Course Objectives

The main objectives of the course is

- The hands-on training through one full semester project with thesis gives special expertise within one of the research areas represented at The Department of Biotechnology.

Course Outcomes

On completion of the course, students are able to apply their knowledge on

1. This dissertation programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education and research

B. Sc. CHEMISTRY

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2015 – 2016)



DEPARTMENT OF CHEMISTRY
FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Established Under Section 3 of UGC Act, 1956)
Eachanari (Post), Coimbatore – 641 021,

DEPARTMENT OF CHEMISTRY
B. Sc. CHEMISTRY
SCHEME OF EXAMINATION (2015-2018 onwards)

Course code	Name of the course	Objectives & Outcomes		Instruction hours per week			Cr edi ts	Maximum Marks		
		PEO 's	PO's	L	T	P			CI A	ES E
SEMESTER I										
15LAU101	Language – I	4	7	05	0	0	05	40	60	100
15ENU101	English – I	4	7	04	0	0	04	40	60	100
15CHU101	General Chemistry-I	1	1,2,3	05	0	0	05	40	60	100
15CHU111	Chemistry Practical- I (Inorganic Qualitative Analysis)	1	1,2,3	0	0	05	03	40	60	100
15CHU102	Allied Physics I	1,2,3	2,3,4 ,10	04	0		04	40	60	100
15CHU112	Allied Physics Practical- I	2,5	2,3,4	0	0	03	02	40	60	100
15FCA101	Foundation course - A(Value Education)	1	1.2	02	0	0	01	10 0	-	100
15SSD101	Soft skill development - 1	4	8,11	02	0	0	-	-	-	-
	Semester total						24	34 0	36 0	700
	SEMESTER – II									
15LAU201	Language – II	4	7	05	0	0	05	40	60	100
15ENU201	English – II	4	7	04	0	0	04	40	60	100
15CHU201	General Chemistry-II	1,2	1,2,3 ,4	05	0	0	05	40	60	100
15CHU211	Chemistry Practical- II (Inorganic Preparations and Quantitative Analysis)	2,3	2,3,8	0	0	05	03	40	60	100
15CHU202	Allied Physics II	1,2,3	2,3,4 ,10	04	0	0	04	40	60	100
15CHU212	Allied Physics Practical- II	2,5	2,3,4	0	0	03	02	40	60	100
15FCB201	Foundation Course-B (Environmental Studies)	1	1,2	02	0	0	01	10 0	-	100
15SSD201	Soft skill Development– 1	4	8,11	02	0	0	01	10 0	-	100
	Semester total						25	44 0	36 0	800
	SEMESTER – III									
15ENU301	English – III	4	7	04	0	0	04	40	60	100
15CHU301	General Chemistry- III	1,2	1,4.1 0	05	0	0	05	40	60	100
15CHU302	Surface Chemistry	1,2	1,3,4	05	0	0	05	40	60	100

15CHU311	Chemistry Practical-III (Quantitative Analysis)	2,3	3,7,1 0	0	0	04	02	40	60	100
15CHU303 A	Allied Mathematics-I	1,4	1,4,5 ,10	06	0	0	04	40	60	100
15CHU303 B	Allied Statistics-I	2	5							
15CHU303 C	Allied Pharmaceutical chemistry-I	1,2,3	2,3,6 ,10							
15FCC301	Computer Course	1,2	1,2,7 ,8	04	0	0	02	10 0	-	100
15SSD301	Soft skill Development- 2	4	8,11	02	0	0	-	-	-	-
	Semester total						22	30 0	30 0	600
	SEMESTER – IV									
15ENU401	English – IV	4	7	04	0	0	04	40	60	100
15CHU401	General Chemistry- IV	1,2	1,3,4	06	0	0	06	40	60	100
15CHU402	Physical Chemistry (Chemical kinetics)	1,2,3	2,3,4 ,10	06	0	0	06	40	60	100
15CHU411	Chemistry Practical- IV (Organic Qualitative Analysis)	3,4	2,7,9	0	0	06	03	40	60	100
15CHU403 A	Allied Mathematics-II	2,3	2,3,4	06	0	0	04	40	60	100
15CHU403 B	Allied Statistics-II	2	5							
15CHU403 C	Allied Pharmaceutical chemistry-II	1,2,3	2,3,6 ,10							
15SSD401	Soft skill Development - 2	4	8,11	02	0	0	01	10 0	-	100
	Semester total						24	30 0	30 0	600
	SEMESTER – V									
15CHU501	Organic Chemistry	2,3	4,5,8	05	0	0	05	40	60	100
15CHU502	Inorganic Chemistry	2,3	4,7,8	05	0	0	05	40	60	100
15CHU503	Electrochemistry	2,3	1,4,8	05	0	0	05	40	60	100
15CHU504	Nano chemistry	2,3	2,4,8	05	0	0	05	40	60	100
15CHU505 A	Green Chemistry	2,3	1,3,6	05	0	0	05	40	60	100
15CHU505 B	Environmental Chemistry	2,3,4	2,4,5 ,10							
15CHU505 C	Bioinorganic Chemistry	2,3,4	2,4,5 ,8,11							
15CHU511	Chemistry Practical- V (Gravimetric Analysis)	2,3,4	2,4,6 ,7,10	0	0	05	03	40	60	100
15OEU501	Open elective(Chemistry of consumer products)	1	1,3,6	-	-	-	03	-	10 0	100

	Semester total						31	24	46	700
	SEMESTER – VI									
15CHU601	Chemistry of Natural Products	1,2,3	4,5,8	05	0	0	05	40	60	100
15CHU602	Physical Methods and Chemical Structures	1,2,3	2,7,8,10	05	0	0	05	40	60	100
15CHU603 A	Radiation Chemistry	1,2,3	2,3,7,11	05	0	0	05	40	60	100
15CHU603 B	Dye Chemistry	1,2,3	2,3,7,11							
15CHU603 C	Chemistry of Materials	1,2,3	1,3,4,10							
15CHU611	Chemistry Practical- VI (Physical Chemistry)	1,2,3	2,3,4,5,6	0	0	05	03	40	60	100
15CHU691	Project	1,2,3,4	1,2,3,5,6,8	10	0	0	05	80	120	200
15EAU601	NCC/NSS/Sports/Club activity etc			-			-	-	-	-
							23	240	360	600
	G. Total			180		-	149	1860	2140	4000

List of Allied Elective (Theory)			
Code	Course	Code	Course
15CHU303A	Allied Mathematics-I	15CHU403A	Allied Mathematics-II
15CHU303B	Allied Statistics-I	15CHU403B	Allied Statistics-II
15CHU303C	Allied Pharmaceutical chemistry-I	15CHU403C	Allied Pharmaceutical chemistry-II

List of Core Course Elective (Theory)			
Code	Course	Code	Course
15CHU505A	Green Chemistry	15CHU603A	Radiation Chemistry
15CHU505B	Environmental Chemistry	15CHU603B	Dye Chemistry
15CHU505C	Bioinorganic Chemistry	15CHU603C	Chemistry of Materials

Open Elective (Theory)

Code	Course
15OEU501	Chemistry of Consumer products

Computer Course	
Code	Course
15FCC301A	Introduction to Computers
15FCC301B	Introduction to Multimedia

Self study courses

Code	Course(s)	Hrs / week	Marks			Exam / Hrs	Credit
			CIA	ESE	Total		
15CHU506	Leather chemistry	-	-	100	100	3	04
15CHU604	Forensic chemistry	-	-	100	100	3	04

B. Sc. Honours

SEMESTER – V							
15CHU507	Spectroscopy	-	40	60	100	3	06
SEMESTER – VI							
15CHU605	Bio - Organic Chemistry	-	40	60	100	3	06
Total			80	120	200	-	12

Programme Outcome

1. Have firm foundations in the fundamentals and application of current chemical and scientific theories.
2. Are able to design, carry out, record and analyze the results of chemical experiments.
3. Knows the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using chemicals.
4. Students should have a working knowledge of the main areas of chemistry: organic, inorganic, analytical, and physical.
5. Students should possess critical thinking and problem solving abilities.
6. Students should be able to perform and understand chemical research.

7. Students should be able to describe, both in writing and orally, chemical processes and procedures
8. Students should be able to work in a chemical or related field.

Programme Specific Outcome

9. Are able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
10. Students should have a basic level understanding of the following areas of chemistry - Analytical, Inorganic, Organic, and Physical Chemistry.
11. Students should be able to work in a chemical or related field.

Programme Educational Objectives

PEO-1

Acquire the fundamental principles of science and demonstrate broad knowledge of descriptive chemistry and will be able to nurture the needs of industries/laboratories related to chemistry

PEO-2

To motivate critical thinking and analytical skills to solve chemical problems of practical relevance to society while complying with economical, environmental, ethical, and safety factors.

PEO-3

To synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.

PEO-4

Demonstrate professional excellence, ethics and will be able to communicate effectively the scientific information and research results in written and oral formats, to both professional scientists and to the public.

Mapping

PO's	1	2	3	4	5	6	7	8	9	10	11
PEO 1	X	X	X	X			X		X	X	
PEO 2					X		X		X		
PEO 3		X				X			X		X
PEO 4						X	X	X		X	X

Blue- Employability

Green- Entrepreneurship

Red – Skill development

பகுதி - I, தமிழ்
15LAU101 :

தமிழ் முதல் தாள்

பருவம் I
5-H,5-C

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21.

Course Objectives

- To enable the learners to acquire English language skills at a faster pace.
- To train the learners to reflect on the literary works and communicate flexibly.
- Know about the Prose and Poetry
- To develop the Short Story:
- Learn about Vocabulary, Grammar and Composition:
- Know about Proverb Expansion

Course Outcomes

1. Enable the learners to acquire English language skills at a faster pace.
2. Trained the learners to reflect on the literary works and communicate flexibly.
3. Knowledge about the Prose and Poetry
4. Development of the Short Story:
5. Learnt about Vocabulary, Grammar and Composition:
6. Knowledge about Proverb Expansion

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry
Vocabulary: Words Often Confused, Anagrams
Grammar: Prepositions, Voice- Active and Passive
Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil
One-Act Play: The Cellphone Epidemic – Claudia I. Haas
Vocabulary: Portmanteau Words, One Word Substitute
Grammar: Questions, Pronunciation
Composition: Letter Writing- Formal

PRESCRIBED TEXTS:

Rao, G. Chandralekha and et al. Spring 2013. Emerald Publishers: Chennai.

REFERENCE BOOK:

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

Course Objectives

Students should be able

- To understand the limitations of classical mechanics and its drawbacks.
- To understand the fundamentals of quantum mechanics and Schrödinger equation for simple atoms.
- To understand and write the electronic configuration of elements.
- To understand a versatile knowledge of different types of bonding like ionic and covalent bonding.
- To understand the basic reactions and properties of alkenes and dienes.
- To know the classification of reagents

Course Outcomes

The students

1. Understand the drawbacks of classical mechanics
2. Understand the fundamentals of quantum mechanics and Schrödinger equation for Hydrogen atom.
3. Know the various rules and principles to write the electronic configuration of elements
4. Have a versatile knowledge of different types of bonding like ionic and covalent bonding.
5. Have knowledge of reactions and properties of alkenes and dienes.
6. Gained knowledge about the classification of reagents.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT-I

Periodic Properties - General group discussion restricted to Atomic radii, Ionic radii, Oxidation state, Ionization energy, Electron affinity and Electronegativity.

UNIT-II

Chemical bonding-Theories of bonding-Ionic bonding - Ionic crystals - NaCl and CsCl crystal structure - Lattice energy and its determination using Born-Haber cycle - Factors affecting crystal lattice energy - properties of ionic crystals - melting point, hardness, electrical conductivity in molten condition and in solution - Fajan's rules -Covalent bonding - sigma and pi bonding - partial ionic character of covalent bonds from electronegativity and dipole moment data - three centered bond - Geometry of molecules-Bonding weaker than covalent -Vanderwaal's forces- Hydrogen bonding - nature, energy and effect on structure and properties.

UNIT-III

Basic principles of qualitative analysis of cations and anions in the inorganic mixture. Polar effects - Inductive effect, Mesomeric effect, Electromeric effect, hyper conjugation. Classification of reagents - Electrophile, Nucleophile and Free radical.

Types of reaction - Polar reactions involving carbonium ions and carbanions with simple examples. Aliphatic hydrocarbons - Restricted rotation about single bond and preferred rotational conformations in ethane.

UNIT-IV

Alkenes: Preparation by Wittig reaction, mechanism of Beta elimination. E_1 , E_2 and Syn elimination. Hofmann rule and Saytzeff rule.

Dienes: Stability of isolated and conjugated compounds. 1, 2 and 1, 4 additions - Diels Alder reaction. Free radical addition – Polymerization - Synthetic rubber.

Cyclo-Alkanes: Preparation by Dieckmann ring closure and by reduction of aromatic hydrocarbons - Ring opening reactions of cyclo propane with H_2 , Br_2 and HI.

UNIT-V

Blackbody radiation, Planck's radiation law, photoelectric effect, Compton effect, de Broglie's hypothesis, Heisenberg's uncertainty principle. Quantum numbers - Postulates of quantum mechanics. Schrodinger wave equation and a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, Radial and angular functions, hydrogen like wave functions, quantum numbers and their importance.

TEXT BOOKS:

1. Bahl, B.S and Arun Bahl, 2006. A textbook of Organic Chemistry, 18th Edition. S.Chand & Co.
2. Puri, Sharma & Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing Co., Jalandar.
3. Puri, B.R., L.R.Sharma and Kalia, 2011. Principles of Inorganic Chemistry, Shoban lal & Co., Jalandar.
4. Malik, W., R.D.Madan and G.D.Tuli, 2004. Selected topics in Inorganic Chemistry, S.Chand & Co., New Delhi.

REFERENCES

1. Bahl, B.S., Arun Bahl and G.D.Tuli, 2004. Essentials of Physical Chemistry. S.Chand & Co., New Delhi.
2. Madan, R.D., 2014. Modern Inorganic Chemistry, S.Chand & Co., New Delhi.
3. Soni, P.L., 2004. Inorganic Chemistry, S.Chand & Sons, New Delhi.
4. Soni, P.L. and S.M.Chawla, 2003. A textbook of Organic Chemistry, S.Chand & Co., New Delhi.
5. Anup Pathak, Anup Saha, 2012, Organic Chemistry, Vol-I, 2nd edn, Books and allied (P) Ltd.
6. Iran N. Levine, 2009, Physical chemistry, 5th edn, Mcraw Hill, New York.

CHEMISTRY PRACTICAL- I
15CHU111 (INORGANIC QUALITATIVE ANALYSIS) 5H-3C
Instruction Hours/week: L:0, T:0, P:5 Marks: Internal:40 External: 60 Total:100

Course Objective

- To understand and develop the skill to analyse qualitatively the anions
- To understand and develop the skill to analyse qualitatively the cations present in a mixture.
- To Learn about the qualitative analysis of cations
- To Learn about the qualitative analysis anions in a mixture by Semi micro methods.
- To analyse the cations like Lead, Copper, Bismuth, Calcium, Strontium, Magnesium and Ammonium.
- To analyse the anion like Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Course outcomes:

1. Understood and develop the skill to analyse qualitatively the anions
2. Understood and develop the skill to analyse qualitatively the cations present in a mixture.
3. Learnt about the qualitative analysis of cations
4. Learnt about the qualitative analysis anions in a mixture by Semi micro methods.
5. Analysis the cations like Lead, Copper, Bismuth, Calcium, Strontium, Magnesium and Ammonium.
6. Analysis the anion like Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Methodology

Demonstration of Experiments and Black board teaching.

Analysis of mixture containing two cations and two anions which contain one interfering ion. Semi micro methods using the conventional scheme with hydrogen sulphide may be adopted.

CATIONS TO BE STUDIED: Lead, Copper, Bismuth, Calcium, Strontium, Magnesium and Ammonium.

ANIONS TO BE STUDIED: Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

TEXT BOOKS:

1. Venkateswaran, V., R. Veeraswamy and A.R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi .
2. Thomas, A.O., 2003. Practical Chemistry, Scientific Book Center, Cannanore.

REFERENCES

1. Ramanujam, V.V., 2004. Inorganic Semi-micro Qualitative Analysis, 3rd Edition, The National Publishing Company, Chennai.
2. Bajpai, D.N. and S.Giri, 2001. Practical Chemistry, 8th Edition, S.Chand Publications, New Delhi .
3. Furniss, B.S., A.J.Hannaford, P.W.G.Smith and A.R.Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry, 5th Edition, Pearson Education Ltd., Singapore.
4. Mendham, J., R.C.Denney, J.D.Barnes and M.Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis, 6th Edition, Pearson Education Ltd., Singapore .

Course Objectives:

- To understand basic theories and experiments in Physics.
- To understand the fundamentals of physics.
- To educate and motivate the students in the field of science
- To know about Debroglie's concept of matter waves
- To learn about Amplifiers
- To Learn about Digital Electronics And Optics

Course Outcomes:

1. Students will demonstrate proficiency in mathematics and the mathematical concepts to understand physics.
2. Students will design and conduct an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes.
3. Students will demonstrate an understanding of the analytical methods required to interpret and analyze results and draw conclusions as supported by their data.
4. Knowledge about Debroglie's concept of matter waves
5. Learnt about Amplifiers
6. Learnt about Digital Electronics And Optics

UNIT – I

MODERN PHYSICS

Debroglie's concept of matter waves- Debroglie's wavelength –Characteristics of Debroglie's matter waves- calculation of Debroglie's wavelength of material particles like electrons –experimental study of matter waves-Thomson's experiment

UNIT – II

ANALOG ELECTRONICS

Construction, characteristics and applications of Zener diode, Photo diode, Light emitting diode (LED); working, efficiency, ripple factor and advantages of a full wave rectifier-Qualitative analysis of a common emitter amplifier;Phase reversal of the output voltage;advantage of common emitter amplification circuit.

UNIT - III

AMPLIFIERS

Circuit symbol polarity conventions and virtual ground or summing point of an operational amplifier; characteristics of an ideal operational amplifier; amplifier as an adder, subtractor, differentiator and integrator.

UNIT – IV

DIGITAL ELECTRONICS

Number systems-Binary Octal-Hexa decimal-ASCII and EBCDIC-Redundant coding for error detection and correction. Basic logic design using digital integrated circuits. Truth tables, Boolean algebra, Simple arithmetic circuits-exclusive half adder-full adder-half subtractor, full subtractor. NAND AND NOR As Universal Building Block-De Morgan's theorem and its proof.

UNIT –V

OPTICS

Reflection – Refraction – Snell's law – Total internal reflection – Interference – Diffraction – Polarisation – Coherence

TEXT BOOKS:

1. Murugesan. R., Modern Physics, S.Chand & CO, New Delhi
2. Aruldas G. and P.Rajagopal, 'Modern Physics', Printice Hall of India, New Delhi, 2009

REFERENCES:

1. Rajam. J.B., Atomic Physics, S.Chand & Co, New Delhi.
2. Gupta and Kumar, 2000, Solid State Physics - Pragati Prakashan, Meerut.
3. Kittel. C., 1996, Introduction to Solid State Physics, 7TH Edition, John Willey & sons, New Delhi.
4. Dekkar. A.J. , 1900, Solid State Physics - Macmillan India Ltd., New Delhi.

Course Objective

- To acquire basic understanding of laboratory technique and
- To educate and motivate the students in the field of Physics
- To allow the students to have a deep knowledge of fundamentals of optics.
- To work efficient in the Young modulus, rigidity modulus
- Refractive Index of a liquid prism-Spectrometer
- Thickness of a thin wire-Air wedge method

Course outcome**Students can able to**

1. Perform basic experiments in mechanics and electricity and analyze the data.
2. Acquire engineering skills and Practical knowledge, which help the student in their everyday life.
3. Knowledge about the physical Principles and applications of Electronics.
4. Work efficiently in the Young modulus, rigidity modulus
5. Refractive Index of a liquid prism-Spectrometer
6. Thickness of a thin wire-Air wedge method

Any 8 Experiments

1. Young's Modulus-Non Uniform bending-Optic lever
2. Young's Modulus-Static cantilever
3. Rigidity modulus- Dynamic method
4. Acceleration due to gravity-Compound pendulum
5. Refractive Index of a liquid prism-Spectrometer
6. Refractive Index of a solid prism (I-d) curve-Spectrometer
7. Co-efficient of thermal conductivity-Lee's disc method
8. Wavelength of spectral lines -Grating-minimum deviation method-Spectrometer.
9. Characteristics of a Junction diode
10. μ of a lens-Newton's ring method
11. Thickness of a thin wire-Air wedge method
12. Frequency of tuning fork and density of solid and liquid – Melde's String

REFERENCES:

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives:

- To improve the integral development of human beings
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom
- To know about goal setting
- To know about responsibility

Course outcomes:

1. Improved the integral development of human beings
2. Trained the students towards sustainable lifestyle
3. Created awareness about the values and their significance and role
4. Imbined the concept of discipline and freedom
5. Knowledge about goal setting
6. Knowledge about responsibility

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil
Total: 100

Course Objective

- To achieve the analytical skills
- To know about reasoning competencies
- To improve their communication and presentation skills
- Gain the knowledge on both Aptitude and Soft skills to the students
- Reinforcing competencies in soft skills which are crucial in a social setting
- Learn critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations

Course Outcomes

1. achieve the analytical skills
2. To know about reasoning competencies
3. To improve their communication and presentation skills
4. Gained the knowledge on both Aptitude and Soft skills to the students
5. Learnt critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
6. Reinforcing competencies in soft skills which are crucial in a social setting

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

பகுதி - I, தமிழ்

15LAU201 :

தமிழ் இரண்டாம் தாள்

பருவம் II

5-H,5-C

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

- நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை, ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.
2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

- குறுந்தொகை: 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ,
2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

- ஐங்குறுநூறு: 1. நுண்ணேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

- அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது, சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட, மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவன மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21, India

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

- To enable the learners to acquire English language skills at a faster pace.
- To train the learners to reflect on the literary works and communicate flexibly.
- Know about the Prose and Poetry
- To develop the Short Story:
- Learn about Vocabulary, Grammar and Composition:
- Know about Proverb Expansion

Course Outcomes

1. Enable the learners to acquire English language skills at a faster pace.
2. Trained the learners to reflect on the literary works and communicate flexibly.
3. Knowledge about the Prose and Poetry
4. Development of the Short Story:
5. Learnt about Vocabulary, Grammar and Composition:
6. Knowledge about Proverb Expansion

UNIT I:**Prose:** The Unexpected- Robert Lynd**Poetry:** The Village Schoolmaster – Oliver Goldsmith**Short Story:** The Lion's Share – Arnold Bennett**Vocabulary:** Homonyms**Grammar:** Irregular Verbs**UNIT II:****Prose:** Travel by Train – J. B. Priestly**Poetry:** The Gift of India – Sarojini Naidu**Grammar:** Sentence patterns**Composition:** Reading Comprehension**UNIT III:****Prose:** Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi**Short Story:** The Necklace – Guy De Maupassant**One-Act Play:** The Referee – W.H. Andrews and Geoffrey Dearmer**Vocabulary:** Similes**Grammar:** Discourse Markers**Composition:** Report Writing**UNIT IV:****Poetry:** Ozymandias – P.B. Shelley**One-Act Play:** The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns
Grammar: Correction of Sentences
Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

PRESCRIBED TEXT:

Wings of Communication 2014. Board of Directors. Emerald Publishers:
Chennai

REFERENCE:

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course objectives:

- The course allows one to get a fundamental idea about the subject concerned.
- The course helps the students in improving their diverse skills in various areas such as
- Laboratory skills,
- Numerical and computing skills, ability to approach to the problems both analytically and logically, etc.
- The principles in this course are used in almost every field such as medicines, food products, and electronics and even in construction industry.
- The principles of coordination Chemistry

Course Outcomes:

On successful completion of the course the students should understand

1. The principles of coordination Chemistry
2. Different types of reactions of aromatic and aliphatic compounds
3. Principles of Thermodynamics.
4. The course helps the students in improving their diverse skills in various areas such as Laboratory skills,
5. Numerical and computing skills, ability to approach to the problems both analytically and logically, etc.
6. The principles in this course are used in almost every field such as medicines, food products, and electronics and even in construction industry.

Methodology

Black board Teaching and Group discussion.

UNIT - I

Nomenclature of coordination compounds - conductivity and precipitation studies-Werner's coordination theory-Electronic interpretation of coordinate bond by Sidgwick. Isomerism: Examples of Geometrical and optical isomerism in square planar and octahedral coordination compounds. Examples of linear and tetrahedral coordination compounds - magnetic properties of coordination compounds and their interpretation by Pauling's valence bond theory and crystal field theory.

UNIT - II

Ozone and hydrogen peroxide-preparation, properties, structure and uses - comparison between the two.

Aromaticity - Huckel's rule - benzenoid and non benzenoid aromatic compounds. Benzene resonance and resonance energy, structure -. Polar effects in electrophilic substitution in benzene-Mechanism of nitration, sulphonation, halogenation, Friedel-Crafts alkylation and acylation - diazo coupling.

UNIT – III

Grignard reagents - preparation and synthetic applications- Aliphatic Nucleophilic substitution mechanism- S_N1 , S_N2 , S_Ni mechanism -Effect of solvent - nucleophile, structure of substrate and neighbouring group participation, elimination versus substitution. Aromatic nucleophilic substitution-Benzyne mechanism, Intermediate complex mechanism.

Alkynes: Acidity of alkynes - formation of acetylides, addition of water with $HgSO_4$ catalyst - Hydroboration.

UNIT - IV

The laws of thermodynamics, generalities and the Zeroth law - kinds of energy - scope of the first and second laws of thermodynamics, thermodynamic terms – Definitions - heat-work of expansion - work of compression - Maximum and minimum quantities of work- Reversible and irreversible transformations - Energy and the first law of thermodynamics - properties of energy changes in relation to changes in properties of the system - Isothermal and adiabatic changes. Meaning of the thermodynamic state function versus path function - properties of exact and inexact differentials - Joule Thomson experiment. Relation between E and H , C_p and C_v .

UNIT - V

Applications of the first law of thermodynamics to chemical reactions. The heat of reaction – Conventional values of H - The determination of heat of formation – Sequences of reactions - Hess's Law, Heats of combustion - Determination by Bomb calorimeter - Bond energies - Resonance energy - Heat of solution - integral and differential dilution. Heats of reaction at constant volume -Dependence of the heat of reaction on temperature and Kirchoff's equation.

TEXT BOOKS:

1. Bahl, B.S and Arun Bahl, 2006. A textbook of Organic Chemistry, 18th Edition. S.Chand & Co.
2. Puri, Sharma & Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing Co., Jalandar.
3. Puri, B.R., L.R.Sharma and Kalia, 2011. Principles of Inorganic Chemistry, Shoban lal & Co., Jalandar.
4. Wahid Malik, W., R.D.Madan and G.D.Tuli, 2004. Selected topics in Inorganic Chemistry, S.Chand & Co., New Delhi.

REFERENCES:

1. De, A.K., Wiley, 1998. A text book of Inorganic Chemistry, New age international publishers, New Delhi.
2. Gurtu and Gurtu, 2000. Thermodynamics, Pragati pragasan publications, Chennai.
3. Madan, R.D., 2005. Modern Inorganic Chemistry, S.Chand & Co., New Delhi.
4. Morrison and Boyd, 2003. Organic Chemistry, 6th Edition, Pearson Education, Singapore.

5. Puri,B.R. and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Co.,
6. Skoog, D.A. and D.M.West, 2004. Fundamentals of Analytical Chemistry, 8th Edition Thomson Book store, Singapore.
7. Soni,P.L., 2004. Inorganic Chemistry, Sultan Chand & Sons,
8. Soni,P.L., 2004. A textbook of Organic Chemistry, S.Chand & Co., New Delhi.
9. Peter Atkins, Tina Overton, Jonathan Rourke, mark Weller and Fraser Armstrong, 2010, Inorganic Chemistry, 5th edn, Oxford University Press, New Delhi.

Instruction Hours/week: L: 0 T:0 P:5 Marks: Internal:40 External: 60 Total:100

Course Objective:

- To understand the basic principles of volumetric estimations and inorganic preparations.
- It enables the students to learn about the basic principles of quantitative analysis in Chemistry.
- To estimate the complexometric titrations
- To prepare inorganic complexes
- To estimate the hardness of water
- Analyse the prepared complexes.

Course Outcomes:

1. Understood and develop the skill to perform complexometric titrations
2. Learned about the development of a skill in the preparation of inorganic complexes and characterise them.
3. Estimation of the complexometric titrations
4. Preparation of inorganic complexes
5. Estimation the hardness of water
6. Analysis the prepared complexes.

Methodology

Demonstration of Experiments and Black board teaching

A. Complexometric titrations

1. Estimation of hardness of water
2. Estimation of calcium using EDTA
3. Estimation of magnesium ions using EDTA

B. Preparation of inorganic complexes

1. Preparation of Tetrammine Copper II Sulphate
2. Preparation of Ammonium Sulphate
3. Preparation of Chrome Alum
4. Preparation of Ferrous Ammonium Sulphate
5. Preparation of Potassium trioxalatochromate
6. Preparation of copper I chloride

TEXT BOOKS:

1. Venkateswaran,V., R.Veerarwamy and A.R.Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi .
2. Thomas, A.O., 2003. Practical Chemistry, Scientific Book Center, Cannanore.

REFERENCES :

1. Lepse Paul, A. and Lyle B.Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry, Prentice Hall, New Delhi.
2. Mendham, J. R.C.Denney, J.D.Barnes and M.Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis, 6th Edition, Pearson Education Ltd., Singapore.
3. Siddhiqui Zeba, N., 2002. Practical industrial Chemistry, 1st Edition, Anmol Publications Pvt. Ltd., New Delhi.

Course Objectives:

- Many basic natural processes in nature can be explained by physics. So it is essential to know basic physics any science student. This paper is aimed at giving some insight into the basic physics, theory as well as experiment.
- To gain a knowledge of elasticity of solids.
- To understand the basics of surface tension
- To learn Eienstein's photoelectric effect.
- To knowledge about laser physics
- To gain a knowledge about solar physics.

Course Outcomes

The students have gained knowledge about

1. Basic natural processes of Physics
2. Gained about elasticity of solids.
3. Learned about Eienstein's photoelectric effect.
4. Understood the basics of surface tension.
5. Laser physics
6. Gained knowledge about solar physics

UNIT-I**ELASTICITY OF SOLIDS**

Elastic constants of an isotropic solid - Relations connecting them - Poisson's ratio - Bending of beams - Uniform and non-uniform bending - Bending moment of a bent beam - cantilever - Static and dynamic methods - Torsion in a wire - Rigidity modulus determination by Static and dynamic methods.

UNIT-II**SURFACE TENSION**

Surface tension and Surface energy- Pressure difference across a spherical surface- Pressure difference across a curved surface - Angle of contact - Angle of contact for water in a glass - Vapour pressure over a flat and curved surface - Variation of Surface tension with temperature - Jaegar's method - Quinke's method.

UNIT-III

MODERN PHYSICS: Photo electric effect – Einstein's photo electric equation – verification of Einstein's photo electric equation by Millican's experiment – photo electric cells – applications

Nuclear physics : characteristics of nuclear forces – nuclear structure by liquid drop model – Binding energy – mass defect – particle accelerators – cyclotron and betatron
nuclear Fission and nuclear Fusion

UNIT-IV

LASER PHYSICS: Purity of spectral lines – Coherence length and time – spontaneous and induced emissions – population inversion – meta stable state – conditions for laser actions – Ruby laser – Helium – neon laser – applications of lasers – Raman effect – Raman shift – stokes and anti stokes lines – Laser Raman Spectrometer.

UNIT-V

SOLAR PHYSICS: solar constant – measurement of solar radiations by Pyroheliometer and Pyranometer – general applications of solar energy – flat–plate collector - box type cooker - solar water heaters – solar photo – voltaic cells – general applications of solar cells.

TEXT BOOKS:

1. Murugesan. R., Modern Physics, S.Chand & CO, New Delhi
2. Aruldas and P.Rajagopal, Modern Physics, Prentice Hall of India, New Delhi.

REFERENCES:

1. Mathur. D.S., 2003, Elements of properties of matter - Shyamlal Charitable Trust, New Delhi.
2. Brijlal and N. Subramanyam, 2004, Properties of matter, S. Chand & Company, New Delhi.
3. Rai. G.D, Solar energy and its utilization, S.Chand & Co., New Delhi.
4. Rajam. J.B., Atomic Physics, S.Chand & Co, New Delhi.

Course objectives

The students are able to

- Determine Field Intensity-Circular coil- Vibration magnetometer
- Co-efficient of thermal conductivity-Lee's disc method
- Refractive Index of a prism (I-I') curve-Spectrometer
- Moment of a magnet-Circular coil-Deflection Magnetometer
- Analyse the Temperature coefficient of resistance of a thermistor-Post office box
- Comparison of viscosities of two liquids
- To Study of logic gates using IC's
- To Study of NOR gate as Universal building block.
- To Study of NAND gate as Universal building block.
- Determine the Verification of Basic logic gates using discrete components.
- Determine the Cauchy's constant – Spectrometer
- AC frequency – Sonometer

Course Outcomes

1. Field Intensity-Circular coil- Vibration magnetometer
2. Co-efficient of thermal conductivity-Lee's disc method
3. Refractive Index of a prism (I-I') curve-Spectrometer
4. Moment of a magnet-Circular coil-Deflection Magnetometer
5. Temperature coefficient of resistance of a thermistor-Post office box
6. Comparison of viscosities of two liquids
7. Study of logic gates using IC's
8. Study of NOR gate as Universal building block.
9. Study of NAND gate as Universal building block.
10. Verification of Basic logic gates using discrete components.
11. Determination of Cauchy's constant – Spectrometer
12. AC frequency – Sonometer

ANY TEN EXPERIMENTS

1. Field Intensity-Circular coil- Vibration magnetometer
2. Co-efficient of thermal conductivity-Lee's disc method
3. Refractive Index of a prism (I-I') curve-Spectrometer
4. Moment of a magnet-Circular coil-Deflection Magnetometer
5. Temperature coefficient of resistance of a thermistor-Post office box
6. Comparison of viscosities of two liquids

7. Study of logic gates using IC's
8. Study of NOR gate as Universal building block.
9. Study of NAND gate as Universal building block.
10. Verification of Basic logic gates using discrete components.
11. Determination of Cauchy's constant – Spectrometer
1. AC frequency – Sonometer

REFERENCES:

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
 2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
 3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut
-

15FCB201

**FOUNDATION COURSE - B
(ENVIRONMENTAL STUDIES)**

SEMESTER II

2H - 1C

Total hours/week: L:2 T:0 P:0

Marks: Internal: 100 External: - Total:100

Course Objective:

- The study creates awareness among the people
- To know about various renewable and nonrenewable resources of the region,
- Enables environmentally literate citizens (by knowing the environmental acts, rights, rules, legislation, etc.)
- To make appropriate judgments and decisions for the protection and
- Improve of the earth life
- Know about eco system and environment.

Couse Outcomes

1. Creating the awareness about environmental problems among people.
2. Developed an attitude of concern for the environment.
3. Students have a Motivation to public to participate in environment protection and improvement.
4. Makes appropriate judgments and decisions for the protection and
5. Improvement of the earth life
6. Knowledge about eco system and environment.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy-water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems

of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil
Total: 100

Course Objective

- To achieve the analytical skills
- To know about reasoning competencies
- To improve their communication and presentation skills
- Gain the knowledge on both Aptitude and Soft skills to the students
- Reinforcing competencies in soft skills which are crucial in a social setting
- Learn critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations

Course Outcomes

1. achieve the analytical skills
2. To know about reasoning competencies
3. To improve their communication and presentation skills
4. Gained the knowledge on both Aptitude and Soft skills to the students
5. Learnt critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
6. Reinforcing competencies in soft skills which are crucial in a social setting

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objective

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To write the paragraph practice & letter writing
- To learn about vocabulary
- To learn about functional grammar

Course Outcomes:

1. The students have confidence to respond in English during situations where the use of English is imperative.
2. They develop fluency in actual conversation in the English language.
3. They develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
4. write the paragraph practice & letter writing
5. Learnt about vocabulary
6. Learnt about functional grammar

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose – Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

REFERENCE BOOKS:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Course Objectives

- To learn the different concepts in metallurgy
- To understand the extraction process of ores
- To understand the reactions of aldehydes, ketones and carboxylic acids.
- Learn about tautomerism of esters
- To understand the principles of second law of Thermodynamics,
- Concept of free energy and third law of thermodynamics.

Course Outcomes:

1. Students learnt the different concepts in metallurgy
2. Understood the extraction process of ores
3. Learnt about tautomerism of esters
4. They understood the reactions of aldehydes, ketones and carboxylic acids.
5. They understood the principles of second law of Thermodynamics,
6. Concept of free energy and third law of thermodynamics.

Methodology:

Black board teaching and Group discussion

UNIT-I

General methods of extraction of metals: Concentration: Gravity separations, Froth flotation, Magnetic separation, Extraction, Chemical and Electrolytic methods. Refining-zone refining, Van Arkel Refining and Electrolytic refining; Comparative study- Physical properties of alkali metals: Electric structure, density, atomic volume, atomic radius, ionic radius, ionization energy and electro negativity.

UNIT-II

Occurrence, Extraction properties, thermodynamic aspects of extraction of ores – Ellingham diagram and uses of Gallium, Thallium, Germanium, Titanium, Zirconium, Vanadium, Molybdenum, Tungsten and their important compounds such as GeCl_4 , GeO_2 , TiO_2 , ZrOCl_2 , V_2O_5 , Ammonium Molybdate and WO_2 .

UNIT-III

Reactions of aldehydes and ketones: Nucleophilic addition of Grignard reagents - Aldol condensation, Perkin, Knoevenagel, Claisen, Dieckmann, Reformatsky reactions, Cannizzaro reaction. Reduction using LiAlH_4 and NaBH_4 - Wolf-Kishner and M.P.V. reduction.

Malonic ester and acetoacetic ester their synthetic applications-Tautomerism of acetoacetic ester.

UNIT-IV

Halogen derivatives of carboxylic acids: mono, di and tri chloro acetic acids, their reactivity. Ester hydrolysis. Hydroxy acids: citric acids.

Introduction to II law of thermodynamics: Entropy - Definition - Entropy changes in isothermal transformations-Troutons rule. Entropy as a function of T, P and V- change of entropy with T- Entropy changes in ideal gas-Entropy of mixing of ideal gases.

UNIT-V

Partial molar properties-Chemical potential-General conditions of equilibrium and spontaneity under constraints- Definitions of A and G - Physical significance of Δ_A and Δ_G -Temperature and pressure dependence of Δ_G – Gibbs-Helmholtz equation.Gibbs-Duhem equation. Chemical equilibrium in a mixture of ideal gases - Third law of Thermodynamics - statement and applications - Exceptions to 3rd law.

TEXT BOOKS:

1. Bahl, B.S and Arun Bahl, 2006. A textbook of Organic Chemistry, 18th Edition. S.Chand & Co.
2. Puri, Sharma & Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing Co., Jalandar.
3. Puri, B.R., L.R.Sharma and Kalia, 2011. Principles of Inorganic Chemistry, Shoban lal & Co., Jalandar.
4. Wahid Malik, W., R.D.Madan and G.D.Tuli, 2004. Selected topics in Inorganic Chemistry, S.Chand & Co., New Delhi.

REFERENCES:

1. Gurtu and Gurtu, 2000. Thermodynamics, Pragati pragasan publications, Chennai.
2. Madan, R.D., 2005. Modern Inorganic Chemistry, S.Chand & Co., New Delhi.
3. Morrison, R.T. and Boyd, 2003. Organic Chemistry, 6th Edition, Pearson Education, Singapore.
4. Puri, B.R. and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Co.,.
5. Skoog, D.A. and D.M.West, 2004. Fundamentals of Analytical Chemistry, 8th Edition Thomson Book store, Singapore.
6. Soni, P.L., 2004. Inorganic Chemistry, Sultan Chand & Sons.
7. Soni, P.L., 2004. A textbook of Organic Chemistry, S.Chand & Co., New Delhi.
8. Wiley and A.K.De, 1998. A text book of Inorganic Chemistry, New age international publishers, New Delhi.

Course Objective

To learn the basic principles of Surface Chemistry.

- It enables the students to learn about the basic principles of Chemistry involved in surface phenomena.
- The course helps the students in improving their diverse skills in various areas such as laboratory skills,
- numerical and computing skills, ability to approach to the problems both analytically and logically, time management skills, etc.
- The principles in this course are used in almost every field such as medicines, food products, and electronics and even in construction industry.
- Learn about emulsion
- Understand Liquid gas and liquid interfaces

Course Outcomes:

1. Students learnt the Adsorption and surface phenomenon
2. The course helps the students in improving their diverse skills in various areas such as laboratory skills,
3. numerical and computing skills, ability to approach to the problems both analytically and logically, time management skills, etc.
4. The principles in this course are used in almost every field such as medicines, food products, and electronics and even in construction industry.
5. Learnt about emulsion
6. Understood Liquid gas and liquid interfaces

Methodology:

Black board teaching and Group discussion.

UNIT- I**Adsorption and surface phenomenon**

Physisorption and chemisorption, adsorption isotherms, Langmuir and B. E. T. equation and significance in surface area determination, surface films, states of insoluble films, L. B. films and their application, adsorption from solution, adsorption types, surface excess concentration, Gibb's adsorption equation: derivation, significance and experimental verification, catalytic activity of surfaces.

UNIT –II**Micelle**

Surface activity, surface active agents and their classification, micellisation, critical micelle concentration (cmc) thermodynamics of micellisation, factors affecting cmc,

methods of determination of cmc , reverse micelle , solubisation of water insoluble organic substances , use of surfactants in oil recovery.

UNIT-III

Emulsion

Types of emulsion, theories of emulsion and emulsion stability, identification of emulsion types, inversion emulsion, microemulsion : theory and application.

UNIT –IV

Liquid gas and liquid interfaces

Surface tension, capillary action, methods of determination of surface tension, surface tension across curved surfaces, vapor pressure of droplet (Kelvin equation) , surface spreading , spreading coefficient, cohesion and adhesion energy, contact angle, constant angle hystereis, wetting and detergency.

UNIT-V

Solid - Solid interfaces

Surface energy of solids, adhesion and adsorption, sintering and sintering mechanism, Tammann temperature and its importance, surface structure and surface composition.

TEXT BOOKS:

1. W. Adamson, 1990. V Edition, Physical chemistry of surfaces, John Wiley & Sons, New York.

REFERENCES:

1. Alfred Clark, 1970. Theory of adsorption and catalysis, Academic Press, United Kingdom.
2. B. M. W. Trapnell and D.O. Hayward, 1964. Chemisorption, Butterworths, London.
3. D. J. Shaw, 1991. Introduction to colloid and surface chemistry, Butterworth-Heinemann Limited, United Kingdom.
4. J. K. Laidler, 2005. Theories of chemical reaction rates, McGraw Hill, New York.
5. J. J. Bikermann, 1958. Surface chemistry, Academic Press Inc., New York.

Instruction Hours/week:L: 0 T:0 P:4 Marks: Internal:40 External: 60 Total:100

Course Objective:

- To understand the basic principles of volumetric analysis.
- It enables the students to learn about the fundamental aspects of different types of titrations in volumetric analysis in Chemistry
- Estimate of Acidimetry and alkalimetry
- Estimate permanganometry
- Estimate Dichrometry
- Estimate iodimetry and argentometry

Course Outcomes:

1. Understood the basic principles of volumetric analysis.
2. It enables the students to learn about the fundamental aspects of different types of titrations in volumetric analysis in Chemistry
3. Understand and develop the skill to perform Acidimetry and alkalimetry Titrations.
4. Understood and develop the skill to perform permanganometry
5. Understood and develop the skill to perform dichrometry
6. Learnt the skill for performing iodimetry and argentometry

Methodology

Demonstrations of experiments and Black board teaching.

A. Acidimetry & Alkalimetry

1. Estimation of Na_2CO_3
2. Estimation of HCl

B. Permanganometry

1. Estimation of Ferrous sulphate
2. Estimation of Oxalic acid
3. Determination of Iron in Ferric Alum
4. Estimation of Calcium-Direct method.

C. Dichrometry

Estimation of Ferrous ion-Internal indicator method.

D. Iodimetry

1. Estimation of $\text{K}_2\text{Cr}_2\text{O}_7$.
2. Estimation of Copper

E. Argentometry- Demonstration experiments
Estimation of chloride-Fajan's and Volhards method.

TEXT BOOKS:

1. Venkateswaran, V., R.Veerawamy and A.R.Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi
2. Pandey, O.P., D.N.Bajpai and S.Giri, 2001. Practical Chemistry, 8th Edition, S.Chand Publications, New Delhi .

REFERENCES :

1. Arun Sethi, 2003. Laboratory experiments in Organic Chemistry, New Age Publishers, New Delhi.
2. Furniss, B.S., A.J.Hannaford, P.W.G.Smith and A.R.Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry, 5th Edition, Pearson Education Ltd., Singapore .
3. Mendham, J., R.C.Denney, J.D.Barnes and M.Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis, 6th Edition, Pearson Education Ltd., Singapore.
4. Raj K.Bansal, 2001. Laboratory Manual of Organic Chemistry, 4th Edition, New Age Publishers, New Delhi.
5. Thomas, A.O., 2003. Practical Chemistry, Scientific Book Center, Cannanore .

Course Objectives

This course enables the students to learn

- The concepts of Matrices and their properties.
- Techniques of differentiation and integration.
- Solve simultaneous equations with the help of matrices.
- Mastery in the concepts of vector and scalar fields.
- Knowledge the properties of definite integrals.
- Learn about integral calculus

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Solve simultaneous equations with the help of matrices.
2. Mastery in the concepts of vector and scalar fields.
3. Gain the intellectual knowledge of complex functions and their applications.
4. Acquire fundamental knowledge in the techniques of differentiation.
5. Know the properties of definite integrals.
6. Learnt about integral calculus

UNIT I

Matrices: Different types of matrices – Inverse of a matrix – Solution of simultaneous equations by matrix method- Cayley-Hamilton theorem(Statement only)-Verification.

UNIT II

Vector calculus: Concepts of vector and scalar fields- Derivative of a vector - The Del operator, Gradient – Divergence of a vector – Curl of a vector- Directional derivative – Formula involving ∇ operator. Laplacian Operator.

UNIT III

Complex variables: Analytical function –Cauchy –Reimann equations – The necessary and sufficient condition for $f(z)$ to be analytic – Polar form of C-R equation-Properties of analytic function – Construction of analytic functions – Milne Thomson method.

UNIT IV

Differential Calculus: Differentiation- Curvature and radius of Curvature in Cartesian and Polar form – Evolutes – Involute .

UNIT V

Integral Calculus: Definite and Indefinite integrals – Methods of Integration – Integration by substitution – Integration by parts.

TEXT BOOKS

1. Venkataraman. M. K.,1998. Engineering Mathematics, The National Publications & Co., Chennai. (Unit I , II)
2. Manickavasagam Pillai.T.K , and S. Narayanan, 2002. “Calculus”, Volume I, and Volume II S.V Printers & Publishers, Chennai. (Unit IV , V)
3. Sastry .S.S,2009, Engineering mathematics, PHI learning Pvt. Ltd, New Delhi(Unit III)

REFERENCES

1. Singaravelu.A.,2011, Engineering Mathematics Vol 1&Vol 2 Meenakshi Publications, Arpakkam.
- 2.Venkataraman.M.K., 2001. Engineering Mathematics Vol 2, National Publishing Company, Chennai.

Course Objective

Students get an idea about

- Collection, interpretation and presentation of statistical data and also learn how to analyze and interpret the data for decision making.
- Measures of Central tendency
- Understand the Meaning and definition of statistics.
- Understand the Measures of Central tendency - Arithmetic Mean, Median
- Understand the Measures of Dispersion – Range, Inter Quartile range, Quartile deviation, Mean Deviation, Standard deviation and Coefficient of variation
- Learn about correlation and regression

Course Outcomes:

1. Collection, interpretation and presentation of statistical data and also learn how to analyze and interpret the data for decision making.
2. Measures of Central tendency
3. Understood the Meaning and definition of statistics.
4. Understood the Measures of Central tendency - Arithmetic Mean, Median
5. Understood the Measures of Dispersion – Range, Inter Quartile range, Quartile deviation, Mean Deviation, Standard deviation and Coefficient of variation
6. Learnt about correlation and regression

UNIT I

Meaning and definition of statistics – sources of data – collection of data – primary and secondary data - methods of primary data collection –sources of secondary data – Classification of data . Diagrammatic representation– Bar diagram and Pie diagram – Graphic representation – Histogram , Frequency distribution , Ogives.

UNIT II

Measures of Central tendency - Arithmetic Mean, Median, Mode - problems on individual, discrete and continuous series, Harmonic Mean and Geometric Mean.

UNIT III

Measures of Dispersion – Range, Inter Quartile range, Quartile deviation, Mean Deviation, Standard deviation and Coefficient of variation – problems on individual, discrete and continuous series.

UNIT IV

Correlation – meaning and definition – types of Correlation – degrees of Correlation – Methods of finding Correlation coefficient – scatter diagram – Karl Pearson’s correlation coefficient – Rank correlation coefficient - Computation and interpretation.

UNIT V

Regression - meaning and definition - Regression equation Regression in two variables – two regression lines - X on Y and Y on X – properties of regression equation – problems using normal equations and regression coefficients.

TEXT BOOK:

1. Pillai R.S.N., and Bagavathi V., 2002. Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCE BOOKS:

1. Dr.P.N.Arora, 1997, A foundation course statistics, S.Chand & Company Ltd, New Delhi.
2. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
3. Gupta S.C., and Kapoor V.K., 1999. Fundamentals of Mathematical statistics, Sultan Chand & Sons, Educational Publishers, New Delhi.
4. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

Course Objectives

- Identify various functional groups in compounds, especially drugs and other pharmaceuticals where possible.
- Make correct predictions of the general reactivity, chemical reactions, and possible synthesis of compounds.
- Discuss the use of the compounds in pharmacy and in medicine.
- Discuss physico-chemical concepts as the basis of drug analysis, drug stability, and reaction spontaneity, maximum yields in synthesis, solubility's and drug actions.
- Classify drugs according to their physiological and biochemical actions.
- Explain the principles on which analytical instruments have been based.

Course Outcomes

The students understood the

1. Knowledge about drug discovery
2. Procedures to prepare analgesic, antipyretic, anti-inflammatory agents
3. Synthesis of Central Nervous System and cardiovascular drugs.
4. Fermentation process and preparation of antibiotics.
5. Classify drugs according to their physiological and biochemical actions.
6. Explain the principles on which analytical instruments have been based.

Methodology

Black Board Teaching

UNIT I

Drug Design

Concept of isosterism and bioisosterism and their applications in drug design
Antimetabolite approach to drug design, Analog drug design, Prodrugs and drug
latentiation, Carrier-linked prodrugs– Bioprecursors– Role of functional groups in
prodrug design–

UNIT II

Drug Discovery

Drug Discovery Historical perspective, Drug Discovery Strategies in Direct Drug Design
(Structure based) and Indirect drug design, Target selection and lead identification,
Natural product sources,

Specific and non-specific drug action Drug receptors, Basic concept and classification of receptors, Forces involved in drug receptors- interactions, Receptor agonism and antagonism,

UNIT III

Drugs & Pharmaceuticals

Drug discovery, design and development; Basic Retrosynthetic approach. Synthesis of the representative drugs of the following classes: analgesics agents, antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, Ibuprofen);

UNIT IV

Fermentation

Aerobic and anaerobic fermentation. Production of (i) Ethyl alcohol and citric acid, (ii) Antibiotics; Penicillin, Cephalosporin, Chloromycetin and Streptomycin, (iii) Lysine, Glutamic acid, Vitamin B2, Vitamin B12 and Vitamin C.

UNIT V

Pharmaceutical Compounds: Structure and Importance

Classification, structure and therapeutic uses of antipyretics: Paracetamol (with synthesis), Analgesics: Ibuprofen (with synthesis), Antimalarials: Chloroquine (with synthesis). An elementary treatment of Antibiotics and detailed study of chloramphenicol, Medicinal values of curcumin (haldi), azadirachtin (neem), vitamin C and antacid (ranitidine).

TEXT BOOKS:

1. Jayashree Ghosh, 2003. A Text Book of Pharmaceutical Chemistry, S. Chand & Company Ltd. Ram Nagar, New Delhi.

REFERENCES :

1. G.L. Patrick., 2013. Introduction to Medicinal Chemistry, Oxford University Press, UK.
2. Hakishan, V.K. Kapoor, 1012. Medicinal and Pharmaceutical Chemistry, Vallabh Prakashan, Pitampura, New Delhi.
3. William O. Foye, Thomas L., Lemke , David A. William, 2008. Principles of Medicinal Chemistry, B.I. Waverly Pvt. Ltd. New Delhi.

		Semester-III
		L T P C
15FCC301A	INTRODUCTION TO COMPUTERS	4 0 0 2

COURSE OBJECTIVES

- Know the basic concept of computers.
- Understand the concept of Ms-word,
- Understand the concept of Ms-Excel.
- Be able to work in Ms-PowerPoint.
- Knowledge about internet and the usage of E-Mail services.
- Data sheet printing

Course Outcomes

The student understood

1. Knowledge about the basic concept of computers.
2. the concept of Ms-word,
3. the concept of Ms-Excel.
4. Able to work in Ms-PowerPoint.
5. Knowledge about internet and the usage of E-Mail services.
6. Data sheet printing

Unit-I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers-the computer system- types of Input/ Output and memory devices-computer software-categories of software.

Unit-II

Starting with MS Office Word – Working with Text – working with tables-Checking spelling and grammar- adding graphics to document- Mail merge- printing a document – Advanced features of MS Office Word- Keyboard shortcuts.

Unit III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

Unit IV

Starting with MS Office PowerPoint – Working with PowerPoint- Working with different views-Designing Presentations- Slide Show.- Printing in PowerPoint.

Unit-V

The Internet-Evolution of Internet-Owner of Internet- Anatomy of Internet – Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

Text Book

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions.2011. Pearson, New Delhi.

References

1. Pradeep K.Sinha ,Priti Sinha. Computer Fundamentals, 2007, 6th Edition BPB Publications, New Delhi.
2. V. Rajaraman. Fundamentals of Computers, Prentice-Hall Of India Pvt. Limited, 2003.
3. Wallace Wang. Microsoft Office 2007 For Dummies,1st Edition Wiley Publishing Inc.

Course Objectives

- This course in curriculum is an introduction to the multimedia and Applications of multimedia.
- This course enables students to understand how the web pages are designed interactively.
- How to critically evaluate website quality,
- Learn how to create and maintain quality web pages learn to create and manipulate images.
- To gain the skills and project-based experience needed for entry into web design and development careers.
- Introducing Photoshop elements

Course Outcomes

1. Learnt the introduction to the multimedia and its applications.
2. Students have understood how the web pages are designed interactively.
3. Critically evaluate website quality,
4. Learnt how to create and maintain quality web pages learn to create and manipulate images.
5. Gained the skills and project-based experience needed for entry into web design and development careers
6. Introducing Photoshop elements

UNIT - I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT - II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT - III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images –

Tagging images - Searching for images - Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT - IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects.

UNIT - V

Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks. Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic ActionScript concepts: ActionScript basics – Data type basics.

TEXT BOOKS

1. Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill . (Unit I, Unit II)
2. Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill. (Unit III)
3. Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press. (Unit IV, Unit V)

REFERENCES

1. Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, Tata McGraw-Hill.
2. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, Dream Tech Press, New Delhi

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil
Total: 100

Course Objective

- To achieve the analytical skills
- To know about reasoning competencies
- To improve their communication and presentation skills
- Gain the knowledge on both Aptitude and Soft skills to the students
- Reinforcing competencies in soft skills which are crucial in a social setting
- Learn critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations

Course Outcomes

1. achieve the analytical skills
2. To know about reasoning competencies
3. To improve their communication and presentation skills
4. Gained the knowledge on both Aptitude and Soft skills to the students
5. Learnt critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
6. Reinforcing competencies in soft skills which are crucial in a social setting

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives:

- To train the students in understanding the concepts of communication.
- To train the students in developing their written communication and presentation skills.
- To Learn Listening Comprehension
- To write Dicto Composition
- To present Effective Presentation
- To understand Group Discussion

Course Outcomes:

1. Students understanding the concepts of communication.
2. Trained the students in developing their written communication and presentation skills.
3. Learn Listening Comprehension
4. Learn Dicto Composition
5. Understood Effective Presentation
6. Understood Group Discussion

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

PRESCRIBED TEXT:

1. Juneja. P. Om and Aarati Mujumdar, “*Business Communication - Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCES:

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

15CHU401	GENERAL CHEMISTRY - IV	Semester -IV 6H-6C
Instruction Hours/week: L: 6 T:0 P:0 Marks: Internal:40 External: 60 Total:100		

Course Objective

- To learn metallurgy of iron, cobalt, nickel
- To learn metallurgy of platinum
- To understand the reactions of phenols and
- To understand the reactions of amines.
- To understand the principles of Phase rule and
- To understand the principles of solutions.

Course Outcomes:

1. Learn metallurgy of iron, cobalt, nickel
2. Learn metallurgy of platinum
3. Understood the reactions of phenols and
4. Understood the reactions of amines.
5. Understood the principles of Phase rule and
6. Understood the principles of solutions.

Methodology

Blackboard teaching and group discussion

UNIT I

Metals: Iron, Cobalt, Nickel - metallurgy-industrial importance-platinum group metals – isolation, properties and uses, their important alloys. Platinum black, spongy platinum, platinized asbestos.

UNIT II

Phenols: Preparation, physical and chemical properties of monohydric phenols - Reactions of monohydric phenols with mechanism - alkylation, esterification, nitration, sulphonation, halogenation, coupling with diazonium salts - Kolbe, Riemeier - Tiemann, Schotten - Baumann, Hoesch and Houben reactions, Gattermann reaction. Preparation,

properties of alpha and beta Naphthols, Dihydric and trihydric Phenols- catechol, resorcinol, quinol, pyrogallol, phloroglucinol and hydroxy quinol.

UNIT III

Amines: Aliphatic amines - Primary, secondary and tertiary amines-separation and comparison of their basicity. Aromatic amines- Preparation and reactions of aromatic amines. Ring substitution, Diazotisation and coupling reaction.

Diazomethane and diazoacetic ester - preparation, structure and their synthetic applications.

UNIT IV

Phase rule and phase equilibria – Conditions for equilibrium between the Phases. Derivation of Gibbs phase rule. Phase equilibria in one component system. Phase diagram for sulphur, water, carbondioxide system. Phase diagram for two component system. Construction of the phase diagram - Thermal analysis method – B- Cd; Zn - Mg; Na - K system. Pressure dependence of U and T curves - Clapeyron and Clapeyron-Clausius equations.

UNIT V

Solutions: Ideal and non ideal solutions- Raoult's law – Henry's law. Nernst distribution law and its applications. Colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point and osmotic pressure.

TEXT BOOKS:

1. Bahl, B.S and Arun Bahl, 2006. A textbook of Organic Chemistry, 18th Edition. S.Chand & Co.
2. Puri, Sharma & Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing Co., Jalandar.
3. Puri, B.R., L.R.Sharma and Kalia, 2011. Principles of Inorganic Chemistry, Shoban lal & Co., Jalandar.
4. Wahid Malik, W., R.D.Madan and G.D.Tuli, 2004. Selected topics in Inorganic Chemistry, S.Chand & Co., New Delhi.

REFERENCES:

1. De,A.K., Wiley, 1998. A text book of Inorganic Chemistry, New age international publishers, New Delhi.
2. Madan,R.D., 2005. Modern Inorganic Chemistry, S.Chand & Co., New Delhi.
3. Morrison,R.T. and Boyd, 2003. Organic Chemistry, 6th Edition, Pearson Education, Singapore.
4. Puri,B.R. and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Co., New Delhi.
5. Soni,P.L., 2004. Inorganic Chemistry, Sultan Chand & Sons.
6. Soni,P.L., 2004. A textbook of Organic Chemistry, S.Chand & Co., New Delhi.
7. Robert Thornton Morrison, Robert Neilson and Saibal Kanthi Bhattacharjee, 2012, Organic chemistry, 2nd edn, New York.

Course Objectives

- To study about the order and rate of reactions.
- To derive the expression for rate constant of first and pseudo-first order reactions.
- To know the experimental methods of determination of order of reaction. Graphical method of determination of order and rate constant of a reaction is also to be studied.
- To learn about the effect of temperature on the rates and rate constants of reaction.
- To know about Arrhenius equation and Arrhenius parameters.
- To differentiate between simple and complex reactions.
- To learn about consecutive, opposing and parallel reactions.

Course Outcomes:

1. Study about the order and rate of reactions.
2. Derive the expression for rate constant of first and pseudo-first order reactions.
3. Know the experimental methods of determination of order of reaction.
4. Graphical method of determination of order and rate constant of a reaction is also to be studied.
5. Learnt about the effect of temperature on the rates and rate constants of reaction. To know about Arrhenius equation and Arrhenius parameters.
6. Differentiate between simple and complex reactions.
7. Learnt about consecutive, opposing and parallel reactions.

Methodology

Black Board Teaching, power point presentation and Group discussion

UNIT - I

Chemical kinetics - Empirical laws and experimental aspects. Rate laws. Stoichiometry, order and molecularity of reactions, setting up and solving simple differential equation for first order, second order, third order and zero order reactions, pseudo order reactions with examples.

UNIT - II

Expression for half-life periods of first order, second order, zero order and third order reactions. Determination of order of reactions. Experimental techniques involved in the following kinetics of reaction.

Volumetry, manometry, dilatometry, polarimetry and colorimetry. Typical examples for each of the techniques.

UNIT - III

Theoretical aspects: effects of temperature on the rate constant. The activation energy. The collision theory of reaction rates and its limitation. The theory of absolute reaction rates. Comparison of the collision theory with the absolute reaction rate theory. Significance of free energy of activation and entropy of activation.

UNIT - IV

Error analysis – terms and definitions – absolute and relative errors – precision and accuracy – classification of errors – sources and minimization of errors – significant figures and computation – mean and standard deviation – method of least squares – student T test and Q test.

UNIT - V

Thermal chain reaction. H_2/Br_2 reactions. Chain reactions – characteristics- steady state approximation, complex reaction. Kinetics of photochemical reactions. Adsorption of light and photochemical processes. The Stark - Einstein law of photochemical equivalence. Photochemical chain reaction H_2/Br_2 reaction. Quantum yield of photochemical reactions. Comparison of thermal and photochemical kinetics of H_2/Br_2 , H_2/Cl_2 reaction. Photosensitized reactions.

TEXT BOOKS:

1. Bahl, B.S, Arun Bahl and Tuli, G.D, 2005. Essentials of Physical Chemistry, S. Chand & Company, 7361, Ram Nagar, New Delhi-110 055.
2. Puri, B.R, Sharma, L.R, Madan S. Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing, Jalandhar, New Delhi-110 002.
3. B.K.Sharma, Instrumental methods of chemical analysis, 5th edition, Goel publication, 1996, Meerut.
4. S. Usharani, Analytical Chemistry, 1st edition, Macmillan publications, 2008.

REFERENCES:

1. Atkins, P.W, 2002. Physical Chemistry, 9th Edition, Oxford Publishers, Oxford.
2. Keith J. Laidler, 2004, Chemical Kinetics, Pearson Education Publishing, Indian branch, 482 F.I.E. Patparganj, New Delhi 110 092, India.
3. Skoog, D.A. and D.M. West, 2004. Fundamentals of Analytical Chemistry, 8th Edition, Thomson Book store, Singapore.
4. Soni, P.L, 2004. Inorganic Chemistry, S. Chand & Company, 7361, Ram Nagar, New Delhi-110 055.
5. Iran N. Levine, 2009, Physical chemistry, 5th edn, Mcgraw Hill, New York.

Instruction Hours/week:L: 0 T:0 P:6 Marks: Internal:40 External: 60 Total:100

Course Objective

To understand and develop the skill to perform organic qualitative analysis.

- Preliminary tests
- Detection of elements present
- Aromatic or Aliphatic
- Saturated or Unsaturated
- Nature of the functional group (Aldehydes, Ketones, Amines, Diamide, Carbohydrates, Phenols, Acids, Esters & Nitro compounds)
- Confirmatory tests
- Preparation of derivatives.

Course Outcomes

Understood and develop the skill to perform organic qualitative analysis.

1. Preliminary tests
2. Detection of elements present
3. Aromatic or Aliphatic
4. Saturated or Unsaturated
5. Nature of the functional group (Aldehydes, Ketones, Amines, Diamide, Carbohydrates, Phenols, Acids, Esters & Nitro compounds)
6. Confirmatory tests
7. Preparation of derivatives.

Methodology

Black board teaching and Demonstration.

Systematic analysis of an organic compound

- ✓ Preliminary tests
- ✓ Detection of elements present
- ✓ Aromatic or Aliphatic
- ✓ Saturated or Unsaturated
- ✓ Nature of the functional group (Aldehydes, Ketones, Amines, Diamide, Carbohydrates, Phenols, Acids, Esters & Nitro compounds)
- ✓ Confirmatory tests
- ✓ Preparation of derivatives.

TEXT BOOKS:

1. Venkateswaran, V., R.Veerawamy and A.R.Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi
2. Bansal Raj, K., 2001. Laboratory Manual of Organic Chemistry, 4th Edition, New Age Publishers, New Delhi.

REFERENCES :

1. Arun Sethi, 2003. Laboratory experiments in Organic Chemistry, New Age Publishers, New Delhi.
2. Furniss, B.S., A.J.Hannaford, P.W.G.Smith and A.R.Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry, 5th Edition, Pearson Education Ltd., Singapore.
3. Lepse Paul, A., Lyle B Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry, Prentice Hall, New Delhi
4. Mendham, J., R.C.Denney, J.D.Barnes and M.Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis, 6th Edition, Pearson Education Ltd., Singapore.

Course Objectives:

This course enables the students to learn

- The Concept of Fourier analysis and
- Solving boundary value problems.
- Techniques of Fourier transform
- Laplace transform
- To solve differential equations.
- Numerical techniques of differentiation and integration.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Appreciate the physical significance of Fourier series
2. Understood the mathematical principles on transforms.
3. Apply mathematical foundation to formulate and solve problems arising in physics
4. Synthesize numerical techniques for practical problems
5. Techniques of Fourier transform
6. Laplace transform

UNIT I

Fourier series: Definition – Finding Fourier coefficients for a given periodic function with period 2π – Odd and Even functions – Half Range Series

UNIT II

Fourier Transforms: Definition of Fourier Transform-Properties of Fourier Transform-Inverse Fourier transform-Convolution theorem-Finite Fourier Sine & Cosine Transform – Parseval's theorem.

UNIT III

Laplace Transforms: Definition of Laplace Transform - Properties of Laplace Transform, Inverse Laplace Transform. Application of Laplace Transform.

UNIT IV

Differential Equations: Types of Linear differential equations with constant coefficients – Simultaneous differential equations with constant coefficient.

UNIT V

Numerical methods: Solving simultaneous equations–Gauss Elimination method, Gauss Jordan method, Gauss – Seidel method. Numerical Integration – Trapezoidal Rule, Simpson's Rule.

TEXT BOOKS

1. Sastry .S.S,2009. Engineering Mathematics, PHI learning Pvt. Ltd, New Delhi.
(For Unit I , II , III & IV)
2. Kandasamy. P., K.Thilagavathy., and K.Gunavathy., 2003. Numerical methods,
S. Chand & company Ltd , New Delhi. (For Unit V)

REFERENCES

- 1.Singaravelu.A.,2011,Engineering Mathematics Vol I & Vol II Meenakshi Publications,
Arpakkam.
- 2.Venkataraman.M.K., 2001. Engineering Mathematics Vol II, National Publishing
Company, Chennai.
3. Manicavachagom Pillay.T.K ,S.Narayanan,2000, “Calculus Vol II”, S. Viswanathan
(Printers and Publishers), PVT., LTD.
4. Sundaram.V, R. Balasubramaniam, And K.A.Lakshminarayanan, 2001, Engineering
Mathematics – Vol III, Vikas Publishing House PVT., LTD, New Delhi.

Course Objective

- To enable the students to learn the Statistical methods and their applications.
- On successful completion of this course the students shall enrich to solve the Statistical problems in commerce and business.
- Learn about Probability distribution
- Know about test of significance
- Understand index numbers
- To learn about time series

Learn about time series

Course Outcomes:

1. The students learnt the Statistical methods and their applications.
2. On successful completion of this course the students shall enrich to solve the Statistical problems in commerce and business.
3. Learnt about Probability distribution
4. Knowledge about test of significance
5. Understood index numbers
6. Learnt about time series

UNIT I

Probability – definitions – addition and multiplication rules (only statements), permutation and combination, diagrammatic representation of probability (Venn diagram) – simple problems.

UNIT II

Probability distribution - Binomial distribution – Poisson Distribution – properties, mean and variance, Normal distribution–characteristics of normal curve (No derivations) simple problems only.

UNIT III

Test of Significance: Basic concepts – Z-test for two means – Small sample tests- t- test for single mean, two means – Chi Square Test.

UNIT IV

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre's, Paasche's and Fischer's method – Tests for an ideal index number – Wholesale and Cost of living index .

UNIT V

Time Series: Meaning – Components – Models – Business forecasting – methods of estimating trend – graphic, semi average, moving average and least square method – Seasonal variation – Methods of Simple Average.

TEXT BOOK:

1. Pillai R.S.N., and Bagavathi V., 2002., Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCES:

1. Gupta S.C., and Kapoor V.K., 1999. Fundamentals of Mathematical statistics, Sultan Chand & Sons, Educational Publishers, New Delhi.
2. Dr.P.N.Arora, 1997, A foundation course statistics, S. Chand & Company Ltd, New Delhi.
3. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
4. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.
5. Richard. I. Levin., & David. S. Rubin., 1998. Statistics for management, Seventh edition, Prentice hall of India, New Delhi.

Course Objectives

- To identify various functional groups in compounds, especially drugs and other pharmaceuticals where possible.
- To make correct predictions of the general reactivity, chemical reactions, and possible synthesis of compounds.
- To discuss the use of the compounds in pharmacy and in medicine.
- To discuss physico-chemical concepts as the basis of drug analysis, drug stability, and reaction spontaneity, maximum yields in synthesis, solubility's and drug actions.
- To classify drugs according to their physiological and biochemical actions.
- Explain the principles on which analytical instruments have been based.

Course Outcomes:

1. Identify various functional groups in compounds, especially drugs and other pharmaceuticals where possible.
2. Make correct predictions of the general reactivity, chemical reactions, and possible synthesis of compounds.
3. Discuss the use of the compounds in pharmacy and in medicine.
4. Discuss physico-chemical concepts as the basis of drug analysis, drug stability, and reaction spontaneity, maximum yields in synthesis, solubility's and drug actions.
5. Classify drugs according to their physiological and biochemical actions.
6. Explain the principles on which analytical instruments have been based.

Methodology

Black Board Teaching

UNIT-I

Molecular basis of drug action: Receptor: Drug Receptor Interaction: Basic ligand concept, agonist, antagonist, partial agonist, inverse agonist, receptor Theories - Occupancy, Rate & Activation Theories.

UNIT -II

Analgesics - Definition - Different types of pain superficial, deep non visceral, visceral, referred and psychogenic, Classification - Morphine and its derivatives. Antipyretic analgesics – Salicylic acid derivatives – Paracetamol, phenacetin – Propanoic acid derivative – Ibuprofen. Antibiotics: Definition - Microbial synthesis, structure,

assay and uses of chloramphenicol and pencillin - Structure and uses of streptomycin and tetracyclines.

UNIT - III

Antiseptics and disinfectants : Definition and distinction - Examples - Phenolic compounds and chloro compounds. Tranquilizers – Definition and examples. Vitamins –Definition – Classification, sources and deficiency, diseases of Vitamins A, B, C, D, E and K. Importance of vitamin A in vision.

UNIT-IV

Synthon approach: Definition of terms - disconnection, synthon, functional group interconversion (FGI), Basic rules in Disconnection.

Combinatorial Chemistry Introduction, combinatorial approaches, chemical Peptide and small molecule libraries.

UNIT-V

Enzyme Inhibition – Enzyme structure: primary, secondary, tertiary and quaternary, enzyme Kinetics, enzyme Inhibitors - reversible, irreversible. Drug binding to nucleic acid -- Antimalarial, anti-cancer, antiviral.

TEXT BOOKS:

2. Jayashree Ghosh, 2003. A Text Book of Pharmaceutical Chemistry, S. Chand & Company Ltd. Ram Nagar, New Delhi.
3. Mukhopadhyay R, Datta S and Das, R.K. 2013. Text Book of Pharmaceutical Chemistry and Medicinal Chemistry, Books and Allied (P) Ltd. 83/1, Belighata Main Road, Kolkatta.
4. Lakshmi S 1998. Pharmaceutical Chemistry, 2nd Edition, S. Chand & Company Ltd. Ram Nagar, New Delhi.
5. Sanjay K. Jain and Vandana Soni Raubins, 2012. Bentley's Text book of pharmaceuticals, 1st Ed., Elsevier.

REFERENCES:

1. Wolff ME., 1995. Burger's Medicinal Chemistry and Drug Discovery, Principle and Practice. John Wiley and Sons, New York. 5th Edition.
2. W. O. Foye, Principles of Medicinal Chemistry, 3rd Edn., Lea & Febige/Varghese Company, Bombay, India (1989).
3. Ledinicer: 2007. Organic Drug synthesis Vol. 1,2,3,4 (John Wiley & Sons N.Y.)
4. Ariens E.J., 1980. Medicinal Chemistry Series, Academic Press Inc.,U.S.
5. Ellis and West, 1991. Progress in Medicinal Chemistry Series. Elsevier Science Ltd.
6. Stuart Warren: 2008. Organic Synthesis – The Disconnection Approach (John Wiley & Sons). 2nd Edition.

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objective

- To achieve the analytical skills
- To know about reasoning competencies
- To improve their communication and presentation skills
- Gain the knowledge on both Aptitude and Soft skills to the students
- Reinforcing competencies in soft skills which are crucial in a social setting
- Learn critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations

Course Outcomes

1. achieve the analytical skills
2. To know about reasoning competencies
3. To improve their communication and presentation skills
4. Gained the knowledge on both Aptitude and Soft skills to the students
5. Learnt critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
6. Reinforcing competencies in soft skills which are crucial in a social setting

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objective

- To learn and understand the fundamental aspects of stereochemistry.
- Learn about R and S notations
- To understand different types of rearrangement reactions.
- To learn about carbohydrates.
- To understand the amino acids and proteins
- To learn about heterocyclic compounds

Course Outcomes:

1. Learnt and understand the fundamental aspects of stereochemistry.
2. Learnt about R and S notations
3. Understand different types of rearrangement reactions.
4. Learnt about carbohydrates.
5. Understand the amino acids and proteins
6. Learnt about heterocyclic compounds

Methodology:

Black board teaching and Group Discussion.

UNIT-I

Optical activity: compounds with asymmetric carbon- racemisation-Resolution-Asymmetric synthesis-Configuration –DL and RS nomenclature for compounds containing one asymmetric carbon. Walden inversion. Optical activity of Biphenyls, Allenes. Geometrical isomerism for olefin compounds. E-Z nomenclature.

UNIT-II

Mechanism of molecular rearrangement reaction: Pinacol-Pinacolone, Wagner-Meerwein, Beckmann, Hofmann, Curtius, Benzilic acid and Claisen rearrangements, Fries rearrangement and Cope rearrangement.

UNIT-III

Carbohydrates: Chemistry of monosaccharide- Glucose and Fructose. Chemistry of disaccharide- Sucrose and Maltose. Chemistry of polysaccharide - Starch and Cellulose - an elementary account (Elucidation of structure not necessary). Inter conversion of Sugars – Muta rotation – Epimerization.

UNIT-IV

Amino acids– Classification, Preparation and properties –Peptides and synthesis of Polypeptides. Proteins- classification based on physical properties and biological functions, colour reactions – Primary, Secondary and tertiary structure.

UNIT-V

Heterocyclic compounds: Preparation, properties and use of Furan, Pyrrole, Thiophene, Pyridine, Quinoline, α and β -Flavones.

TEXT BOOKS:

1. Finar, I.L., 2003. "Organic Chemistry", Vol. I, Pearson Education, Singapore .
2. Finar, I.L., 2001. "Organic Chemistry", Vol. II, Pearson Education, Singapore.
3. Agarwal, O.P., 2004. "Natural Product Chemistry", Vol . I, Goel publishing House, Meerut.
4. Agarwal, O.P., 2004. "Natural Product Chemistry", Vol . II, Goel publishing House, Meerut.

REFERENCES :

1. Bahl, B.S. & Arun bahl, 2005. Advanced Organic Chemistry, S.Chand & Co., New Delhi.
2. Morrison, R.T. and Boyd, 2003. Organic Chemistry, 6th Edition ,Pearson Education, Singapore.
3. Soni, P.L., 2004. A textbook of Organic Chemistry, S.Chand & Co., New Delhi.
4. Jerry March, 1992. "Advanced Organic Chemistry", 4th Edition, Wiley, New York.
5. Pillai, C.N. 2009, Text book of Organic Chemistry, University press, New Delhi.
6. Michael B. Smith and Jerry March, 2013, Advanced Organic Chemistry, 6th edn, John Wiley & sons, New York.

Course Objectives

- Understand the structure of metals and alloys
- To learn the principles of radioactivity.
- To learn about isotopes and isobars
- To understand the fundamentals of acids and bases.
- To understand about the structure of metals and alloys.
- To learn about different aspects of solvents

Course Outcomes:

1. Understood the structure of metals and alloys
2. Learnt the principles of radioactivity.
3. Learnt about isotopes and isobars
4. Understood the fundamentals of acids and bases.
5. Understood about the structure of metals and alloys.
6. Learnt about different aspects of solvents

Methodology

Black board teaching and Group discussion.

UNIT- I

Structure of metals and alloys - substitutional and interstitial solid solutions - Hume – Rothery ratios - metallic bonding –theories-VBT, MOT and free electron theory- electrical, optical and mechanical properties of metals -semi conductors, intrinsic and extrinsic – uses, Crystal defects.

UNIT - II

Radio activity – General properties of Radio activity radiations, detection and measurement of radio activity. Natural radio activity & artificial radioactivity: Artificial transmutation of new elements, synthesis of radio isotopes of elements. Nuclear fission and fusion. Nuclear reactors - principles of working - production of electrical energy. Atomic energy projects in Industries - Safety measures, pollution, disposal of reactor wastes.

UNIT - III

Nature of isotopes and isobars - Detection and isolation of isotopes- various methods- importance of discovery of isotopes - uses of isotopes in various fields. Nuclear stability n/p ratio, magic numbers, C-12 and C-14 and nuclear binding energies. Nuclear reactions, mechanism and different types. Stellar energy. Radioactive disintegration series.

UNIT - IV

Acids and Bases - Arrhenius concept, proton transfer theory – concept of Lowry and Bronsted –Luxflood concept – the solvent system concept – Lewis concept – relative strength of acids and bases – effect of solvent – leveling effect – effect of polarity and dielectric constant – effect of substituents – factors influencing relative strengths of acids and bases. Applications and Limitations of HSAB concept.

UNIT - V

The solvent - solubility's of compounds - effect of temperature on solubility - Chemical structure and solubility of solvents. Classification of solvents - general behavior - properties of ionizing solvents. Types of reaction in solvents. Aqueous and non aqueous solvents –Protonic solvents- Ammonia. Non-protonic solvents - SO₂.

TEXT BOOKS:

1. C.V.Shekar , 2005. A text book of nuclear chemistry. First Edition, Dominant publishers and Distributors, New Delhi.
2. Puri, B.R. and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Co.,
3. Wahid Malik, R.D.Madan and G.D.Tuli, 2004. Selected topics in Inorganic Chemistry, S,Chand & Co., New Delhi.

REFERENCES :

1. Arnikaar H.J, 2003. Essentials of Nuclear Chemistry. IV Edition, New Age International Publishers Pvt. Ltd., New Delhi.
2. James E Huheey, Ellen A Keiter and Richard L Keiter, 2003. Inorganic Chemistry – Principles of Structure and Reactivity, 4th Edition, Pearson Education Ltd., Delhi.
3. Madan, R.D., 2005. Modern Inorganic Chemistry, S.Chand & Co., New Delhi.
4. Puri, B.R. and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Co.,
5. Skoog, D.A. and D.M.West, 2004. Fundamentals of Analytical Chemistry, 8th Edition Thomson Book store, Singapore.
6. Soni, P.L., 2004. Inorganic Chemistry, Sultan Chand & Sons.
7. Wiley and A.K.De, 1998. A text book of Inorganic Chemistry, New age international publishers, New Delhi.

Course Objective

- To learn and understand the electrical condition in solutions.
- To understand about the ionic equilibrium,
- Learn about electrochemical cells and
- Learn about fuel cells.
- Learn about redox reactions
- Know about application of EMF measurements

Course Outcomes

1. Learnt and understand the electrical condition in solutions.
2. Understood about the ionic equilibrium,
3. Learnt about electrochemical cells and
4. Learnt about fuel cells.
5. Learnt about redox reactions
6. Knowledge about application of EMF measurements

Methodology

Black board teaching and Group Discussion.

UNIT-I

Electrical conduction: Conduction in metals and in electrolytic solutions. Measurement of conductivity in electrolytic solution. Migration of ions-Kohlrausch's law. Arrhenius theory of electrolytic dissociation – Ostwald's dilution law. Theory of strong electrolytes-Debye-Huckel-Onsagar theory Elementary account only verification – Debye – Falkenhagen effect- Wien effect. Transport numbers –Determination. Conductometric titrations.

UNIT-II

Ionic Equilibria- Solubility and solubility product- Determination of solubility product - Application of solubility product principle-Dissociation of weak acids and bases-Dissociation constants – pH scale - common ion effect – buffer solutions –Determination of pH values of buffer mixtures - Henderson's equation –Hydrolysis of salts –Degree of hydrolysis.

UNIT-III

Electrochemical cells: Electrode potentials-The standard hydrogen electrode- kinds of electrodes and their potentials- Nernst equation. EMF –computation and measurement of

cell emf- Single electrode potential –Determination and significance of electrode potentials- Electrochemical series –Temperature dependence of the cell EMF. Thermodynamic quantities of cell reactions.

UNIT-IV

Reference electrodes-calomel electrode-hydrogen electrode-glass electrode- Electrodes for measurement of pH –Concentration cells with and without transport- Liquid junction potential –Application of EMF measurements. Redox potentials –Redox indicators – Uses. Potentiometric titrations.

UNIT-V

Fuel cells: Hydrogen – Oxygen cell and hydrocarbon oxygen cell. Storage cells. Lead storage cell and Nickel Cadmium cell. Decomposition voltage – Over voltage-Deposition and discharge potential.

TEXT BOOK:

1. Puri Sharma and Pathania, 2003. Physical Chemistry, Vishal Publishing Co., Jalandar.

REFERENCES:

1. Atkins, P.W., 1983. Physical Chemistry, ELBS & Oxford university press, Oxford.
2. Glasstone, S., 2002. An Introduction to Electrochemistry, Affiliated East West press, New Delhi.
3. Whittakar, A.G., 2001. Physical Chemistry, Mount & Heal Viva Books Pvt. Ltd.,
4. Peter Atkin's and Julio De Paula, 2010, Physical Chemistry, 9th edn, Oxford University Press, New York.

Course Objective

- To learn and understand the fundamentals of Nanochemistry.
- To understand the use of nano particles in molecular electronics,
- To learn about super Conductors
- To learn about the synthesis and stabilization of nano particles
- To characterize them by experimental techniques.
- Know about nano rods nano tubes

Course Outcome

1. Learnt and understood the fundamentals of Nanochemistry.
2. Understand the use of nano particles in molecular electronics,
3. Learnt about Super Conductors
4. Learnt about the synthesis and stabilization of nano particles
5. Characterization of them by experimental techniques
6. Know about nano rods nano tubes

Methodology:

Black board teaching, Discussion and Powerpoint Presentation.

UNIT-I

Basics of Nanochemistry: Introduction – definition – length scales – importance of nanoscale and its technology – self assembly of materials – self assembly of molecules – porous solids, nanowires, nanomachines and quantum dots.

UNIT-II

Nano Particles: Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles.

UNIT-III

Synthetic Techniques: Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods – characterization of nanoparticles – applications and toxic effects of nanomaterials.

UNIT-IV

Nano Materials: Preparation, properties and applications of carbon nanotubes, nanorods, nano fibre and nanoclay.

UNIT-V

Instrumental Techniques: Electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force

microscopy (AFM) – scanning tunneling electron microscope (STEM) – basic principles only.

TEXT BOOKS:

1. Shanmugam.S, 2010, Nanotechnology, MJP Publishers, Chennai.
2. Patrick Salomon, A Handbook on Nanochemistry, Dominant Publishers and Distributors, New Delhi.
3. S. Balaji, 2010, Nanobiotechnology, MJP Publishers, Chennai.

REFERENCES:

1. CNR Rao, 2006, The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, Springer.
2. Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, 2005, Nanotechnology: Basic Science and Emerging Technologies, Overseas Press.
3. Segreev, G. B., 2006, Nanochemistry, Elsevier, New York.
4. T.Pradeep, 2013, Nano- The Essentials, Mcraw Hill Edn, New York.

Course objectives

This course enables the student to

- Apply the principles and the practical aspects of green chemistry
- Prepare biodiesel from vegetable oil.
- Prepare phthalocyanine complex of Cu (II).
- Characterise the biodiesel.
- Mechano chemical solvent free synthesis of azomethine.
- Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper(II)

Course outcome

The students have to use

1. The basic principles and practical aspects like preparations and characterization in green approach.
2. Preparation and characterization of biodiesel from vegetable oil.
3. Characterization of biodiesel from vegetable oil.
4. Preparation of phthalocyanine complex of Cu(II).
5. Mechano chemical solvent free synthesis of azomethine.
6. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper(II).

Methodology:

Black board teaching, Group discussion and Powerpoint Presentation.

UNIT-I

Introduction to green chemistry

Green chemistry-relevance and goals, Anastas' twelve principles of green chemistry - Tools of green chemistry: alternative starting materials, reagents, catalysts, solvents and processes with suitable examples.

UNIT-II

Microwave mediated organic synthesis (MAOS)

Microwave activation – advantage of microwave exposure – specific effects of microwave – Neat reactions – solid supports reactions – Functional group transformations – condensations reactions – oxidations – reductions reactions – multi-component reactions.

UNIT III

Ionic liquids and PTC :

Introduction – synthesis of ionic liquids – physical properties – applications in alkylation – hydroformylations – epoxidations – synthesis of ethers – Friedel-Craft reactions – Diels-Alder reactions – Knoevenagel condensations – Wittig reactions – Phase transfer catalyst - Synthesis – applications.

UNIT IV

Supported catalysts and bio-catalysts for Green chemistry

Introduction – the concept of atom economy – supported metal catalysts – mesoporous silicas – the use of Biocatalysts for green chemistry - modified bio catalysts – fermentations and biotransformations – fine chemicals by microbial fermentations – vitamins and amino acids — Baker's yeast –mediated transformations– Bio-catalyst mediated Baeyer-Villiger reactions— Microbial polyester synthesis.

UNIT V

Alternative synthesis, reagents and reaction conditions

A photochemical alternative to Friedel-Crafts reactions - Dimethyl carbonate as a methylating agent – the design and applications of green oxidants – super critical carbon dioxide for synthetic chemistry.

TEXT BOOK:

1. Ahluwalia V. K, 2012. Green Chemistry – Environmentally benign reactions. II Edition, Ane Books Pvt. Ltd., Chennai.

REFERENCES :

1. Paul T. Anastas & Tracy C. Williamson, 1996. Green Chemistry – Designing Chemistry for the Environment. II Edition, American Chemical Society, Washington, D. C.
2. Paul T. Anastas & Tracy C. Williamson, 1998. Green Chemistry – Frontiers in benign chemical synthesis and processes. Oxford University Press, United Kingdom.
3. Rshmi Sanghi & M. M. Srivastava, 2003. Green Chemistry – Environment friendly alternatives. Narora Publishing House, Chennai.

Course Objectives

- To learn about atmospheric pollution
- To understand the chemistry of pollution in land
- To learn about the biosphere
- To understand the lithosphere and biosphere interactions
- To learn the control of pollution
- To learn about agricultural pollution

Course Outcomes

1. Learnt about atmospheric pollution
2. Understand the chemistry of pollution in land
3. Learnt about the biosphere
4. Understand the lithosphere and biosphere interactions
5. Learnt the control of pollution
6. Learn about agricultural pollution

Methodology

Black board teaching and Group discussion.

UNIT-I

Atmospheric Chemistry

The structure of the earth's atmosphere- chemistry of the lower and upper atmosphere. The chemistry of air pollution- oxides of nitrogen- hydrogen sulphide and oxides of sulphur- Aerosols – ozone depletion and consequences- dioxins burning plastics- other atmospheric chemicals- smog- radio activity and fallout- air pollution abatement. Green house effect- Global warming, oxides of carbon.

UNIT-II

The earth

The lithosphere- the chemical composition of earth- the structure and composition of inner earth- the mantle, and the crust. The exploitation of mineral resources and the abuse of earth – earth resources – changing the face of the land- the earth as a dump- recycle- earth resource conservation steps.

The hydrosphere : The fresh water chemistry – the structure and properties of liquid water – lakes, rivers, ponds and stream –The role of water in our total environment- the hydrologic cycle- snow and ice – nucleation and precipitation – the chemical composition of rain water- phase changes and isotopic fractionation.

UNIT- III

The biosphere

The structure of the biosphere, Man's perturbation of the biosphere – Man as a chemical factory – material use and waste – energy use and thermal pollution – ecological

disruption – chemical sensation, hormonal imbalance and mutagens- internal pollution. Hydrosphere - lithosphere interaction: The structure of water at an interface – chemical composition of mineral water- weathering and the changing face of the land- the origin of the oceans- sedimentation and the deposition of materials from the hydrosphere – chemical exchange between sediments and the water column.

UNIT- IV

Interactions

Lithosphere- biosphere interaction: soil chemistry – the prospects of agriculture-agricultural pollution – pesticides and other persistent pollutants – the deposition of coal and petroleum – theories of origin of petroleum. Atmosphere – biosphere interaction and atmosphere– hydrosphere interaction: history of earth’s atmosphere – the nitrogen cycle – the carbon cycle – air – sea interactions.

UNIT-V

Pollution control

Pollution control in the following: Fertilizer, petroleum, pulp and paper, tanning, sugar, alcohol, electroplating and nuclear reactors.

Analysis of pollutants: Sum, specific and group parameters BOD, COD, specific oxygen demand, DOC, DOCl, DOS, Fe, Cr, Cu, Pb, and Ni-So₂, NO_x, H₂S, O₃ and CO.

TEXT BOOK:

1. A.K.De , 2001 Environmental chemistry, Rohan Ahmed Publishers.

REFERENCES :

1. Von R. A. Horne, 1978. Chemistry of our environment, John Wiley & Sons Ltd., New York.
2. Iain L, Marr and Malcom S. Cresser, 1983. Environmental chemical analysis, International Textbook Co, Pennsylvania.
3. Mahajan S.P, 1985. Pollution control in process industries. Mc.Graw Hill Publishing, New York.

Instruction Hours/week:L: 5 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objective

- To acquaint the students with the applications of Bioinorganic Chemistry to the medicinal chemistry.
- To Identify key structural molecules for metal bonding in biological molecules.
- To learn about the metals in life process
- To understand oxygen carrier systems.
- To understand about the metals used in plant life and about metal poisoning.
- To learn about nitrogen fixation

Course Outcomes

1. Students know the applications of Bioinorganic Chemistry to the medicinal chemistry.
2. Identify key structural molecules for metal bonding in biological molecules.
3. Learnt about the metals in life process.
4. Understand about the metals used in plant life and about metal poisoning.
5. Understood about Oxygen carrier systems
6. Learn about nitrogen fixation

Methodology

Black board teaching and Group discussion.

UNIT-I

Metals in Life Processes

Na-K-charge carriers & osmotic pressure, relation to sensitivity of nerves and control on muscles, Mg-Ca complexes with nucleic acid, nerve impulse transmission, trigger reaction, Mn, Fe, Co, Cu, Mo, ferridoxins, Zn-super acid catalysis.

UNIT-II

Oxygen Carrier Systems

Structure and mechanism of hemoglobin, vitamin B12, B12 co-enzyme myoglobin, synthesis of oxygen carriers.

Photosynthesis : Porphyrins ring complexes and redox mechanism.

UNIT-III

Nitrogen Fixation

Nitrogen in biosphere, nitrogen cycle, nitrification role of microorganisms, nitrogen fixation in soils

UNIT-IV

Metal poisoning and drug action of Inorganic complexes compounds

Metal poisoning, treatment by using chelating agent, mercury, lead & cadmium poisoning & treatment. Platinum complexes in treatment of cancer, metal deficiency and use of metal chelates.

UNIT-V

Trace Metals in Plant Life

Micronutrients in soil, role of micronutrients in plant life

Biogeochemistry : Biodegradation of minerals bacteria leaching and its applications.

TEXT BOOK:

1. A.K.De , 2001 Environmental chemistry, Rohan Ahmed Publishers.

REFERENCES :

1. Ochiai E-I 1977. Bioinorganic Chemistry. Allyn and Bacon, Inc., Massachusetts, Boston.
2. Williams, 1983. An Introduction to Bioinorganic Chemistry, C.C. Thomas Spring III.
3. Wallace, 1962. Decade on synthetic chelating agent in Inorganic plant nutrition.
4. E. Crabb and E.Moore, 1995. Metals in Life , Royal Chemical Society, Washington.
5. Zagic J.E., 1969. Microbial Biogeochemistry, Academic press, New York.
6. Ahuja S and E.M. Cohen, 1973. Chemical Analysis of the Environment and other modern techniques, Plenum press, New York.

Instruction Hours/week:L: 0 T:0 P:5 Marks: Internal:40 External: 60 Total:100

Course Objective

- To understand and develop the skill to perform organic qualitative analysis.
- To understand the factors which affect the crystallinity/size of precipitate.
- To understand the steps to be taken to ensure that the precipitates formed are large and easily filtered and avoid peptization.
- Estimate the Barium as Barium chromate
- Estimate of Lead as Lead Chromate.
- Estimate of Lead as Lead Sulphate.

Course Outcomes

1. Understand and develop the skill to perform organic qualitative analysis.
2. Understand the factors which affect the crystallinity/size of precipitate.
3. Understand the steps to be taken to ensure that the precipitates formed are large and easily filtered and avoid peptization.
4. Estimation the Barium as Barium chromate
5. Estimation of Lead as Lead Chromate.
6. Estimation of Lead as Lead Sulphate

Methodology

Black board teaching and Demonstration.

LIST OF PRACTICALS

1. Estimation of Barium as Barium chromate.
2. Estimation of Barium as Barium Sulphate.
3. Estimation of Lead as Lead Chromate.
4. Estimation of Lead as Lead Sulphate.
5. Estimation of Calcium as Calcium Oxalate
6. Estimation of Nickel as Nickel Dimethylglyoxime complex.
7. Estimation of Mg as Oxinate.

TEXT BOOKS:

1. Thomas, A.O., 2003. Practical Chemistry, Scientific Book Center, Cannanore.
2. Venkateswaran, V., R.Veerawamy and A.R.Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi.

REFERENCES :

1. Furniss, B.S., A.J.Hannaford, P.W.G.Smith and A.R.Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry, 5th Edition, Pearson Education Ltd., Singapore .
2. Mendham, J., R.C.Denney, J.D.Barnes and M.Thomas 2002. Vogel's textbook of quantitative Chemical Analysis, 6th Edition, Pearson Education Ltd., Singapore.
3. Pandey, O.P., D.N.Bajpai and S.Giri, 2001. Practical Chemistry, 8th Edition, S.Chand Publications, New Delhi.
4. Santi Rajan palit and Sadhan Kumar, 1971. Practical Physical Chemistry, 1st Edition, Joy Publishers, Calcutta.

Instruction Hours/week:L:0 T:0 P:0**Marks: External: 100 Total:100****Course Objectives:**

This skill enhancement course helps the student to

- Develop the preparation of hair dyes, hair spray and shampoos
- Develop the preparation of Hair spray
- Describe the preparation and uses of lotions,
- Describe the preparation and uses lipsticks
- Describe the preparation and uses talcum powder and Creams.
- Demonstrate the chemistry of essential oils

Course outcome

The students have formulate the knowledge about

1. The preparation of hair dyes, hair spray and shampoos
2. The preparation and uses of lotions,
3. The preparation and uses of lipsticks and
4. The preparation and uses of talcum powder
5. The preparation and uses of creams
6. The chemistry of essential oils

Methodology

Self study

UNIT I**Soaps**

Saponification of oils and fats. Manufacture of soaps. Formulation of toilet soaps-different ingredients used. Their functions. Medicated soaps. Herbal soaps. Mechanism of action of soap. Soft soaps. Shaving soaps and creams. ISI specifications. Testing procedures/limits.

UNIT II**Detergents**

Anionic detergents: Manufacture of LAB (linear alkyl benzene). Sulphonation of LAB – preparation of acid slurry. Different ingredients in the formulation of detergent powders and soaps. Liquid detergents. Foam boosters. AOS (alpha olefin sulphonates. cationic detergents: examples. Manufacture and applications.

Non-ionic detergents: examples. Manufacture of ethylene oxide condensater.

Mechanism of action of detergents. Comparison of soaps and detergents.
Biodegradation – environmental effects. ISI specifications / limits.

UNIT III

Shampoos

Manufacture of SLS and SLES. Ingredients. Functions. Different kinds of shampoos – anti-dandruff, anti-lice, herbal and baby shampoos. Hair dye. Manufacture of conditioners. Coco betaines or coco diethanolamides – ISI specifications. Testing procedures and limits.

UNIT IV

Skin preparations

Face and skin powders. Ingredients, functions. Different types. Snows and face creams. Chemical ingredients used. Anti perspirants. Sun screen preparations. UV absorbers. Skin bleaching agents. Depilatories. Turmeric and Neem preparations. Vitamin oil.

Nail polishes: nail polish preparation, nail polish removers. Article removers. Lipsticks, roughes, eyebrow pencils. Ingredients and functions – hazards. ISI specifications.

UNIT V

Oils, fats and Waxes

Classification of oils fats and waxes: distinction between oil, fats and waxes
Hydrogenation of oils-principle and manufacturing details. Definition and determination of saponification value, acid value, iodine value, RM value and their signification. Elaidin test for oils. Some common waxes like spermaceti, Bees wax, baybeery wax and their uses.

TEXT BOOKS:

1. Mohan Malhotra, Latest Cottage Industries, 20th Edition Edn, Vishal publishers, 1980, Meerut.
2. Gobala Rao.S , Outlines of chemical technology, Affiliated East West press,1998

REFERENCES:

1. Kafaro, Wasteless chemical processing, Mir publishers, 1995.
2. Sawyer.W, Experimental cosmetics, Dover publishers, New York, 2000.

Instruction Hours/week:L: 5 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

- To understand the field of natural products chemistry;
- To identify natural products and their probable synthetic pathways.
- To enhance their understanding of biological and biochemical sciences.
- To learn about the Natural products including terpenoids
- To learn about the alkaloids,
- To learn about the vitamins, hormones and chemotherapeutic agents

Course Outcomes

1. Understand the field of natural products chemistry;
2. Identify natural products and their probable synthetic pathways.
3. Enhance their understanding of biological and biochemical sciences.
4. Learnt about the Natural products including terpenoids
5. Learnt about the alkaloids,
6. Learnt about the vitamins, hormones and chemotherapeutic agents

Methodology:

Black board teaching, Discussion and Power Point Presentations

UNIT-I

Terpenoids : Introduction – Classification – General methods of isolation – Isoprene rule- Structural elucidation and synthesis of geraniol, terpinol, dipentene and alpha-pinene.

UNIT-II

Alkaloids – Introduction –Classification – General characteristics – General methods of determining structures – Hofmann's exhaustive methylation, structural elucidation and synthesis of Nicotine, Conine, Piperine and Papaverine.

UNIT-III

Vitamin's – Introduction – Importance of vitamins – structural elucidation and synthesis of Retinol, Thiamine, Riboflavin, Ascorbic acids.

UNIT-IV

Hormones: Introduction – Structural elucidation and synthesis of adrenaline and thyroxin.
Steroids: Introduction -Chemistry and structure of cholesterol. Synthesis (not necessary), Enzymes.

UNIT-V

Chemotherapy: Introduction – Classification of drugs – lethal dose –chemistry and application of sulpha drugs, Antimalarials, and Amoebicidal drugs, Antiseptics, Antipyretics, Analgesics and Antibiotics, Penicillin, Streptomycin, Chloromycetin, Tetracycline- Structure and uses only.

TEXT BOOK:

1. Agarwal,.O.P, 2003. Natural Product Chemistry, Goel Publishing House, Meerut.

REFERENCES:

1. Arun Bahl and B.S.Bahl, 2005. Advanced Organic Chemistry, S.Chand And Company, New Delhi
2. Finar, I.L., 2003. Organic Chemistry, Vol. I & Vol. II, Pearson Education, Singapore.
3. Gurdeep R.Chatwal, 2001. Organic Chemistry Of Natural Products, Vol. I, Himalaya Publishing House, New Delhi.
4. Gurdeep R.Chatwal, 2004. Organic Chemistry Of Natural Products, Vol. II, Himalaya Publishing House, New Delhi.
5. Madan.R.L, 2005. Organic Chemistry Q & A, S.Chand And Company, New Delhi.

Course Objectives

- To enable and impart the knowledge of crystal classes,
- To learn about polarization,
- To understand magnetic properties and spectroscopy.
- To understand how to characterize a compound.
- Identify functional groups
- Interpret a spectrum.

Course Outcomes

1. The students have knowledge of crystal classes
2. Learnt about polarization,
3. Understood magnetic properties and spectroscopy.
4. Understood how to characterize a compound.
5. Identify functional groups
6. Interpret a spectrum.

Methodology

Black board teaching and Group discussion.

UNIT-I

Electrical properties of molecules: Molar polarization, Orientation polarization and distortion polarization – polar and non polar molecules. Determination of dipole moment of polar gases, liquids and solids – Applications of dipole moment in the study of simple molecules.

UNIT-II

Magnetic properties of molecules: Meaning of the terms magnetic susceptibility, magnetic moment, diamagnetism, paramagnetism and ferromagnetism. Determination of magnetic susceptibility by Gouy's method. Application of magnetic measurements.

UNIT-III

Spectroscopy: Absorption spectra- Fundamental concepts of electromagnetic spectrum- The various regions of the spectrum and the relative energies of the radiation in each region-Type of changes induced by the interaction of the radiation with matter. Theory of rotation spectra – Diatomic molecule as rigid rotor and non rigid rotor - Intensities of spectral lines.

Theories of IR spectra – simple harmonic oscillator, model anharmonic oscillator, model of diatomic molecules information on molecular constitution from IR spectra; Application of IR spectra.

UNIT-IV

Theory of Raman spectra – Comparison of IR and Raman spectra - Theory of UV and visible spectra–Franck-Condon principle-Application of UV spectra to simple molecules.

NMR spectra – Basic principles – Chemical shift – Application of NMR spectra to simple molecules. High resolution Raman spectra (details not expected). Examples-Ethanol and o, m & p-xylenes.

UNIT-V

Chromatography – classification- Principles of Column, Paper and Thin Layer chromatography.

TEXT BOOKS:

1. Puri Sharma and Pathania, 2003. Physical Chemistry, Vishal Publishing Co., Jalandar.
2. Y.R.Sharma , 2004.Elementary Organic Spectroscopy,1stEdition,S.Chand& Company Ltd, New Delhi.

REFERENCES :

1. Gopalan,V., P.S.Subramanan and K.Rangarajan, 2003. Elements of Analytical Chemistry, S.Chand and Sons, New Delhi .
2. GurdeepR.Chatwal,ShamK.Anand 2004.Instrumental methods of chemical analysis,1st Edition Mrs.Meenapandey for Himalaya publishing House, Mumbai.
3. B.K.Sharma, 1999. Instrumental methods of chemical analysis,15th Revised and Enlarged Edition Global Publishing House,Meerut.
4. Skoog, .D.A., and D.M.West, 2004. Fundamentals of Analytical Chemistry, 8th Edition, Thomson book store, Singapore.
5. Galen W.Ewing., 1988. Instrumental Methods of Chemical Analysis. III Edition, McGraw Hill International Editions, Singapore .
6. Skoog, D.A., 2004. Instrumental Methods of Analysis, Thomson book store, Singapore.
7. Robbert M. Siverstein and Francis X. Webster, 2013, Spectroscopic identification of organic compounds, 6th edn, Wiley India, New Delhi.

**Instruction Hours/week: L: 5 T:0 P:0
Total:100**

Marks: Internal:40 External: 60

Course Objectives

- To learn about the effect of radiation on plants and animals
- To understand about the radiochemical separation
- To learn about the principles of tracer chemistry,
- To Learn about detection of radiation
- To learn about the use of lasers in chemistry.
- To learn about isotopes.

Course Outcomes

1. Know about the effect of radiation on plants and animals
2. Understand about the radiochemical separation
3. Learn about the principles of tracer chemistry,
4. Learnt about detection of radiation
5. To learn about the use of lasers in chemistry
6. Learnt about isotopes.

Methodology:

Black board teaching and Group discussion

UNIT-I

Isotopes

Isotope separation, thermodynamic and kinetic isotope effects, isotope exchange reaction kinetics, determination of exchange rate constant, production of radio isotopes.

Biological effects of Radiation:

Introduction, genetic and somatic effect on human being, effect of radiation on plants and aquatic Environment .

UNIT-II

Radiochemical Separation

The need of radiochemical separation techniques, carrier techniques, isotope and nonisotopic carriers, co precipitation and adsorption, ion exchange, solvent extract, electrolytes behavior of carrier free tracer radionuclide.

UNIT-III

Principle of tracer chemistry

Application of tracers in physiochemical studies, diffusion studies, isotopic and exchange reactions, tracer in the study of the mechanism of the inorganic chemical reaction, atom transfer & electron transfer mechanisms. Heterogeneous catalysis and surface area measurements, radio carbon dating, tracer studies with tritium, application in metallurgy and preservation of food, geochemical application and hot atom chemistry.

UNIT-IV

Radiation detection and measurements

Ionization current measurements, multiplicative ion collector, methods not based on ion collection, auxiliary Instrumentation and health physical instruments and counting statistics.

UNIT-V**Lasers and Lasers in Chemistry**

Introduction, characteristics of laser, uses of lasers in chemical process, laser induced chemical reactions, organic photochemistry, lasers as a photochemical tool, laser induced selective bond chemistry, overview, bond selective chemistry of light atom molecules.

TEXT BOOK:

1. Hari J. Arnikar, 1982. Essentials of Nuclear Chemistry, John Wiley, New York.

REFERENCES :

1. Friendlander, Kennedy & Miller, 1981. Nuclear and radio Chemistry, John Wiley and Sons, New York.
2. B.G. Harvey, 1965. Nuclear Chemistry, Pentice-Hall of India (Private) Ltd., New Delhi.
3. Hassinsky Translated by D. G. Tuck, 2006. Nuclear Chemistry and its application, Addison Wiley, New York.
4. N. Nesmeyanov, An. N. Nesmeyanov, 1974. Radiochemistry, Mir, Russian.
5. Alan M. Jacobs, Donald E. Kline and Forrest J. Remick, 1960. Basic Principles of nuclear science and reactors, Princeton, N.J., Van Nostrand.
6. Jay, K. E. B, 1961. Nuclear power, today tomorrow, Methuen, London.
7. Gerald R. Van Hecke & Kerry K. Karukstis, 1998. A Guide To lasers in chemistry, Boston.

Instruction Hours/week:L: 5 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

- To know about colour and chemical constituents.
- To introduce the application of colourants (dyes) on various substrate- fibres, food, plastics, etc.
- To provide students with opportunities to appreciate and know the basic skills in dyeing.
- To learn about different types of dyes like Direct, Acid & basic dyes, Mordant, Azo and Vat Dyes ,
- Disperse dyes and about optical brightening agents.
- Know about mechanism of fading

Course Outcomes

1. Knowledge about colour and chemical constituents.
2. Introduce the application of colourants (dyes) on various substrate- fibres, food, plastics, etc.
3. Students have opportunities to appreciate and know the basic skills in dyeing.
4. Learnt about different types of dyes like Direct, Acid & basic dyes, Mordant, Azo and Vat Dyes ,
5. Disperse dyes and about optical brightening agents.
6. Knowledge about mechanism of fading

Methodology

Black board teaching and Group discussion

UNIT I**Colour and chemical constitution**

Colour and chemical constitution - chromophore, auxochrome and resonance, various theories; History of natural and synthetic dyes; Names of commercial dyes; Study of raw materials and dyestuff intermediates; Unit operations - nitration, sulphonation, halogenation, amination, diazotisation and alkali fusion; Classification of dyes based on chemical constitution.

UNIT II**Direct, Acid and Basic Dyes**

Direct cotton dyes (substantive dyes) – Classification, properties, structure and mechanism of dyeing, post treatment of dyeing.

Acid dyes and Basic dyes – Classification, Characteristics, Mechanism of dyeing, Nature of affinity on cellulose and protein fibres.

UNIT III

Mordant, Azo and Vat Dyes

Mordant dyes – classification, methods of application; Metal complex dyes – types of bond formation between dye and various fibres.

Azo dyes – Azoic coupling components, protective colloids, electrolytes, stabilisation of diazonium salts, principles and application.

Vat dyes and solubilised vat dyes – classification, methods of application, principles and application, Stripping agents and correction of faulty dyeing.

UNIT IV

Disperse dyes

Chemistry involved in the production of Aniline black; Prussian black and phthalocyanines.

Disperse dyes - classification based on chemical structure, properties and principles of application; Solvent soluble dyes - Nigrosines and Indulines; Cyanine dyes.

UNIT V

Colour and Brightening Agents

Fluorescent brightening agents (FBA) - Theory and applications; Identification and estimation of dyes on fibres; The action of light on dyes and dyed fibres; Mechanism of fading.

TEXT BOOKS:

1. K. Venkataraman, The chemistry of synthetic dyes Part I & II, Academic Press, New York, 1952.
2. V. A. Shenai, Introduction to Chemistry of Dyesuffs, Sevak Prakashan Pub., Mumbai, 1991.

REFERENCES :

1. V. A. Shenai, Chemistry of Dyes and Principles of Dyeing Vol.-II, Sevak Prakashan, Mumbai, 1987.
2. V. A. Shenai, Ecology and Textiles, Sevak Publications, Mumbai, 1997.
3. D. M. Nunn, The Dyeing of Synthetic Polymer and Acetate Fibres, Dyers Company, Publication Trust, 1979.
4. V. A. Shenai, Toxicity of Dyes and Intermediates, Sevak Publications, Mumbai, 1998.
5. Directory of safe dyes conforming to German Consumer Goods Ordinances, The Dyestuff Manufacturers Association of India, 1996.

Instruction Hours/week:L: 5 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

- To review the chemistry in the context of materials science & engineering.
- To learn the introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.
- To learn about composite and nano material
- To understand the relation between processing, structure, and physical properties.
- To know about High Tc materials
- To know about Thin films and Langmuir- Blodgett Films

Course Outcomes

1. Understand the chemistry in the context of materials science & engineering.
2. Learnt the introduction to metals, ceramics, polymers
3. Knowledge about electronic materials in the context of a molecular level understanding of bonding.
4. Understood the relation between processing, structure, and physical properties.
5. Learn about composite and nano material
6. Knowledge about thin films

Methodology:

Black board teaching and Group discussion

UNIT-I

Glasses and Ceramics

Glassy state, glass formers and glass modifiers, applications, Ceramic structures, mechanical properties, clay products. Reformatories, characterizations, properties and applications.

UNIT – II

Composite and Nanomaterials

Microscopic composites; dispersion - strengthened and particle - reinforced, fibre - reinforced composites, macroscopic composites. Nanocrystline phase, preparation procedures, special properties, and applications.

UNIT-III

High Tc Materials

Defect perovskites, high T_c superconductivity in cuprates, anisotropy; temperature dependence of electrical resistance; optical phonon modes, superconducting state; heat capacity; coherence length, elastic constants, position lifetimes, microwave absorption - pairing and multigap structure in high T_c materials, applications of high T_c materials.

UNIT- IV

Polymeric Materials

Molecular shape, structure and configuration, crystallinity, stress-strain behavior, thermal behavior, polymer types and their applications, conducting and ferro-electric polymers.

UNIT- V

Thin films and Langmuir- Blodgett Films

Preparation techniques; evaporation / sputtering, chemical processes, MOCVD, sol-gel etc. Langmuir-Blodgett (LB) film, growth techniques, photolithography, properties and application of thin and LB films.

Materials of Solid Devices: Rectifiers, transistors, capacitors IV-V compounds, low dimensional quantum structure; optical properties.

TEXT BOOKS:

1. N. W. Ashcroft and N. D. Mermin, 1976. Solid State Physics, Saunders College Publishing, USA.
2. W. D. Callister, 2007. Material Science and Engineering: An introduction, John Wiley & Sons, New York.

REFERENCES:

1. H. V. Keer, 1993. Principles of Solid State, Willey Easton Ltd., New Delhi.
2. G. W. Gray, 1987. Thermotropic Liquid Crystals, John Willey, New York.
3. Kelkar and Halz, Text book of liquid crystals, Chemie Verlag.

Course Objectives

- To provide the skill of the Physical chemistry experiments.
- To provide students with basic laboratory skills and techniques including partition, Rast method and Eutectic system and some basic instrumental methods.
- To develop skills in determining the rate constant of a reaction
- Determination of critical solution temperature of Phenol-water system
- Determination of effect of added electrolyte on critical solution temperature of Phenol-water system.
- Phase Diagram- Simple Eutectic system.

Course Outcomes

1. Students have the skill of the Physical chemistry experiments.
2. Students with basic laboratory skills and techniques including partition, Rast method and Eutectic system and some basic instrumental methods.
3. They have a Skills in determining the rate constant of a reaction
4. Determination of critical solution temperature of Phenol-water system
5. Determination of effect of added electrolyte on critical solution temperature of Phenol-water system.
6. Phase Diagram- Simple Eutectic system.

Methodology

Black board teaching and demonstration.

Content

- 1.Determination of partition coefficient of iodine between Carbontetrachloride and water.
- 2.Determination of partition coefficient of iodine between Benzene and Water.
- 3.Determination of equilibrium constant for the reaction between Potassium iodide and iodine.
- 4.Determination of rate constant of acid- catalyzed hydrolysis of an ester Methyl acetate or Ethyl acetate
- 5.Determination of K_f molecular weight by Rast method –Naphthalene, Diphenyl and m-dinitrobenzene as solvents.
- 6.Determination of critical solution temperature of Phenol-water system.
- 7.Determination of effect of added electrolyte on critical solution temperature of Phenol-water system.
- 8.Determination of concentration of an electrolyte NaCl/KCl/Succinic acid.

9. Determination of transition temperature of sodium acetate, sodium thiosulphate and $\text{SrCl}_2 \cdot 6\text{H}_2\text{O}$
10. Phase Diagram- Simple Eutectic system.

TEXT BOOK:

1. Pandey, O.P, D.N.Bajpai and S.Giri, 2001. Practical Chemistry, 8th Edition, S.Chand Publications, New Delhi

REFERENCES:

1. Lapse, Paul A., Lyle B.Peter, 1986.. Lab Manual for Lingren's Essentials of Chemistry, Prentice Hall, New Delhi
2. Santi Rajan palit and Sadhan Kumar, 1971. Practical Physical Chemistry, Ist Edition, Joy Publishers, Calcutta
3. Siddhiqui, Zeba N, 2002. Practical industrial Chemistry, 1st Edition, Anmol Publications Pvt. Ltd., New Delhi

Course Objectives

- Through this course the student gains knowledge on the technology involved in processing of leathers.
- To learn about principles involved in different process of leather manufacturing
- To understand the tanning of leather and dyeing
- To learn the pollution problems accompanied with the leather manufacturing.
- To understand about animal by products.
- To know about Tannery effluents and treatment

Course Outcomes

1. Through this course the student gained knowledge on the technology involved in processing of leathers.
2. Learnt about principles involved in different process of leather manufacturing
3. Understand the tanning of leather and dyeing
4. Learnt the pollution problems accompanied with the leather manufacturing.
5. Understand about animal by products.
6. Knowledge about Tannery effluents and treatment

Methodology

Self Study

UNIT I

Hides, Skins, Leather-An elementary knowledge of the structure and composition of hides and skins. proteins and their characteristics, Anatomy and histology of protein constituents of leather (an elementary concept).

Basic principle involved in pre-tanning such as soaking, liming, deliming, bating, pickling involved in pre-tanning such as soaking, liming, deliming, bating, pickling and depickling.

UNIT II

Types of tanning-vegetable and mineral tanning, Different types of vegetable tanning materials classification and chemistry of vegetable tanning. Factors and Physio-chemical principle involved in vegetable tanning, Fixation of vegetable tanning. Synthetic tannings-their classifications, general methods of manufacture and use.

UNIT III

The preparation and chemistry of chrome tanning liquids, Olation, Oxolation and hydrolysis of chrome liquids. Effect of adding tanning agents-Role of pH in the reaction of chromium complexes with hide proteins. Factors governing chrome tanning-chemistry of neutralization process.

A brief survey of chemistry of other tanning like Al, Zr and Te salts and their relative merit in contrast with chrome tanning.

Chemistry of combination of tannages involving vegetable tanning aldehydes, chrome and other mineral tanning agents.

UNIT IV

Chemical methods of curing and preservation of hides and skins in acid and alkaline solution.

Principles of analytical methods employed in curing, liming, deliming, bating, pickling. Analysis of vegetable tanning materials and extract.

Process of dyeing leather-Use of mordants, dyeing auxiliaries such as leveling, wetting and dispersing agents-Dye fixations.

UNIT V

Animal by-products-their collection, handling and preservation methods (such as hair, blood, bones, glands, Keratinous materials and their utilization).

Tannery effluents and treatment: Types of water pollution-physical, chemical, physiological and biological. Different types of tannery effluents and wastes-beamhouse waste-liquors-tanning and finishing yard waste liquors, solid waste-origin and disposal.

REFERENCES:

1. Chemical technology of Leather (ISI).
2. Fundamentals of Leather Science-Woodroffe.
3. Tanning processes-Crthmann.
4. Chemistry of Leather manufacture-Mchangelils.
5. Vegetable tanning materials-Howes.

15CHU604	Self study course FORENSIC CHEMISTRY	Semester -VI 4C
Instruction Hours/week:L: 0 T:0 P:0		Marks: External: 100

Course Objectives

- To give the students the importance of forensic chemistry and an exposure to find,
- analyse and find a suitable method to detect the crime .
- To know about food adulteration
- To gain knowledge about transportation
- To gain knowledge about crime detection
- To know about Forgery and counterfeiting
- To learn about Medical aspects

Course Outcomes

1. Students know the importance of forensic chemistry and an exposure to find,analyse and find a suitable method to detect the crime .
2. Knowledge about food adulteration
3. Gained knowledge about transportation
4. Gained knowledge about crime detection
5. Knowledge about Forgery and counterfeiting
6. Learnt about Medical aspects

Methodology

Self study

UNIT I

Food adulteration

Contamination of wheat, rice, dhal, milk, butter, etc. With clay, sand, stone, water and toxic chemicals (e.g. Kasseridhal with mentanil yellow).

Food poisons: natural poisons (alkaloids, nephrotoxins), pesticides (DDT, BHC, Follidol), Chemical poisons (KCN). First aid and Antidotes for poisoned persons.

Heavy metal (Hg, Pb, Cd) Contamination of Sea food. Use of neutron activation analysis in detecting poisoning (e.g., As in human hair)

UNIT II

Transportation

Drunken driving: breath analyzer for ethanol. Incendiary and timed bombs in road and railway tracks. Defusing live bombs.

Hit -and-go traffic accidents : paint analysis by AAS. Soils of toxic and corrosive chemicals (e.g., conc.acids) from tankers.

UNIT III

Crime detection

Accidental explosions during manufacture of matches and fire-works (as in Sivakasi). Human bombs, possible explosives (gelatin sticks,RDX). Metal detector devices and other security measures for VVIP. Composition of bullets and detection of powder burns. Scene of crime: finger prints and their matching using computer records. Smell tracks and police dogs. Analysis of blood and other body fluids in rape cases. Typing of blood. DNA finger printing for tissue identification in dismembered bodies. Blood stains on clothing. Cranial analysis (head and teeth).

UNIT IV

Forgery and counterfeiting

Detecting forgery in bank cheques / drafts and educational records (mark lists, certificates), using UV-light. Alloy analysis using AAS to detect counterfeit coins. Checking silverline water mark in currency notes.

Jewellery : detection of gold purity in 22 carat ornaments, detecting gold plated jewels, authenticity of diamonds (natural, synthetic and glassy).

UNIT V

Medical aspects

AIDS : Cause and prevention . Misuse of scheduled drugs. Burns and their treatment by plastic surgery. Metabolite analysis, using mass spectrum - gas chromatography. Detecting steroid consumption among athletes and race horses.

TEXT BOOKS:

1. B.R. Sharma, Forensic Science in Criminal Investigation and Trial, 4th edn. Universal Law Publishing Company. New Delhi., 2011.

REFERENCES:

1. Stuart H. James, Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. 2013
2. Richard Saferstein, Criminalistics: An Introduction to Forensic Science, 9th edn., 2014.
3. R.K. Tiwari, Computer Crime and Computer Forensic., 2002.
4. Brent E. Turvey, Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd edn. 2011.

Course Objectives

This course enables the students to

- Discuss the principle and the theory behind the UV spectroscopy.
- Discuss the principle and the theory behind the IR spectroscopy.
- Explain the principle and the theory behind the NMR spectroscopy.
- Explain the principle and the theory behind the mass spectroscopy.
- Explain the principle and the theory behind the ESR spectroscopy.
- Identify the free radicals using ESR

Course Outcome

The Student have gained knowledge about

1. The principle and the theory behind the UV spectroscopy.
2. The principle and the theory behind the IR spectroscopy.
3. The principle and the theory behind the NMR spectroscopy.
4. The principle and the theory behind the Mass spectroscopy
5. The principle and the theory behind the ESR spectroscopy
6. Identification of the free radicals using ESR

Methodology

Self study

UNIT – I

Ultraviolet and Visible Spectroscopy: Electronic spectra of diatomic molecules - laws of photochemistry - electronic absorption transitions-correlation of electronic structure with molecular structure - Simple chromophoric groups - effects of conjugation - Instrumentation.

UNIT – II

Infrared Spectroscopy: The vibrating diatomic molecules-the simple harmonic oscillator, identification of fundamental groups. Finger print region-application to organic and inorganic compounds-Instrumentation.

UNIT – III

NMR Spectroscopy: Principle of NMR spectroscopy – description of the PMR instrument, factors affecting chemical shifts-chemical shift equivalence and magnetic equivalence - spin-spin coupling -double resonance-shift reagents-applications to organic and inorganic compounds - problems. FT NMR

UNIT – IV

Mass Spectroscopy: Principles of mass spectrometry – resolution - description of single focusing and double focusing electron impact mass spectrometers - presentation and analysis of spectra - determination of molecular formulae - nitrogen rule- stevenson's rule - isotope abundance analysis - meta stable ions and peaks the molecular ion peak - fragmentation processes .

UNIT - V

ESR spectroscopy - theory - derivative curves - g shift - hyperfine splitting-isotropic and anisotropic systems-zero field splitting and Kramer's degeneracy. Identification of free radicals – applications to copper complexes.

TEXT BOOKS:

1. Jag Mohan, 2001. Organic Spectroscopy Principles and Applications. Narose Publishing House, New Delhi.
2. Kemp W., 2004. Organic Spectroscopy. III Edition, Pal Grave, New York.

REFERENCES

1. Russell S. Drago, 1965. Physical Methods in Inorganic Chemistry. Reinhold Publishing Corporation, New York.

Course Objectives

- To give the students the importance of Greener reagents and chemicals and an exposure to knowledge about the clinical training and synthesis of drugs.
- Summarize the twelve principles of green chemistry
- To know the special emphasis of an atom economy.
- Explain the catalysis and alternate sources of energy.
- Explain the basics of medicinal chemistry
- Pharmacokinetics and clinical trial

Course Outcomes

1. The students know the importance of Greener reagents and chemicals and an exposure to knowledge about the clinical training and synthesis of drugs.
2. Summarize the twelve principles of green chemistry
3. Knowledge about the special emphasis of an atom economy.
4. the catalysis and alternate sources of energy.
5. the basics of medicinal chemistry
6. Pharmacokinetics and clinical trial

Methodology

Self study

UNIT – I

Introduction to green chemical principles: Definition, tools and twelve principles of green chemistry, solvent less reactions and reactions in water, microwaves and fluorosolvents, green resolution of racemic mixtures, atom efficient processes,

UNIT – II

Greener reagents and Products: Greener reagents and products, minimizing bioavailability and use of auxiliary materials, examples of greener reagents including replacement of phosgene, solid state polymerizations, alternative nitrile synthesis.

UNIT - III

Basics of Medicinal chemistry: Brief history of medicinal chemistry, classification of drugs- brief description of biological, design of pro drugs system- multiple pro drug formation – soft drug principle and application

UNIT - IV**Pharmacokinetics and drug metabolism and development of new drugs**

Natural resources of lead compounds – absorption, distribution, metabolism, elimination – oxidation and hydrolysis - Five classic steps in the design of a new drug – procedures in drug design isolation of bio active compounds - accidental discovery

UNIT – V

Clinical training and synthesis of drugs

Various phases in pre-clinical testing– designing organic synthesis – convergent synthesis – patenting and manufacture – complexes and chelating agents – metal clusters – detoxification – drug action and metal chelation.

TEXT BOOKS:

1. Anastas, P.T. and J.C. Warner, 1998. Green chemistry; theory and practice. Oxford Uni.press; Oxford.
2. Matlack, A.S.2001. Introduction to Green chemistry Marcel Dekker. New York
3. Cann.M.C. Connelly, M.E.2000.Real world cases in green chemistry. ACS; Washington D.C

REFERENCES:

1. Clarke.J.H.and D.Macquarrine, 2002. Hand book of Green chemistry and technology. Balackwell; Oxford.U.K.
2. Kirchoff, M. and Ryan.M.A. 2002. Editors.Greener approaches to under graduate chemistry experiments. ACS; Washington .D.C
3. Lancaster.M.2002. Green chemistry; An introductory text. Royal society of chemistry; London

M.Sc. CHEMISTRY

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2015 – 2016)



DEPARTMENT OF CHEMISTRY
FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)
Pollachi Main Road, Eachanari (Post), Coimbatore – 641 021,
Tamil Nadu, India

Phone: 0422- 2980011 – 15 Fax No: 0422- 2980022-23
Email: info@karpagam.com web: www.kahedu.edu.in

Programme Learning Outcomes (PLO)

- a. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Analytical, Inorganic, Organic and Physical Chemistries.
- b. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
- c. Students will be skilled in problem solving, critical thinking and analytical reasoning as applied to scientific problems.
- d. Students will be able to clearly communicate the results of scientific work in oral, written and electronic formats to both scientists and the public at large.
- e. Students will be able to explore new areas of research in both chemistry and allied fields of science and technology.
- f. Students will appreciate the central role of chemistry in our society and use this as a basis for ethical behavior in issues facing chemists including an understanding of safe handling of chemicals, environmental issues and key issues facing our society in energy, health and medicine.
- g. Students will be able to function as a member of an interdisciplinary problem solving team.
- h. The graduate has specific skills in planning and conducting advanced chemical experiments and applying structural-chemical characterisation techniques.
- i. Are able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
- j. Are able to use modern library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry.

Programme Specific outcome (PSO)

- k. A graduate with a Master's degree in Chemistry has in-depth and detailed functional knowledge of the fundamental theoretical concepts and experimental methods of chemistry.
- l. Students should have an advanced level understanding of the following areas of chemistry - Analytical, Inorganic, Organic, and Physical Chemistry. They should master graduate level understanding of their major area(s) of research.
- m. Students should be able to communicate scientific results in writing and in oral presentation.
- n. Students should become proficient in their specialized area of chemistry and acquire the basic tools needed to carry out independent chemical research

Programme Educational Objectives

PEO-1

The Masters in Chemistry will extend your depth and breadth of knowledge in all branches of chemistry, suitable for a professional chemist capable of conducting research.

PEO-2

To carryout research in the trust areas of chemistry. Will be able to communicate effectively the scientific information and research results in written and oral formats, to both professional scientists and to the public.

PEO-3

To motivate critical thinking and analytical skills to solve complex chemical problems and the Ability to handle problems of practical relevance to society while complying with economical, environmental, ethical, and safety factors.

PEO-4

To practice chemistry by performance of experiments in the laboratory classes. To perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions

Mapping

PO	a	b	c	d	e	f	g	h	i	j	k	l	m	n
PEO 1	x	x			x			x	x		x	x	x	
PEO 2		x	x	x	x			x	x		x		x	x
PEO 3			x	x		x	x			x			x	x
PEO 4	x	x	x			x		x		x	x	x		x

DEPARTMENT OF CHEMISTRY

FACULTY OF ARTS, SCIENCE AND HUMANITIES

PG PROGRAM (CBCS) – M.Sc. Chemistry

(2015–2016 Batch and onwards)

Course code	Name of the course	Objectives & Outcomes		Instruction hours per week			Credits	Maximum Marks		
		PEO's	PO's	L	T	P			CIA	ESE
SEMESTER I										
15CHP101	Organic Chemistry – I: Reaction Mechanisms	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP102	Inorganic Chemistry –I: Nuclear Chemistry and Metallic Clusters	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP103	Physical Chemistry- I: Quantum Chemistry and Group Theory	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP104	Organic and Inorganic Spectroscopy	1,2,3,4	a,b,c,h,j	4	0	0	4	40	60	100
15CHP105	Green and Medicinal Chemistry	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP111	Organic Chemistry Practical-I: Qualitative Analysis and Single Stage Preparations	3,4	b,h,j	0	0	4	2	40	60	100
15CHP112	Organic Chemistry Practical-II: Quantitative Analysis and Double Stage Preparations	3,4	b,h,j	0	0	4	2	40	60	100
	Seminar Presentation	1,2,3	A,b,c,d,e,h,j	2	0	0	-	-	-	-
	Semester Total			22	0	8	24	280	420	700
SEMESTER II										
15CHP201	Organic Chemistry-II: Rearrangements, Reactions, Photochemistry and Pericyclic Reactions	1,2,3	a,c,e	4	1	0	5	40	60	100
15CHP202	Inorganic Chemistry-II: Co-ordination Chemistry	1,2,3	a,c,e	4	1	0	5	40	60	100
15CHP203	Physical Chemistry II: Chemical Kinetics and Electrochemistry	1,2,3	a,c,e	4	0	0	4	40	60	100
15OEP201	Open Elective (Chromatographic Techniques)	3,4	f,h	0	0	0	3	-	100	100

15CHP205A	Elective – II	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP205B										
15CHP205C										
15CHP205D										
15CHP205E										
15CHP211	Inorganic Chemistry Practical-I: Qualitative Analysis and Preparations	3,4	b,h,j	0	0	5	3	40	60	100
15CHP212	Inorganic Chemistry Practical-II: Quantitative Analysis and Complex Preparations	3,4	b,h,j	0	0	5	3	40	60	100
	Seminar Presentation	1,2,3	A,b,c,d,e,h,j	2	0	0	-	-	-	-
	Semester Total			18	2	10	27	240	460	700
SEMESTER III										
15CHP301	Organic Chemistry- III (Natural Products)	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP302	Physical Chemistry-III (Thermodynamics)	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP303	Physical Methods in Chemistry (Instrumentation)	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP304	Nanochemistry	3,4	F,h	4	0	0	4	40	60	100
15CHP305A	Elective – III	1,2,3	a,c,e	4	0	0	4	40	60	100
15CHP305B										
15CHP305C										
15CHP305D										
15CHP305E										
15CHP311	Physical Chemistry Practical –I : (Molecular Weight Determination and Conductometric Titrations)	3,4	b, h,i	0	0	4	2	40	60	100
15CHP312	Physical Chemistry Practical- II: (Chemical Kinetics and Potentiometric Titrations)	3,4	b, h,i	0	0	4	2	40	60	100
	Seminar Presentation	1,2,3	A,b,c,d,e,h,j	2	-	-	-	-	-	-
	Semester Total			22	0	8	24	280	420	700
SEMESTER IV										
15CHP419	Project Work	1,2,3	A,b,c,d,e	-	-	30	15	80	120	200

			,h,j							
	Semester Total			-	-	30	15	80	120	200

*Only for Experiments. Calculations to be carried out at home.

List of Core Course Elective			
Elective-I		Elective-II	
Code	Course	Code	Course
15CHP204A	Advanced Organic Chemistry	15CHP305A	Polymer Chemistry
15CHP204B	Analytical Chemistry	15CHP305B	Textile Chemistry
15CHP204C	Organometallic Chemistry	15CHP305C	Industrial Chemistry
15CHP204D	Advanced Coordination Chemistry	15CHP305D	Applied Chemistry
15CHP204E	Organic Chemical Technology	15CHP305E	Printing Chemistry

Open Elective	
Code	Course
15OEP201	Chromatographic Techniques

Self study courses

Code	Course(s)	Hrs / week	Marks			Exam / Hrs	Credit
			CIA	ESE	Total		
15CHP306	Nano Technology	-	-	100	100	3	04
15CHP401	Analytical Techniques in Chemistry	-	-	100	100	3	04

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100

Course Objectives

- To understand aromaticity.
- To provide a versatile knowledge of different name reactions and their application in synthesis.
- To learn about familiar addition and elimination reactions.
- To gain knowledge about reaction intermediates.
- To understand the principles and reaction mechanisms involving various electrophilic and nucleophilic, addition and elimination reactions.
- To relate the different organic reaction mechanisms.

Course outcomes (CO's)

1. Learned the concept aromaticity and various types of aromaticity
2. Familiarized the various types of electrophilic and nucleophilic substitution reactions and their Mechanism
3. Learned the familiar addition and elimination reactions
4. Learned the concept of reaction intermediates.
5. Understood about the synthesis aromatic compounds using electrophilic and nucleophilic substitution, addition and elimination reactions.
6. Described the various organic reaction mechanisms.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Aromaticity and chemical methods in mechanisms: Aromaticity - introduction - aromaticity of benzenoid and heterocyclic compounds. Non-benzenoid aromatics – annulenes, azulenes, ferrocenes and fulvenes.

Kinetic and non-kinetic methods of study of reaction mechanisms - kinetic methods-Primary and secondary kinetic isotopic effects. Non-kinetic methods - study of intermediates, isotopic labeling, stereochemical studies, energy profile diagrams and cross over experiments. Hammond's postulate. Kinetic and thermodynamic control.

Linear free energy relationship - Hammett equation and Taft equation.

UNIT – II

Addition reactions: Electrophilic, nucleophilic and free radical addition to double and triple bonds - hydration, hydroxylation, Michael addition, hydroboration and epoxidation. Addition reactions to carbonyl compounds – Mannich reaction, Meerwein Ponderoff-Verley reduction, Grignard, Claisen, Dieckmann, Stobbe, Knoevenagel, Darzen, Wittig, Thorpe and Benzoin reactions.

UNIT – III

Electrophilic substitution reactions: Aromatic electrophilic substitution reactions-formylations–Gattermann, Gattermann Koch and Riemer Tiemann reactions. Kolbes, Bischler-Napieralski and Hofmann-Martius reactions. Friedel crafts alkylation and acylations.

Aliphatic electrophilic substitution reactions - mechanisms- SE1, SE2 and SEi - structure reactivity relationship, typical electrophilic substitution reactions - Friedel crafts acylation at olefinic carbon, Stork enamine reaction and decarboxylation of aliphatic acids.

UNIT – IV

Nucleophilic substitution reactions: Aliphatic nucleophilic substitution reactions-mechanisms - SN1, SN2, ion pair and SNi- substitution at vinyl carbon. Stereochemistry of nucleophilic substitution reaction - effect of substrate structure - solvent effects - leaving group effect – nucleophilicity, ambident nucleophiles and ambident substrates-neighbouring group participation.

Aromatic nucleophilic substitution reactions - benzyne mechanism, intermediate complex mechanism and SN1 mechanism, structure reactivity relationship.

Ziegler alkylation and Chichibabin reaction.

UNIT – V

Elimination reactions: Mechanisms - E1, E2, Ei and E1cB mechanisms- stereochemistry of eliminations. Hofmann rule-Saytzeff rule-Bredts rule – Substitution versus Elimination. Typical elimination reaction - Chugaev reaction, Hofmann degradation and Cope elimination.

Carbenes and nitrenes - structure, generation and reactions.

TEXT BOOKS:

1. Jerry March, 1992, Advanced Organic Chemistry. IV Edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore.
2. Finar, I.L., 2000. Organic Chemistry Vol. II: Stereochemistry and the Chemistry of Natural Products. V Edition, Addison Wesley Longman (Singapore) Pte. Ltd- Indian Branch, New Delhi.
3. Gurdeep R. Chatwal, 2004. Organic Chemistry of Natural Products. Vol. II, Himalaya Publishing House, New Delhi.

REFERENCES:

1. Sanyal, S.N., 2003. Reactions, Rearrangements and Reagents. IV Edition, Bharathi Bhawan (Publishers and Distributors), New Delhi.
2. Tewari, N., 2011, Advanced Organic Reaction Mechanism. III Edition, Books and Allied (P) Ltd, Kolkata.

3. Agarwal, O.P., 2004. Natural Product Chemistry. Vol. II, Goel Publishing House, Meerut.
4. Gurdeep R. Chatwal, 2001. Organic Chemistry of Natural Products. Vol. I, Himalaya Publishing House, New Delhi.

Course Objectives

- To learn the nuclear structure, stable and unstable atomic nuclei, nuclear reactions and different modes of radioactive decay and also methods for measurements of radioactivity.
- To analyses the various defects and its application on inorganic crystals.
- To understand the detection of radioactive rays and to measure the radiation.
- To learn about the fundamentals of metallic clusters.
- To understand the chemistry of boranes and related compounds.
- To apply the knowledge to know about the various forms of inorganic compounds

Course outcomes

1. Described the basic concepts of nuclear chemistry and types of nuclear reactions.
2. Discriminate the various defects and also known about its application on inorganic crystals
3. Understood the Basics of metallic clusters, preparation, properties and applications of metallic clusters
4. Learned the structure and bonding in molecules / ions and predict the structure of molecules / ions.
5. Described the type of defects in metals and about semi conductors
6. Understood the inorganic and organometallic chemistry, catalysis in the molecular level

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Inorganic chains – rings - cages and clusters (definition and structure) - metal clusters - dinuclear clusters - trinuclear clusters - tetranuclear clusters - hexanuclear clusters – organometallic clusters.

Boranes, boron hydrides (structure and properties) – carboranes - metallocarboranes - Wade's theory -closo-nido and arachno structures - borazines, phosphazenes – Sulphur-Nitrogen ring compounds. Isopoly and heteropoly acids of V, Cr, Mo and W.

UNIT – II

Metallic state-free electron, band and zone theories - non stoichiometry - point defects in solids - Schottky and Frenkel defects - linear effects - dislocation - effects due to dislocation - electrical properties of solids - insulators-intrinsic semiconductors - n and p type and super conductors - ceramics elementary treatment.

Organometallic compounds in homogeneous catalytic reactions-coordinative unsaturation – acid-base behavior reaction – migration of atoms or groups from metal to ligand – insertion reaction – reactions of coordinated ligands – catalytic reactions of alkenes – isomerisation of alkenes – hydrogenation – hydroformylation and hydrosilation of alkenes – alkene polymerization and oligomerisation – fluxional molecules.

UNIT – III

Nuclear Chemistry - the nucleus - subatomic particles and their properties, binding energy. N/P ratios in stable and meta stable nuclei - different type of nuclear forces - liquid model- shell model. Modes of radioactive decay - α , β and γ decay radiation, electron capture, nuclear isomerism, internal conversion.

UNIT – IV

Experimental methods - Cloud chamber, nuclear emulsion, bubble chamber, proportional counters-G.M counter, scintillation counters, semi conductor detector.

Particle accelerators - Cyclotron, synchrotron, betatron and bevatron.

UNIT – V

Nuclear reactions - Bethes's notation, Q-value, columbic barrier, cross section, different types of nuclear reactions - projectiles capture - particle emission, spallation, fission, fusion, theories of fission, use of fission products, nuclear reactors - fissile and fertile isotopes- U^{233} , U^{235} , Pu^{239} , Th^{232} , -atomic power projects in India, stellar energy, synthetic elements - application of radio isotopes - Hot atom chemistry.

TEXT BOOKS:

1. Huheey, J. E., E A. Keitler & R.L. Keitler, 2002. Inorganic Chemistry. IV Edition, Pearson Education, Singapore.
2. Shekar C. V., 2005. A text book of nuclear chemistry. I Edition, Dominant publishers and Distributors, New Delhi.
3. Arnikar, H. J., 2003. Essentials of Nuclear Chemistry. IV Edition, New Age International Publishers Pvt. Ltd., New Delhi.

REFERENCES:

1. Chakrabarty, D. K., 2005. Solid State Chemistry. I Edition, New Age International Publishers, New Delhi.
2. Cotton F.A. and Wilkinson, 1998. Advanced Inorganic Chemistry. John-Wiley & Sons, New Delhi.
3. Glasstone S., 1967. Source Book on Atomic Energy. III Edition, East West Press, New Delhi.
4. Gurdeep Raj, 2002. Advanced Inorganic Chemistry. Vol. I, Goel Publishing House, Meerut.
5. Madan, R.D., 2005. Modern Inorganic Chemistry. S. Chand & Co., New Delhi.
6. Puri B.R. and L. R. Sharma, 2002. Principles of Inorganic Chemistry. Shoban Lal & Co., New Delhi.
7. Wahid Malik, R. D.Madan and G. D. Tuli, 2004. Selected topics in Inorgani Chemistry. S. Chand & Co., New Delhi.

Course Objectives

- To study the fundamentals and applications of classical mechanics and quantum chemistry
- To understand the structure of an atom and different approximation methods
- To learn the concept of Group theory and their applications.
- To discuss the molecular phenomena and its model problems
- To explain the probabilities, amplitudes, averages, expectation values and observables.
- To analyses the concept of group theory to predict the spectroscopic properties of a molecules

Course Outcomes (CO's)

Students have learned and understood

1. The differences between classical and quantum mechanics. The limitations of classical mechanics.
2. the connection of quantum mechanical operators to observables
3. probabilities, amplitudes, averages, expectation values, and observables
4. how molecular phenomena can be related to model problems
5. the fundamentals of group theory
6. the connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals, for example)
7. Identified the point groups of molecules and apply the concept of group theory to predict the spectroscopic properties.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Failure of classical mechanics and the success of quantum theory in explaining black body radiation and photoelectric effect.

The time dependent and time independent Schrodinger equations - Born's interpretation of the wave function. Requirements of the acceptable wave function.

Algebra of operators. Sums and products of operators - commutator - linear operators-eigen functions and eigen values - correspondence between physical quantities in classical mechanics and operators in quantum mechanics - Hamiltonian operator - angular momentum operator. Quantization of angular momentum and its spatial orientation - average values - postulates of quantum mechanics.

UNIT – II

Particle in a one-dimensional box - quantization of energy - normalization of wave function - orthogonality of the particle in a one-dimensional box wave functions. Illustration of the uncertainty principle and correspondence principle with reference to the particle in a one-dimensional box - particle in a three dimensional box - separation of variables.

Solving of Schrodinger equation for one-dimensional harmonic oscillator. Harmonic oscillator model of a diatomic molecule. Illustration of the uncertainty principle and correspondence principle with reference to harmonic oscillator.

Solving of Schrodinger equation for a rigid rotor. Rigid rotor model of a diatomic molecule.

UNIT – III

Schrodinger equation for the H-atom (or H-like species)- separation of variables - energy levels. Radial distribution functions - orbitals and orbital shapes. Probability density and radial distribution functions.

Need for approximation methods. The perturbation theory- application of perturbation method to systems such as anharmonic oscillator and He-atom.

The variation method - application of variation method to systems such as anharmonic oscillator and He-atom.

UNIT – IV

Symmetry elements and symmetry operations - definition of identical and equivalent elements configurations - effect of performing successive operations commutative and non-commutative - inverse operations.

Groups and their basic properties - definition of a group - basic properties of a group- definition of abelian - cyclic- isomorphic, finite, infinite groups and subgroup. Symmetry classification of molecules into point groups-Schoenflies symbol (only-difference between point group and space group).

Matrices- Definition of matrix, square matrix, diagonal matrix, null matrix, unit matrix, row matrix, column matrix, symmetric matrix, skew symmetric matrix and conjugate matrix. Multiplication, commutative and non commutative-determination of inverse of a matrix, block multiplication of matrices-addition and subtraction of matrices.

Matrix notations for symmetry operations of C_{2v} and C_{3v} groups-construction of character tables for C_{2v} and C_{3v} point groups.

UNIT – V

Definition of reducible and irreducible representations - irreducible representations as orthogonal vectors - direct product rule, the great orthogonality theorem and its

consequences - determinations of the characters for irreducible representation of C_{2v} and C_{3v} point groups using the orthogonality theorem.

Group theory and Vibrational spectroscopy - vibrational modes as basis for group representation - symmetry selection rules for IR and Raman spectra, Mutual exclusion principle - classification of vibrational modes.

Group theory and dipole moment.

TEXT BOOKS:

1. Prasad R.K., 2004 Quantum Chemistry. New Age International Publishers Pvt. Ltd., Second Edition, New Delhi.
2. Cotton F.A, 2002. Chemical Applications of Group Theory. III Edition, A Wiley Inter Science Publication, Texas.
3. Chandra A.K., 2002. Quantum Chemistry. IV Edition, Tata McGraw – Hill Publishing Company Ltd., New Delhi.
4. House Ames E., 2005. Fundamental of Quantum Chemistry. II Elsevier Academic Press, New Delhi.
5. Levine, Iran, 2004. Quantum Chemistry. Pearson Education Pvt. Ltd., New Delhi.
6. Raman K.V, 2002. Group theory. Tata Mc Graw Publishing Company, New Delhi.
7. Puri, Sharma & Pathania, 2006. Principles of Physical Chemistry, Millenium Edition, Vishal Publishing Co., Jalandar.
8. Veera Reddy K., 2005. Symmetry and Spectroscopy of Molecules, New Age International Pvt. Ltd., New Delhi.

REFERENCES:

1. Peter Atkins and Julio de Paula, 2009. Atkins' Physical chemistry, Oxford University press, Gopsons papers Ltd., Noida.

15CHP104 ORGANIC AND INORGANIC SPECTROSCOPY 4H 4C
Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objective

- To learn about Electronic spectroscopy.
- To understand about IR spectroscopy.
- To understand the basic concept of NMR spectroscopy
- To apply the different aspects of NMR spectroscopy to predict the structure of compounds.
- To learn about the mass spectroscopy and Mossbauer spectroscopy.
- To learn about the invaluable tools in synthetic chemistry for the confirmation of known molecules and elucidation of shape and structures of unknown compounds of high complexity with a high degree of certainty.

Course outcomes

1. Understood the basic concepts of Electronic and IR spectroscopy.
2. Understood the valuable concepts in NMR spectroscopy.
3. Learned the basic knowledge about Mass spectroscopy.
4. Applied the different aspects of NMR spectroscopy to predict the structure of compounds.
5. Analyzed and identified simple organic molecules by using UV, IR, ^1H -NMR and ^{13}C -NMR and Mass spectral data.
6. The students learned how to interpret the spectral data and to identify the structure of the molecules

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Ultraviolet and Visible Spectroscopy: Electronic spectra of diatomic molecules - laws of photochemistry - electronic absorption transitions-correlation of electronic structure with molecular structure - Simple chromophoric groups - effects of conjugation - Woodward -Fisher rules for α,β unsaturated carbonyl compounds & dienes - Aromatic systems with extended conjugation - applications to Organic and Inorganic compounds - Instrumentation.

UNIT-II

Infrared Spectroscopy: The vibrating diatomic molecules-the simple harmonic oscillator and unharmonic oscillator - the diatomic rotor - factors influencing vibrational frequencies - identification of fundamental groups. Fingerprint region-application to organic and inorganic compounds-Instrumentation.

UNIT-III

NMR Spectroscopy: Principle of NMR spectroscopy – description of the PMR instrument, factors affecting chemical shifts-chemical shift equivalence and magnetic equivalence - spin-spin coupling - first order and non first order spectra - Hetero nuclear coupling in ^1H NMR - deuterium exchange - high field spectra - double resonance-shift reagents-applications to organic and inorganic compounds. FT NMR.

^{13}C NMR spectroscopy- factors affecting the chemical shifts - broad band and off-resonance decoupling - applications in organic chemistry.

UNIT – IV

Mass Spectroscopy: Principles of mass spectrometry – resolution - description of single focusing and double focusing electron impact mass spectrometers - presentation and analysis of spectra - determination of molecular formulae - Nitrogen rule- Stevenson's rule - isotope abundance analysis - meta stable ions and peaks the molecular ion peak - fragmentation processes - Retro Diels - Alder rearrangement - McLafferty rearrangement - Ortho Effect - fragmentation associated with functional groups - aldehydes, ketones, carboxylic acids, esters, amides, alcohols, thiols, amine, ethers, sulphides and halides..

UNIT – V

Mossbauer and Problems: Mossbauer spectroscopy – Principles - Spectrometer - Isomer shift - Quadrapole interaction - Nuclear Zeeman Splitting – Applications.

Problems involving UV, IR, NMR, Mass spectral data (for compounds not more than 10 carbon atoms).

TEXT BOOKS:

1. Jag Mohan, 2001. Organic Spectroscopy Principles and Applications. Narose Publishing House, New Delhi.
2. Kemp W., 2004. Organic Spectroscopy. III Edition, Pal Grave, New York.
3. Sharma Y.R., 2005. Elementary Organic Spectroscopy: Principles and Chemical Applications. S. Chand Limited, New Delhi.
4. Silverstein, R. M., F. X. Webster and D. Kiemle, 1998. Spectroscopy of Organic Compounds. VI Edition, John Wiley & Sons, New York.

REFERENCES:

1. Levine, Ira. N., 2001. Quantum Chemistry. Prentice – Hall of India Pvt. Ltd., New Delhi.
2. Prasad R.K., 2002. Quantum Chemistry. II New Age International Pvt. Ltd., New Delhi.
3. Russell S. Drago., 1965. Physical Methods in Inorganic Chemistry. Reinhold Publishing Corporation, New York.

Course Objectives

- To introduce the concept of Green chemistry.
- To understand the basics of Medicinal chemistry.
- To introduce the 12 principles of Green chemistry as well as the tools of Green chemistry.
- To demonstrate how to evaluate a reaction or process and determine “Greener” alternatives.
- To focus on the application of greener routes to improve industrial processes and to produce important products.
- To understand the drug targets, drug metabolism and about clinical training.

Course outcomes

The student understood the following

1. Designed of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.
2. Created awareness for reducing waste, minimizing energy consumption in organic synthesis.
3. Implemented techniques of green synthesis in organic reactions
4. Used the various alternative resources for green technology in organic synthesis.
5. Understood the drug targets, metabolism and about clinical training.
6. Applied the concept of microwaves and ionic liquids in various chemical reactions.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT-I

Introduction to green chemical principles: Definition, twelve principles of green chemistry, solventless reactions - reactions in water, microwaves and fluorous solvents - Atom efficient processes: evaluating chemical reactions according to their yield and atom efficiency - examples of enzymatic reactions and catalytic processes- Planning of green synthesis in a chemical lab.

UNIT – II

Greener reagents and reactions: Methods of designing safer chemicals. Examples of greener reagents including replacement of phosgene and solid state polymerizations.

Green reactions: Acyloin condensation, Aldol condensation, Arndt Eistert synthesis, Baker Venkatraman synthesis, Beckmann rearrangement, Clemmenson reduction and Baeyer Villiger oxidation.

UNIT - III

Basics of Medicinal chemistry: Classification of drugs- basics of molecular modeling and docking - prodrugs and soft drugs- types of pro drugs system.

Drug targets and drug solubility: Enzymes and enzyme inhibitor – competitive and non-competitive inhibitors – reversible and irreversible inhibitors – ligand receptor theories:- Clarke's theory and Paton's rate theory – effect of pH, pKa and polarity on drug solubility

UNIT – IV

Pharmacokinetics and drug metabolism and development of new drugs: Absorption, distribution, metabolism, elimination – oxidation and hydrolysis of a drug- Design of a new drug – procedures in drug design - accidental discovery - molecular modification of lead compounds.

UNIT – V

Clinical training and synthesis of drugs: Various phases in pre-clinical testing and clinical testing – designing organic synthesis – different types of synthesis –complexes and chelating agents – natural resources of lead compounds – extraction and isolation of bio active compounds.

TEXT BOOKS:

1. Ahluwalia V.K., 2012. Green Chemistry-Environmentally Benign Reactions. Ane Books Pvt Ltd, New Delhi.
2. Ghose J., 2005. A Text book of Pharmaceutical Chemistry, S. Chand Pub Ltd., Delhi.
3. Ilango K & P. Valentina, 2007. Text Book of Medicinal Chemistry. Vol I, Keerthi Publishers, Chennai.

REFERENCES:

1. Ashutosh Kar, 2005. Medicinal Chemistry. III Edition, New Age International Publishers, New Delhi.
2. Stanley E. Manahan, 2006. Green Chemistry and the Ten Commandments of Sustainability. II Edition, ChemChar Research, Inc Publishers Columbia, Missouri U.S.A.
3. Chatterjea, M. N and R. Shinde, 2012. Textbook of Medicinal Biochemistry. Jaypee Brothers, Medical Publishers (P) Ltd, New Delhi.

Course Objectives

- To provide the knowledge about the qualitative analysis by separation techniques of a two component mixture.
- To develop skills for the preparation of organic compounds by name reactions.
- To familiarizes the test involving identification special elements.
- To learn confirmation test of various functional groups.
- To learn systematic procedure for bimixture organic substance analysis
- To understand the solubility nature of different types of organic substances.
- To calculate the limiting reagent, yield and purity of the compounds.
- To list the various techniques of preparation and analysis of organic substances.

Course outcomes

1. Familiarized the solubility nature of organic substances of different functional group.
2. Learned the pilot separation of bimixtures and familiarize the systematic procedure of organic substances analysis
3. Learned two stage preparations involving molecular rearrangement and well known organic reactions.
4. Familiarized the test involving identification of special elements
5. Learned the confirmatory test for various functional groups.
6. Understand the techniques involving drying and recrystalliation by various method
7. Expertise the various techniques of preparation and analysis of organic substances.
8. Calculated a limiting reagent, yield and purity

Evaluated collected data to determine the identity, purity, and yield of products

Methodology

Blackboard teaching and Demonstration.

Contents

Analysis of two – component mixtures: Separation and characterization of compounds.

Note: Each student should analyze a minimum of six organic mixtures.

Preparations involving one stage comprising of the following process: Nitration, acylation, halogenation, diazotisation, rearrangement, hydrolysis, reduction, alkylation and oxidation and one preparation illustrating the following: Benzoin condensation, Canizzaro reaction, Perkin reaction, Reimer-Tiemann reaction, Sandmayer reaction, Fries rearrangement, Skraup synthesis- single stage.

Note: Each student should do a minimum of six preparations involving single stage.

REFERENCES:

1. Thomas, A.O., 2003. Practical Chemistry, Scientific Book Center, Cannanore.
2. Bansal, Raj K, 2001. Laboratory Manual of Organic Chemistry. IV Edition, New Age Publishers, New Delhi.
3. Arun Sethi, 2003. Laboratory experiments in Organic Chemistry. New Age Publishers, New Delhi.
4. Furniss B.S, A. J. Hannaford, P. W. G. Smith and A. R. Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry. V Edition, Pearson Education Ltd., Singapore.
5. Lepse, Paul A and Lyle B.Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.
6. Mendham, J., R. C. Denney, J. D. Barnes and M. Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis. VI Edition, Pearson Education Ltd., Singapore.

Objectives

On successful completion of the course the students should have

- To learn about the basic concept of quantitative analyses of organic compounds.
- to measure the Iodine value on oil
- To analyses the amount of glucose, phenol, ethyl methyl ketone, ascorbic acid and aniline in the given solutions.
- To learn the two stage preparation of organic compounds by important name reactions.
- To calculate the saponification and Iodine number of various oils for identifies its purity
- To understand preparation of various organic compounds in single step or in double step.

Course Outcomes

1. The students have learned about basic concept in quantitative analyses
2. Learned how to estimate the Glucose, Phenol, ethyl methyl ketone, Ascorbic acid and aniline.
3. Measured the Iodine number of oil
4. Understood the two stage preparation of organic compounds by important name reactions.
5. Measured the saponification and Iodine number of value to justify their purity.
6. Learned to prepare para-Nitro Benzamide for para-Nitro toluene and also know about double stage preparations like Anthranilic acid and pthalimides preparations

Methodology

Blackboard teaching and Demonstration.

Contents

Estimation of phenol, Ethyl methyl ketone, glucose, nitro, amino and methoxy groups, unsaturation in an organic compound.

Analysis of oils Reichert- Meissl value, Iodine value, saponification value and acetyl value.

Double stage preparations- Anthranilic acid and pthalimides.

Extraction and estimation of active constituents

Only for learning purpose and demo (Not for exam)

- a. Lactose from milk.
- b. Caffeine from tea.
- c. Nicotine from tobacco extract.
- d. Citric acid or ascorbic acid from a tablet or from a natural source.

- e. Curcumin from turmeric.
- f. Lycopene from tomato.

REFERENCES:

1. Arun Sethi, 2003. Laboratory experiments in Organic Chemistry. New Age Publishers, New Delhi.
2. Bansal, Raj K, 2001. Laboratory Manual of Organic Chemistry. IV Edition, New Age Publishers, New Delhi.
3. Furniss, B. S., A. J. Hannaford, P. W. G. Smith and A. R. Tatchell, 2004. Vogel's Textbook of Practical Organic Chemistry. V Edition, Pearson Education Ltd., Singapore.
4. Lepse, Paul A and Lyle B. Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.
5. Mendham J., R.C. Denney, J.D. Barnes and M. Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis. VI Edition, Pearson Education Ltd., Singapore.

(REARRANGEMENTS, REACTIONS, PHOTOCHEMISTRY AND PERICYCLIC REACTIONS)

Instruction Hours/week:L: 4 T:1 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

On successful completion of the course the students should have

- To know about versatile knowledge of rearrangements
- To understand the different organic (radical and concerted) reactions and their applications in synthesis.
- To learn the principles of conformational analysis and stereochemistry.
- To explain the concepts in organic photochemistry
- To describe the basic ideas about pericyclic reactions
- To implement this basic concept to design and produce the new organic molecules

Course outcomes (CO's)

1. Understood the versatile knowledge of rearrangements
2. Understood the different organic reactions (radical and concerted).
3. Learned about the principle of conformational analysis and stereochemistry.
4. Explained about the molecular rearrangements, Pericyclic reactions and Cyclo addition and sigmatropic reactions
5. Described the basic ideas of pericyclic reactions.
6. Designed new form of organic compounds using these basic concepts.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Molecular rearrangements: Intramolecular 1,2 - shifts - Wagner - Meerwein and Pinacol-Pinacolone rearrangements.

Migration to carbonyl carbon – Demyanov and Neber rearrangements.

Rearrangements to electron deficient nitrogen and oxygen – Baeyer – Villiger, Dienone - phenol, Favorskii, Fries, Wolff, Benzidine and Stevens rearrangements.

Non-cyclic rearrangements – Chapman and Wallach rearrangements.

UNIT – II

Conformational analysis and stereochemistry: Stereochemistry of sulphur and nitrogen compounds, stereoselective and stereospecific reactions - R/S-notation of optically active carbon compounds. Optical isomerism of biphenyls, allenes and spiranes. Planar chirality - cyclophanes and ansa compounds - geometrical isomerism - E/Z notation-configuration in aldoximes and ketoximes. Conformation in cyclic system-decalins, perhydrophenanthrene and perhydroanthracene. Conformation and reactivity of cyclohexanes.

UNIT – III

Radical reactions: Configuration and generation of short lived free radicals- characteristics of free radical reactions – radical substitution, radical additions and rearrangement of free radicals. Typical reactions such as Sandmeyer, Gomberg, Pechmann, Ullmann, Pschorr and Hunsdiecker reactions.

Oxidation and reductions- mechanisms – aromatisation, oxidation of alcohols and glycols, ozonolysis, Sommelet reaction and selectivity in reduction-metal hydride reduction- reduction of nitro compounds and acyloin condensation.

UNIT – IV

Organic photochemistry: Introductory theory of light absorption- Jablonski diagram- photophysical processes- excimers and exciplexes - energy transfer-geometry of excited states – quantum efficiency - photochemical reaction of ketones- Norrish type-I and type-II reactions. Paterno Buchi reaction- cis and trans isomerisation-Photo-Fries rearrangement and Ene reaction.

UNIT – V

Pericyclic reactions: Definition-classification-characteristic features- the electrocyclic reaction-Woodward – Hofmann rules- orbital correlation diagram- the Frontier molecular orbital theory-electrocyclic conversion of 1,3-dienes and 1,3,5-trienes. Cycloaddition – [2+2] addition-Diel's Alder reaction- stereochemistry of Diel's Alder reaction. Sigmatropic reactions – [1,3], [1,5] and [3,3] sigmatropic shifts - Cope and Claisen rearrangements.

TEXT BOOKS:

1. Jerry March, 1992, Advanced Organic Chemistry. IV Edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore.
2. Mukherji, S.M. and S.P. Singh, 2002. Reaction Mechanism in Organic Chemistry. III Edition, Rajiv Beri for Macmillan India Ltd., New Delhi.
3. Nasipuri D., 2003, Stereochemistry of Organic Compounds-Principles and Applications. II Edition, New Age International (P) Ltd., New Delhi.

REFERENCES:

1. Tewari, N., 2011. Advanced Organic Reaction Mechanism. III Edition, Books and Allied (P) Ltd., Kolkata.
2. Sanyal, S.N., 2003. Reactions, Rearrangements and Reagents. IV Edition, Bharati Bhawan (Publishers and Distributors), New Delhi.
3. Ramesh, P., 2005. Basic Principles of Organic Stereochemistry. I Edition, Meenu Publications, Madurai.
4. Depuy C.H. and O.L. Chapman, 1975. Molecular Reactions and Photochemistry, Prentice-Hall of India Private Limited, New Delhi.
5. Coxon, J.M. and B. Halton, 1974. Organic Photochemistry, Cambridge University Press, Bentley House, 200 Euston Road, London.

Instruction Hours/week:L: 4 T:1 P:0 Marks: Internal:40 External: 60 Total:100

Course objectives

- To understand the theories of bonding in coordination compounds.
- To study the kinetics and mechanisms of reactions of complex compounds.
- To understand the magnetic properties of coordination compounds.
- To learn about the coordination compounds present in the biological systems and their functions.
- To remember the types of coordination compounds like metal carbonyls, carbocyclic pi complex in coordination compounds
- To evaluate the geometries of simple molecules.

Course Outcomes

1. Learned how to name coordination compounds and to be able to draw the structure based on its name
2. Used Crystal Field Theory to understand the magnetic properties (and in simple terms the colour) of coordination compounds
3. Described the stability of metal complexes by the use of formation constants and to calculate thermodynamic parameters from them
4. Recognized the types of coordination compounds like metal carbonyls, carbocyclic pi complexes in coordination compounds
5. Familiar with some reactions and applications of coordination compounds
6. Predicted the geometries of simple molecules

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT-I

Coordination Chemistry: Nomenclature, Isomerism and methods of preparation of coordination complexes- types of ligands.

Bonding: Valence bond theory- Crystal field theory – Crystal field effects in tetrahedral, octahedral and square planar symmetries. Crystal field stabilization energy - weak and strong fields- spectrochemical series. Molecular orbital theory: based on group theoretical approach. M.O. diagram of Oh, Td & square planar symmetries involving pi bonding- experimental evidence for the presence of pi bonding. Magnetic behaviour of the transition metal ions in crystal field and molecular orbital theories.

UNIT-II

Electronic spectra of complexes: Term symbols for d configuration. Characteristics of d-d transition and selection rules. Weak and strong field limits. Orgel and Tanabe - Sugano diagrams. Jahn-Teller tetrahedral distortion and spin orbit couplings. Nephelauxetic effect - charge transfer spectra.

UNIT-III

Metal carbonyls: Methods of preparation, structure, bonding and reactions. Carbonylate ions. Carbonyl hydrides–Vaska's compound, complexes of molecular nitrogen and oxygen. Nitrosyl complexes, **dinitrogen complexes**. Complexes of unsaturated hydrocarbons- alkenes, allyl and pentadienyl complexes.

UNIT-IV

Carbocyclic pi complexes: Cyclopentadienyl and related complexes synthesis, bonding, structure and reaction. Arene complexes-Complexes of biochemical importance: Cytochromes, Haemoglobin, Myoglobin, Cyanocobalamin, Chlorophyll- structure and functions.

UNIT-V

Reaction of coordination compounds: Substitution reactions in square planar and octahedral complexes – Trans effect – mechanism of redox reactions.

Homogeneous catalysis by coordination compounds – hydroformylation –carboxylation of methanol – hydrogenation of unsaturated organic compounds.

TEXT BOOKS:

1. Huheey J. E., E. A. Keitler & R. L. Keitler, 2002. Inorganic Chemistry. Vol. IV, Pearson Education, Singapore.
2. Madan R. L and G. D. Tuli, 2005. Inorganic Chemistry Q & A. S. Chand and Co., New Delhi.
3. Sarn, K, 2005.Co-Ordination Chemistry. Rajat Publications, New Delhi.

REFERENCES:

1. Alan G. Sharpe, 1999. Inorganic Chemistry. III Edition, Addison Wesley Harlow, England.
2. Albert Cotton, F. Geoffrey Wilkinson and Paul. L. Gaus, 2002. Basic Inorganic Chemistry. John Wiley & Sons, New York.
3. Agarwal, R.C., 1998. Some Recent Aspects of Inorganic Chemistry. Kitab Mahal, Allahabad.
4. Chakraborty D.K., 2003. Inorganic Chemistry. New Age International Publishing Pvt. Ltd., New Delhi.
5. Cotton, F.A. & G. Wilkinson, 2003. Advanced Inorganic Chemistry. John Wiley & Sons, New York.
6. Drago, R.S. 1965. Physical Methods in Inorganic Chemistry. Rein Gold Publishing Corporation, New York.

Course Objectives

- To provide knowledge on fundamental understanding of chemical kinetics and to establish a relationship between the rate of reaction and the concentration of the reactants (the rate law, or rate equation).
- To apply the chemical kinetics concept to study the enzyme mechanisms.
- To provide knowledge to the students about coulometric methods and its application.
- To investigate the adsorption, classification of adsorption and factors affecting of adsorption over corrosion application.
- To remember the basic polarography concepts.
- To understand the theories of catalysis and types of catalysis.

Course outcomes

1. Student understood theories of reaction rates, how reaction rates are measured and represented in rate laws.
2. Understood the applications of chemical kinetics in studying enzyme mechanisms
3. Provided the knowledge of coulometric methods and applications.
4. Evaluated the electrochemical principles involved in corrosion and energy storage.
5. Remembered the basic polarography techniques.
6. Understood the theories of catalysis and types of catalysis

Methodology

Black-board teaching, Powerpoint presentation and group discussion.

UNIT-I

Theories of reaction rates: Arrhenius theory- hard - sphere collision theory of gas – phase reactions. Activated complex theory or Absolute reaction rate theory (ARRT) for ideal gas reactions (in terms of partition functions).

Reactions in solution: Comparison between gas-phase and solution reactions. The influence of the solvent on the reactions between ions. Influence of ionic strength on rates of reactions in solution - Primary salt effect-influence of pressure on rates of reactions in solution -significance of volume and entropy of activations.

Study of Fast reactions: Flow methods, pulse methods, relaxation methods, shock-tube method and nuclear magnetic resonance method.

UNIT-II

Homogeneous catalysis: Specific and general acid - base catalysis. Bronsted catalysis law- Hammett acidity functions. Enzyme catalysis (single substrate reaction only). Michaelis Menten law - Influence of pH and temperature on enzyme catalysis.

Surface phenomenon and heterogeneous catalysis: Adsorption and free energy relation at interfaces. Gibb's adsorption isotherm- physisorption and chemisorptions- Adsorption

isotherms (Freundlich & Langmuir). Kinetics of heterogeneous catalysis- Langmuir - Hinshelwood and Langmuir - Rideal - Eley mechanisms.

UNIT-III

Inter ionic attraction theory: Debye – Huckel – Onsager equation - Falkenhagen effect- Wien effect. Activity and activity coefficient- Ionic strength- Debye – Huckel limiting law and its applications.

Theories of double layer. Helmholtz – Perrin - Gouy chapmann – Stern theories.

UNIT – IV

Polarography: Current – voltage relationships-The dropping mercury electrode. Diffusion current- Half – wave potentials. Applications of polarography- Amperometric titrations.

Fundamental principles of coulometric methods- Constant current and controlled potential methods- Simple applications.

UNIT – V

Kinetics of corrosion: Importance–Graphical presentation of kinetic data-exchange current density- different types of polarization of electrodes. Activation polarization and Tafel plots-Mixed potential theory-Application of electrode kinetics to experimental observations-Faradic impedance and corrosion.

TEXT BOOKS:

1. Bahl, B. S, Arun Bahl and Tuli, G.D, 2005. Essentials of Physical Chemistry, S. Chand & Company, New Delhi-110 055.
2. Puri, B. R, Sharma, L.R, Madan S. Pathania, 2013. Elements of Physical Chemistry, Vishal Publishing, Jalandhar.

REFERENCES:

1. Keith J. Laidler, 2004, Chemical Kinetics, Pearson Education Publishing, Indian branch, New Delhi.
2. Atkins, P.W, 2002. Physical Chemistry. IX Edition, Oxford Publishers, Oxford.
3. Glasstone, S. 2002. An Introduction to Electrochemistry. Litton Educational Publishing, New Delhi.
4. Arora, M.G, 1996. Polarographic Methods in Analytical Chemistry. I Edition, Anmol Publications, New Delhi.
5. Raj Narayan, 1983. An Introduction to Metallic Corrosion and Its Prevention. Mohan Primlani for Oxford & IBH Publishing Company.
6. Moore W.J., 1999. Physical Chemistry. V Edition, Orient Longman Ltd., Prentice Hall-INC Delhi.
7. Rajaram, J and K.C. Kuriakose, 1993. Kinetics & Mechanisms of Chemical Transformations. Mac Millan, Chennai.

Instruction Hours/week:L: 0 T:0 P:0External: 100 Total: 100

Course Objectives

- To make non-chemistry graduates to get exposed to different chromatographic techniques.
- To learn the terms and definitions in general chemistry and use of popularly used chemicals.
- To enable the student to understand about instrumentation in chromatography.
- To explain the basic ideas of separation techniques.
- To implement the some chromatography techniques to separate the compounds from mixtures.
- To describe the concepts in Gas-Liquid and HPLC.

Course Objectives

1. Make non-chemistry graduates to get exposed to different chromatographic techniques.
2. Learned the terms and definitions in general chemistry and use of popularly used chemicals.
3. Enabled the student to understand about instrumentation in chromatography.
4. Understood the basic ideas of separation techniques.
5. Apply the some chromatography techniques to separate the compounds from mixtures.
6. Described the concepts in Gas-Liquid and HPLC.

Methodology

Self study

UNIT- I

Chromatographic methods, general aspects of chromatography, classification and types, mechanism.

UNIT- II

Column chromatography, construction and operation of column, choice of adsorbent elements, applications. Ion exchange chromatography : Anion and cation exchangers techniques applications.

UNIT- III

Paper chromatography: Mechanism of separation, development and applications. Thin layer chromatography: Techniques, choice of adsorbent solvents and applications.

UNIT- IV

Gas-liquid Chromatography, Principles, Retention Volumes, Instrumentation, Carrier Gas, Columns, Stationary Phase, Detectors, Thermal Conductivity, Flame Ionization, Electron Capture, application of G.L.C.

UNIT -V

High Performance Liquid chromatography: Scope, Column efficiency, Instrumentation, Pumping Systems, Columns, Column packing, Detectors, Applications.

TEXT BOOKS:

1. Vogel's, 2000. Text book of Quantitative Chemical Analysis. VI Edition, Pearson Education Limited, London.
2. Sharma B.K., 2005. Instrumental Methods of Chemical Analysis. 24 Edition, Krishna Prakashan Media (P) Ltd, Meerut.

REFERENCES:

1. Skoog, D. A And J. J. Leary, 1971. Principles of Instrumental Analysis. IV Edition, Saunders College Publishing, US.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Objectives

On successful completion of the course the students should have:

- To describe heterocyclic compounds, synthetically important name reactions in organic chemistry.
- To list the various reagents used in organic synthesis
- To understand the composition of chemotherapy.
- To learn about some basic anti biotics.
- To remember the various vitamins and its synthesis.
- To construct a small organic moiety with basic pharmacokinetics property.

Course Outcomes

1. Described the heterocyclic compounds and some important naming reactions.
2. Listed the various reagents used in organic synthesis.
3. Understood the composition of chemotherapy.
4. Learned about some basic anti-biotics
5. Remembered the various vitamins and its synthesis.
6. Applied to make a small organic moiety with basic pharmacokinetics property.

Methodology

Black-board teaching, Power point presentation and group discussion.

UNIT-I

Heterocyclic compounds: Nomenclature-methods of preparation and important reactions of indole, pyrazole, imidazole, quinoline, isoquinoline, uric acid and adenine. Structure elucidation of caffeine.

A general study of flavones, isoflavones and anthocyanins – structure and synthesis of quercetin and cyanidin chloride.

UNIT-II

Reagents in organic synthesis: Use of the following reagents in organic synthesis and functional group transformations: Gilman's reagent, Diazomethane, N-Bromosuccinimide, Lead Tetraacetate, Raney Nickel, Trimethylsilyl Iodide, Tri-n-Butyltin hydride, Periodic Acid, Sodium Amide, Jones reagent, Wilkinsons catalyst, 1,3-dithiane and Fenton's reagent.

UNIT-III

Some typical reactions and their applications in organic synthesis: C-C and C=C bond forming reactions-Vilsmeier – Haack, Shapiro, Wittig – Horner, Peterson synthesis and Heck reactions. Ring formation by Robinson annulation Simmons-Smith reaction.

Woodward Prevost hydroxylation, Oppenauer oxidation, Birch reduction, Clemmenson reduction, Wolff Kishner reduction, Sharpless asymmetric epoxidation.

UNIT-IV

Chemotherapy: Introduction-Sulphonamides-Antimalarials-Arsenical drugs.

Antibiotics: A detailed study of structure, stereochemistry and synthesis of Penicillin, Cephalosporin C, Chloramphenicol and Patulin. The macrolide group of antibiotics-polypeptide antibiotics-polyacetylene antibiotics.

UNIT- V

Vitamins: Structure and synthesis of vitamin B complex : Vitamin B1 (aneurin) - vitamin B2 (riboflavin) - pantothenic acid - folic acid - vitamin H (biotin) - vitamin B6 (pyridoxine) - vitamin E (tocopherol) - vitamin K1 (phyloquinone) and vitamin K2.

TEXT BOOKS:

1. Finar, I.L., 2007. Organic Chemistry Vol. I: The Fundamental Principles. VI Edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
2. Finar, I.L., 2000. Organic Chemistry Vol. II: Stereochemistry and the Chemistry of Natural Products. V Edition, Addison Wesley Longman (Singapore) Pte. Ltd-Indian Branch, New Delhi.
3. Jerry March, 1992, Advanced Organic Chemistry. IV Edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore.

REFERENCES:

1. Sanyal, S.N., 2003. Reactions, Rearrangements and Reagents. IV Edition, Bharathi Bhawan (Publishers and Distributors), New Delhi.
2. Tewari, N., 2011. Advanced Organic Reaction Mechanism. III Edition, Books and Allied (P) Ltd, Kolkata.
3. Gurdeep Raj, 2013. Organic Name Reactions and Molecular Rearrangements. III Edition, Krishna Media Prakashan Pvt. Ltd., Meerut.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course objectives

This course enables the students

- To learn about quantitative inorganic analysis.
- To understand the different colorimetric analysis.
- To learn about electrochemical methods of analysis.
- To learn different chromatographic techniques.
- To understand how to analyze the data obtained.
- To Explain about various analytical techniques for inorganic compounds.

Course Outcomes (CO's)

On successful completion of the course the students should have to

1. Learned about quantitative inorganic analysis.
2. Understood the different colorimetric analysis.
3. Learned the electrochemical methods of analysis.
4. Understood the different chromatographic techniques.
5. Learned about how to analyze the data obtained.
6. Explained the various analytical techniques for inorganic compounds.

Methodology

Black-board teaching, Powerpoint presentation and group discussion.

UNIT-I

Quantitative Inorganic Analysis: Theoretical basis of quantitative inorganic analysis-common ion effect solubility product, effect of acid, temperature and solvent upon the solubility of a precipitate.

Supersaturation-Von Weimarn concept. Formation and treatment of precipitates-co-precipitation and post-precipitation. Precipitation from homogeneous solution. Specific and selective precipitants.

Principles of acid-base, oxidation-reduction, precipitation and complexometric titrations-indicators used in such titrations. Uses of organic reagents in inorganic quantitative and qualitative analysis.

UNIT-II

Data Analysis: Errors in chemical analysis-Defining terms: Mean median, accuracy and precision – classification of errors: Systematic errors and random errors. Improving accuracy of analysis – mean, standard deviation and Q-test. Comparison of results – Least square, 't'-test, 'F'-test and 'Chi' square test.

UNIT-III

Techniques in Inorganic Chemistry: Colorimetry: Theoretical and practical aspects of colorimetric analysis. Flame emission and atomic absorption spectroscopy – types of

atomic spectroscopy – emission methods – absorption methods – fluorescence methods – source and atomizers for atomic spectroscopy – flame atomizers – Electrothermal atomizers – principle and applications of atomic absorption spectroscopy. Advantages of atomic absorption spectrometry over flame photometry.

UNIT-IV

Electrochemical Methods of Analysis: Cyclic Voltammetry, Coulometry and amperometry-principle and applications.

Thermal Characterization techniques: Principle and applications of Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) and Thermogravimetric Analysis (TGA) Thermometric titration.

UNIT- V

Chromatographic Methods: Classification – techniques and applications in column, size-exclusion, ion exchange, paper and thin layer chromatography.

Gas chromatography and high performance liquid chromatography (HPLC)-principle, equipment design, sample injection system, columns, detectors and applications.

TEXT BOOKS:

1. Vogel A. T, 1962. A Text Book of Quantitative Inorganic Analysis. Longman Publishing Group, United Kingdom.
2. Christian G. D, 2007. Analytical Chemistry. VI Edition, John Wiley & Sons, United States.

REFERENCES:

1. Skoog, D. A., D. M. West, F. J. Holler and S. R. Crouch, 2014. Fundamentals of Analytical Chemistry. IX Edition, Cengage Learning, United States of America.
2. Skoog, D. A., F. J. Holler and S.R. Crouch, 2007, Principles of Instrumental Analysis. VI Edition, Thomson Brooks/Cole Publishers, United States of America.
3. Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch, 2000. Analytical Chemistry – An Introduction. VII Edition, Cengage Learning, United States of America.

Instruction Hours/week:L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total:100

Course objectives

This course enables the students

- To learn about nature of the bonding between organic ligands and metals.
- To understand about the metal alkyl complexes.
- To learn about the alkene and cyclopentadienyl complexes.
- To understand about the usage of organometallic compounds as catalysts
- To learn about the organometallic compound used as the catalyst in hydrogenation and hydroxylation of olefins.
- To study the concept of oxidation and polymerization of olefins.

Course Outcomes

On the completion of the course

1. Learned about the Alkyls and Arene complexes
2. Understood the bonding in olefin, acetylene and allyl systems
3. Known about the concepts of synthesis, structure and bonding in metallocenes
4. Understood the Organometallic reaction mechanisms and its applications
5. Learned about the Catalysis, hydrogenation of olefins and oxoprocess
6. Studied the concept of oxidation of olefins and polymerization

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Metal carbonyls: Definition of organometallic compound - 18 electron rule - effective atomic number rule classification of organometallic compounds - the metal carbon bond types - ionic bond - sigma covalent bond - electron deficient bond - delocalised bond - dative bond - metal carbonyl complexes - synthesis - structure and reactions of metal carbonyls - the nature of M- CO bonding - binding mode of CO and IR spectra of metal carbonyls - metal carbonyls- metal carbonyl anions - metal carbonyl hydrides - metal carbonyl halides - metal carbonyl clusters - Wades rule and isolobal relationship - metal nitrosyls - dinitrogen complexes - dioxygen complexes.

UNIT- II

Metal alkyl complexes: Stability and structure - synthesis by alkylation of metal halides - by oxidative addition - by nucleophilic attack on coordinated ligands - metal alkyl and 18 electron rule - reactivity of metal alkyls - M-C bond cleavage reactions - insertion of CO to M-C bonds - double carbonylation - insertions of alkenes and alkynes - insertions of metals with C-H bonds - alkylidene and alkylidyne complexes - synthesis of alkylidene complexes in low oxidation states and in high oxidation states - bonding in

alkylidene complexes - synthesis and bonding in alkylidyne complexes - reactivity of alkylidene and alkylidyne complexes.

UNIT- III

Alkene complexes: Synthesis of alkene complexes by ligand substitution - by reduction and by metal atom synthesis - bonding of alkenes to transition metals - bonding in diene complexes - reactivity of alkene complexes - ligand substitution - reactions with nucleophiles - olefin hydrogenation - hydrosilation - Wacker process - C-H activation of alkenes - alkyne complexes - bonding in alkyne complexes - reactivity of alkynes - alkyne complexes in synthesis - cobalt catalysed alkyne cycloaddition.

UNIT- IV

Cyclopentadienyl complexes: Metallocenes - synthesis of metallocenes - bonding in metallocenes - reactions of metallocenes - $\text{Cp}_2\text{Fe}/\text{Cp}_2\text{Fe}^+$ couples in biosensors - bent sandwich complexes - bonding in bent sandwich complexes - metallocene halides and hydrides - metallocene and stereospecific polymerisation of 1-alkenes - cyclopentadiene as a non-spectator ligand - monocyclopentadienyl (half-sandwich) complexes - synthesis and structures of allyl complexes - arene complexes - synthesis - structure and reactivity of arene complexes - multidecker complexes.

UNIT - V

Organometallic compounds in homogeneous catalytic reactions: Coordinative unsaturation - acid-base behaviour reaction - migration of atoms or groups from metal to ligand - insertion reaction - reactions of coordinated ligands - catalytic reactions of alkenes - isomerisation of alkenes - hydrogenation - hydroformylation and hydrosilation of alkenes - alkene polymerisation and oligomerisation - fluxional molecules.

TEXT BOOKS:

1. Huhe, J. E., 1978. Inorganic Chemistry - Principles of Structure and Reactivity, Harper International Edition, Harper and Rone, New York.
2. Haiduc J and J. J. Zuckerman, 1985. Basic Organometallic Chemistry, Walter de Gruyter, Berlin.

REFERENCES:

1. Bockmann, 1996. Organometallics 1, Complexes with transition metal-carbon-bonds, Oxford science publications, Oxford, UK.
2. Bockmann, 1996. Organometallics 2, Complexes with transition metal-carbon bonds, Oxford science publications, Oxford, UK.
3. Cotton, F. A and G. Wilkinson, 1978. Basic Inorganic Chemistry, Wiley Eastern.

Instruction Hours/week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

- To understand bonding parameters in cubic and distorted geometries from absorption spectra.
- To identify coordination compounds with noble electrochemical and photochemical properties suitable for the construction of supramolecular assemblies and nanostructures.
- To envision the importance of inorganic photosensitizers for solar energy conversion.
- To identify complexes suitable for application in medicinal inorganic chemistry.
- To implement these ideas to synthesis any new metal coordinate compounds.
- To set research goals in the highly topical areas of research in coordination chemistry.

Course Outcomes

1. Understood bonding parameters in cubic and distorted geometries from absorption spectra.
2. Identified the coordination compounds with noble electrochemical and photochemical properties suitable for the construction of supramolecular assemblies and nanostructures.
3. Proposed the importance of inorganic photosensitizers for solar energy conversion.
4. Remembered the complexes suitable for application in medicinal inorganic chemistry.
5. Applied these ideas to synthesis any new metal coordinate compounds.
6. Set research goals in the highly topical areas of research in coordination chemistry.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Electronic Structure and Geometry of Coordination Compounds: Electronic spectroscopy: crystal field spectra of Oh and Td complexes, effect of distortion on the spectra, structural evidence from electronic spectra, evaluation of Δ_o values in Co(III) and Ni(II) Oh and Td complexes, quantification of covalency nephelauxetic ratio.

Nuclear magnetic resonance spectroscopy: application of spin-spin coupling to inorganic structural determinations, NMR spectra of quadrupolar nuclei, NMR of paramagnetic transition metal complexes: scalar shift and pseudocontact shift, scalar shift and covalency.

Electron spin resonance spectroscopy: hyperfine and zero field effects on the epr spectra of coordination compounds, ligand field interpretation of the g- and A- tensors, nuclear quadrupole interaction.

Mossbauer spectroscopy: quadrupole and magnetic interactions, isomer shift and site symmetry of metal ions in coordination compounds, Mossbauer emission spectroscopy and applications.

UNIT- II

Electrochemical Studies and Photochemistry: Applications of AC polarography, cyclic voltammetry, and differential pulse voltammetry to the study of coordination compounds: computation of electrochemical parameters and evaluation of reversibility. Spectroelectrochemistry: optically transparent electrodes and cells, chrono absorptometry.

Solar and renewable energy: light- to-chemical energy conversion in lamellar solids and thin films, solar energy conversion by dye-sensitized photovoltaic cells and by coordination compounds anchored onto semiconductor surfaces.

Photochemistry of lanthanide complexes: A-ET-E processes, NIR- to-visible photon up conversion, nonlinear optical behavior, exciting multiplication and relaxation dynamics in quantum dots and applications.

UNIT- III

Supramolecular Assemblies and Devices: Supramolecular assemblies: design principles, homo- and heteropoly metallic polypyridyl systems, inter component energy and electron transfer, role of bridging ligands.

Dendrimers and metallodendrimers: synthetic methodology-divergent and convergent methodologies; types of metallodendrimers, dendrimer encapsulated catalysis.

Molecular devices: supramolecular photochemistry, photo- and electrochemical sensors, molecular electronic devices.

UNIT-IV

Inorganic Biochemistry and Medicinal Inorganic Chemistry: Photosynthesis: biological photosynthesis, chemical approaches to artificial photosynthesis-light harvesting dendrimers and multiporphyrin arrays.

Bioredox agents: rubredoxins and ferredoxins- functions and structural features.

Contrast enhancing agents for MRI: theory of MRI imaging, synthesis of Gd-based contrast agents.

Metal complexes for radiotherapy: diagnostic radiopharmaceuticals, non- technetium for diagnostic imaging, Tc-labelled small molecules and peptides as diagnostic radiopharmaceuticals.

Metal complexes as photosensitizers.

UNIT-V

Synthesis of Novel Coordination Compounds and Assemblies: Synthesis of Schiff base macrocycles and macrocyclic binucleating ligands by coordination template effects.

Polyazamacrocycles and macrocycles with pendant arms.

Construction of polynuclear supramolecular assemblies and nanostructures.

TEXT BOOKS:

1. Huheey, J. E, E. A. Keiter and R. L. Keiter, 1983. Inorganic Chemistry. IV Edition, Harper and Row, New York.
2. Lever. A. B. P., 1984. Inorganic Electronic Spectroscopy. II Edition, Elsevier Publishing Company, Amsterdam.
3. Steed, J. W and J. L. Atwood, 2000. Supramolecular Chemistry, John Wiley & Sons Ltd., New York.
4. Drago, R. S., 1977. Physical Methods in Chemistry, Saunders, Philadelphia.

REFERENCES:

1. Cotton, F. A., G. Wilkinson, C. A. Murillo and M. Bochmann, 1998. Advanced Inorganic Chemistry. VI Edition, Wiley Interscience, New York.
2. Purcell, K. F and J. C. Kotz, 1976. Inorganic Chemistry, Saunders, Philadelphia.
3. Weil, J. A., J. R. Bolton and J. E. Wertz, 1994. Electron Paramagnetic Resonance, Wiley Interscience, New York.
4. Kissinger, P. T and W. R. Heinann, 1996. Laboratory Techniques in Electroanalytical Chemistry. II Edition, Marcel Dekker Inc., New York.
5. Sawyer, D. T., A. Sobkowiak and J. L. Roberts, 1995. Electrochemistry for Chemists. II Edition, Wiley Interscience, New York.
6. Lehn, J.M., 1995. Supramolecular Chemistry, Concepts and Perspectives, VCH, Weinheim.

Instruction Hours/week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

This course enables the students

- To understand the elements of chemical engineering in organic synthesis.
- To know the unit processes in organic chemical technology.
- To understand the techniques involved in typical organic synthesis.
- To know the thermodynamics in organic unit processes.
- To apply the knowledge of chemical reactions in organic synthesis.
- To study the detailed manufacture techniques to synthesis dye, pigment and dugs.

Course Outcomes

On the completion of the course, students to

1. Understood the elements of chemical engineering in organic synthesis.
2. Knew the unit processes in organic chemical technology.
3. Understood the techniques involved in typical organic synthesis.
4. Learned the thermodynamics in organic unit processes.
5. Applied the knowledge of chemical reactions in organic synthesis.
6. Studied the detailed manufacture techniques to synthesis dye, pigment and dugs.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Elements of Chemical Engineering: Unit operations in chemical engineering: Fluid flow: Reynold's number; Laminar and turbulent flow. Bernoullis' equation, head loss in piping. Calculation of head as an aid in selecting pumps. Turbulent flow and its relevance in heat transfer. Agitation and mixing of liquids.

UNIT- II

Heat transfer: Heat transfer coefficient, Importance of heat transfer in chemical process. Special provisions for heat transfer in highly exothermic reactions. Corrosion and scale formation in heat exchangers and condensers. Preliminary data to aid design of heat transfer equipment.

Mass transfer: Distillation- two and three component systems. Ideal and non- ideal systems, various types of fractioning columns. Calculation of HETP from distillation curves. Leaching and extract ion based on process parameters.

Filtration and Drying: Select ion of proper equipment for above operations.

UNIT- III

Applications of Thermodynamics in Organic Unit Processes: Energy balance over a flow system, heat of reaction, effect of temperature upon heat of reaction Chemical equilibrium, calculation of equilibrium conversion, entropy changes, simultaneous reactions, vapour phase and liquid phase catalytic reactions.

Organic Chemical Process Kinetics: Factors affecting chemical processes Type and shape of reactors used, the method of operation, temperature control Batch or flow process, batch mixing, fixed or fluidized bed.

UNIT- IV

Unit Process in Industrial Organic Synthesis: Study of Organic reactions as they apply to industrial processes. Process parameters of importance in scaling up of these reactions from laboratory to pilot plant to main plant.

Selection of suitable plant equipment, especially the shape and size of the reactor stirrer, condenser etc. choice of material of construction.

Study of industrial scale nitration, sulphonation, homogeneous and heterogeneous hydrogenation, oxidation and halogenations reactions.

UNIT-V

Study of Detailed Technologies of Manufacture- a dye, a drug and a pigment: Three specific chemicals, one each from the above category will be discussed, illustrating the chemical engineering principles used in proper selection of equipment.

The logic involved in the layout of the plant, the control tests for the process itself and isolation methods of the product and its standardization.

Importance of quality control and technical service to customers will be pointed out.

TEXT BOOKS:

1. Chris A. Clausen and Guy Matson, 1978. Principles of Industrial Chemistry, John Wiley & Sons, New York.
2. Gopala Rao M and Marshall Sittig, 2001. III Edition, Outlines of Chemical Technology. Affiliated East-West Press Pvt. Ltd., New Delhi.

REFERENCES:

1. McCabe W.L and J.C. Smith, 1976. Unit Operations of Chemical Engineering. III Edition, McGraw-Hill Kogakusha Ltd., Tokyo.
2. Groggins, P.H., 1958. Unit Processes in Organic Synthesis. V Edition, McGraw-Hill Kogakusha Ltd., Tokyo.
3. Dridens, 2001. Outlines of Chemical Technology. Affiliated East-West Press Pvt. Ltd., New Delhi.

Course Objectives

The course enables the students should have

- To learn about the qualitative analysis by semi micro-qualitative analysis method.
- To learn the preparation of inorganic complexes.
- To describe the basic concept and advantages of semi- micro qualitative analysis.
- To understand the systematic separation d-block elements
- To study the step wise procedure to predict the anions along with metals
- To identify the d-block elements with their special tests.

Course Outcomes

Students have to,

1. Learned about the qualitative analysis by semi micro-qualitative analysis method.
2. Learned the preparation of inorganic complexes.
3. Described the basic concept and advantages of semi- micro qualitative analysis.
4. Understood the systematic separation d-block elements
5. Studied the step wise procedure to predict the anions along with metals
6. Identified the d-block elements with their special tests.

Methodology

Blackboard teaching and Demonstration.

Contents

Thallium, Tungsten, Selenium, Tellurium, Molybdenum, Cerium, Thorium, titanium, Zirconium, Vanadium, Beryllium, Uranium and Lithium.

Note: Each student should analyze a minimum of six inorganic mixtures.

About ten preparations involving different techniques selected from the following:

Lead tetra acetate, dipyrindinium hexaplumbate, hydroxylamine hydrochloride, ortho and para- hydroxy phenyl mercuric chloride, potassium cupric chloride, chrome alum, copper(I) chloride, tris(thio urea) copper(I) Chloride, potassium trioxalato- aluminato(III), potassium trioxalato-chromate(III), potassium trioxalato- ferrate(III), hexammine cobalt(III)chloride, chloropentammine chromium(III), chloro aquo pentammine chromium(III) nitrate, tetrammine copper(II) sulphate, ammonium hexa chloro stanate(IV).

Note: Each student should do a minimum of ten preparations.

REFERENCES:

1. Ramanujam, V.V. 2004. Inorganic Semi-micro Qualitative Analysis. III Edition, The National Publishing Company, Chennai.
2. Venkateswaran, V. R. Veeraswamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry. II Edition, S. Chand Publications, New Delhi.
3. Siddhiqui, Zeba N 2002. Practical industrial Chemistry. I Edition, Anmol Publications Pvt. Ltd., New Delhi.
4. Mendham, J. R. C. Denney, J. D. Barnes and M. Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis. VI Edition, Pearson Education Ltd., Singapore.
5. Lepse, Paul A and Lyle B. Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.

Course Objectives

Course enables the students should have

- To learn about the basic principles about quantitative analyses.
- To study the concepts and systematic procedure in gravimetric analysis.
- To must know about the systematic procedure for estimation.
- To describe the synthesis method for in-organic co-ordination complexes
- To separate the molecules and identify its nature through chromatography technique.
- To apply this ideas and concepts to water treatment process, food science and forensic fields.

Course Outcomes

On successful completion of the course the students should have

1. Learned about the basic principles about quantitative analyses.
2. Studied the concepts and systematic procedure in gravimetric analysis.
3. Knew about the systematic procedure for estimation.
4. Described the synthesis method for in-organic co-ordination complexes
5. Known about separate the molecules and identify its nature through chromatography technique.
6. Applied this ideas and concepts to water treatment process, food science and forensic fields.

Methodology

Blackboard teaching and Demonstration.

Contents

Analysis of mixture of ions – Volumetry and Gravimetry. Any four Complexometric titration- estimation of Zinc, nickel, magnesium and calcium ions using Eriochrome black-T or murexide indicator.

Titrimetry: Oxidation using ceric and vanadium salts.

Chromatography: Column, Paper and Thin layer chromatography.

Titration in non aqueous solvents.

Preparation, analysis and study of co-ordination complexes (any 5).

REFERENCES:

1. Lapse, Paul A. and Lyle B. Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.
2. Mendham, J. R. C. Denney, J. D. Barnes and M. Thomas, 2002. Vogel's textbook of quantitative Chemical Analysis. VI Edition, Pearson Education Ltd., Singapore.
3. Ramanujam V.V., 1993. Inorganic Semi-micro Qualitative Analysis. III Edition, The National Publishing Company, Chennai.
4. Siddhiqui, Zeba N 2002. Practical industrial Chemistry. I Edition, Anmol Publications Pvt. Ltd., New Delhi.
5. Venkateswaran, V. R. Veeraswamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry. II Edition, S. Chand Publications, New Delhi.

Course Objectives

On successful completion of the course the students should have,

- To Study about Isolation, classification and structure determination of simple terpenoids.
- To learn about Isolation, classification and structure determination of simple steroids and alkaloids
- To know the structure of proteins, enzymes and nucleic acids.
- To discuss about the biological application of DNA and RNA.
- To list the various reagents used in organic synthesis
- To apply this fundamentals to clarify the pharmacological and biological activity of organic molecules

Course outcomes

The students have

1. Studied about Isolation, classification and structure determination of simple terpenoids.
2. Learned about Isolation, classification and structure determination of simple steroids and alkaloids
3. Knew the structure of proteins, enzymes and nucleic acids.
4. Discussed about the biological application of DNA and RNA.
5. Remembered the various reagents used in organic synthesis
6. Applied this fundamentals to clarify the pharmacological and biological activity of organic molecules

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT-I

Terpenoids: Isolation and classification of terpenoids – general methods of determining structure of terpenoids –structural elucidation and synthesis of Zingiberene, Eudesmol, Abietic acid, Caryophyllene and Santonin-biosynthesis of monoterpenoids.

UNIT-II

Steroids: Introduction – structural elucidation and synthesis of Cholesterol (synthesis not necessary), Ergosterol, Vitamin D, Equilenin, Oestrone, Testosterone and Progesterone. Bile acids – biosynthesis of sterols.

UNIT-III

Alkaloids: Definition of an alkaloid-extraction of alkaloids-general properties - general methods of determining structure of alkaloids – structural elucidation and synthesis of Atropine, Morphine and Quinine -biosynthesis of quinoline alkaloids.

UNIT-IV

Proteins: General nature of proteins - classification of proteins – synthesis of peptides – oxytocin- insulin.

Enzymes: Nomenclature and classification - cofactors – specificity of enzyme action-mechanism of enzyme action. Nucleic acids- structures of RNA and DNA and their biological importance.

UNIT- V

Reagents in organic synthesis: Preparations and synthetic applications of DDQ, DBU, Ozone, Diborane, Osmium tetroxide, Selenium dioxide, Dicyclohexylcarbodiimide (DCC), LDA, DIBAL-H and Mercuric acetate.

TEXT BOOKS:

1. Gurdeep R. Chatwal, 2004. Organic Chemistry of Natural Products. Vol. II, Himalaya Publishing House, New Delhi.
2. Finar, I.L., 2000. Organic Chemistry Vol. II: Stereochemistry and the Chemistry of Natural Products. V Edition, Addison Wesley Longman (Singapore) Pte. Ltd- Indian Branch, New Delhi.
3. Jerry March, 1992, Advanced Organic Chemistry. IV Edition, John Wiley & Sons (Asia) Pte. Ltd., Singapore.
4. Agarwal O.P, 2004. Natural Product Chemistry. Vol. II, Goel Publishing House, Meerut.

REFERENCES:

1. Gurdeep R. Chatwal, 2001. Organic Chemistry of Natural Products. Vol. I, Himalaya Publishing House, New Delhi.
2. Sanyal, S.N., 2003. Reactions, Rearrangements and Reagents. IV Edition, Bharathi Bhawan (Publishers and Distributors), New Delhi.
3. Tewari, N., 2011. Advanced Organic Reaction Mechanism. III Edition, Books and Allied (P) Ltd, Kolkata.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The course enables the student to

- Understand about thermodynamics and Non-ideal systems
- Learn the third law of thermodynamics
- Study the classical Maxwell-Boltzman and quantum statistics
- Know about partition functions and determining thermodynamic properties
- Understand heat capacity of solids.
- Apply the thermodynamic factors in various organic synthesis processes (how the reaction condition and reaction rate various depend on the thermodynamic factors).

Course Outcomes

The students have to,

1. Understood about thermodynamics and Non-ideal systems
2. Learned the third law of thermodynamics
3. Studied the classical Maxwell-Boltzman and quantum statistics
4. Knew about partition functions and determining thermodynamic properties
5. Understood heat capacity of solids.
6. Applied the thermodynamic factors in various organic synthesis processes (how the reaction condition and reaction rate various depend on the thermodynamic factors).

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Thermodynamics and Non-ideal systems: Chemical potential and the definition of fugacity. Determination of fugacity of gases by graphical method and from equations of state. Variation of fugacity with temperature. Fugacity and the standard states for non ideal gases.

Definition of activity. Activity coefficient. Temperature coefficient of activity. Standard states. Applications of activity concept to solutions. The rational and practical approaches. Measurement of activity of solvent from colligative properties. Determination of activity of solute.

UNIT – II

Third Law of Thermodynamics: Probability and third law. Need for third law. Nernst heat theorem and other forms stating third law. Thermodynamic quantities at absolute zero. Statistical meaning of third law and apparent exception.

Mathematical Introduction: Theories of permutation & combination, Laws of probability. Distribution laws. Gaussian distribution.

UNIT – III

Classical Maxwell – Boltzmann Statistics: Maxwell distribution law for molecular velocities and molecular speeds in an ideal gas. Velocity and speed distribution functions. Experimental verification of Maxwell distribution law. Evaluation of average speed, root mean square speed and most probable speed from distribution law. Distribution function in terms of the kinetic energy of an ideal gas. The principle of equipartition of energy and the calculation of heat capacities of ideal gases. Limitations of the principle of equipartition of energy.

Quantum statistics: Maxwell-Boltzmann statistics. Thermodynamic probability. Thermodynamic probabilities of systems in equilibrium. Boltzmann expression for entropy. Stirling's approximation. State of maximum thermodynamics probability. Legrangian multipliers. Thermodynamic probabilities of systems involving energy levels. Maxwell-Boltzmann distribution law. Evaluation of alpha and beta in MB distribution law.

UNIT – IV

Partition function: Definition, justification of nomenclature, microcanonical and canonical ensembles. Molecular partition and canonical function. The relation between the total partition function of a molecule and the separate partition functions. Translational partition function, rotational partition function. Effect of molecular symmetry on rotational partition function. Ortho and Para hydrogen. Vibrational partition function. Electronic partition function. Evaluation of thermodynamic properties E, H, S, A, G, C_v and C_p from monoatomic and diatomic ideal gas molecules partition functions. Thermodynamic properties of polyatomic ideal gases. Calculation of equilibrium constants of reaction involving ideal gases from partition functions.

UNIT – V

Heat capacities of solids: Einstein's and Debye's theories of heat capacities of solids. Bose-Einstein and Fermi-Dirac Statistics: Bose Einstein distribution law- Entropy of Bose Einstein gas. Planck distribution law of black body radiation. Fermi-Dirac distribution law. Entropy of a Fermi-Dirac gas. Heat capacities of the electron gas and the heat capacities of metals. Negative absolute temperature.

TEXT BOOKS:

1. Glasstone, S. 2002. Thermodynamics for Chemists. Litton Edition Publishing, New York.

REFERENCES:

1. Atkin, P.W. 2002. Physical Chemistry. VII Edition, Oxford University Press, Oxford, UK.
2. Kapoor, K.L 1994. A Text Book Physical Chemistry. Vol. I & II, Mac Millan India Ltd., New Delhi.
3. Lavin, I.N 2002. Physical Chemistry. V Edition, Tata-Mc Graw Hill Publishing Company, New Delhi.
4. Whittakar, A.G., 2001. Physical Chemistry. Mount & Heal Viva Books Pvt. Ltd., New Delhi.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The course successfully enables the student,

- To understand different chromatographic methods.
- To discuss about electron spectroscopy and thermal analysis
- To learn Circular Dichroism and Optical Rotatory Dispersion
- To describe the Electron Spin Resonance spectroscopy
- To know about flame emission spectroscopy.
- To apply the chromatographic and spectroscopic concepts for separation and identification of mixture compounds/complex/metals.

Course outcomes

The students have to

1. Understood different chromatographic methods.
2. Discussed about electron spectroscopy and thermal analysis
3. Learned Circular Dichroism and Optical Rotatory Dispersion
4. Described the Electron Spin Resonance spectroscopy
5. Knew about flame emission spectroscopy.
6. Applied the chromatographic and spectroscopic concepts for separation and identification of mixture compounds/complex/metals.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Chromatography: Theory, instrumentation, basic principles & application in the chemical analysis of the following – columns, paper, thin layer and ion exchange-gel permeation-HPLC applications in chemical analysis-gas chromatography.

UNIT – II

Thermal analysis: Differential thermal analysis DTA and differential scanning calorimetry DSC - basic principles - thermo gravimetric analysis.

Electron spectroscopy: ESCA XPS: Principle, chemical shifts - description of ESCA spectrometer, X-ray sources, samples, analysis, detectors and recording devices-applications.

Auger electron spectroscopy AES and Ultra-Violet photo electron spectroscopy UPS/PES principles and applications.

UNIT – III

Circular Dichroism and Optical Rotatory Dispersion: Basic principles - Cotton effects-Octants rule –axial halo ketone rule-application of ORD and CD. Tyndal Scattering-turbidimetry and nephelometry-applications. Atomic Absorption Spectroscopy.

UNIT – IV

ESR spectroscopy: Theory - derivative curves - g shift - hyperfine splitting-isotropic and anisotropic systems-zero field splitting and Kramer degeneracy. Identification of free radicals – applications to copper complexes.

UNIT – V

Flame Emission Spectroscopy: Introduction, Flames and flame spectra, Flames temperature, Chemical reaction in flame and flame background. Flame photometers, Flame spectrophotometers, Photosensitive detectors, Single beam and double beam instruments, calibration curve, Errors in flame photometers, applications.

TEXT BOOKS:

1. Gopalan, V., P. S. Subramanian and K. Rangarajan, 2003. Elements of Analytical Chemistry. S. Chand and Sons, New Delhi.
2. Usharani, S., 2002. Analytical Chemistry. Mac Millan India Ltd., Chennai.
3. Sharma, B.K., 2005. Instrumental Methods of Chemical Analysis. 24 Edition, Krishna Prakashan Media (P) Ltd, Meerut.

REFERENCES:

1. Galen W. Ewing, 1988. Instrumental Methods of Chemical Analysis. III Edition, Mc Graw Hill International Edition, Singapore.
2. Gurdeep R. Chatwal and Sham. K. Anand. 2004, Instrumental methods of chemical analysis. V Edition, Himalaya Publishing House, New Delhi.
3. Russel. S. Drago.1965, Physical Methods in Inorganic Chemistry, Reinhold Publishing Corporation, New York.
4. Skoog D. A and D. M. West, 2004. Fundamentals of Analytical Chemistry. VIII Edition, Thomson Book Store, Singapore.
5. Vogel, A.I 2002. Vogel's Quantitative Inorganic Analysis. VII Edition, Pearson Education, Singapore.

Course Objectives

The course enables the students

- To know about the basic concepts of polymerization.
- To understand about the coordination polymerization.
- To discuss the various molecular weight determination methods of the polymers and its application.
- To explain the various polymer processing and properties of commercial polymers.
- To study the fundamentals in nano-chemistry and its instrumentation techniques.
- To Apply the polymerization technique to prepare polymers and nanocompounds and characterized by using various electron spectroscopic technique.

Course outcomes

On the successful completion of the course, students have

1. Knew about the basic concepts of polymerization.
2. Understood about the coordination polymerization.
3. Discussed the various molecular weight determination methods of the polymers and its application.
4. Explained the various polymer processing and properties of commercial polymers.
5. Studied the fundamentals in nano-chemistry and its instrumentation techniques.
6. Applied the polymerization technique to prepare polymers and nanocompounds and characterized by using various electron spectroscopic technique.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Step polymerization: Kinetics of step polymerization, self catalyzed polymerization, external catalysis of polymerizations.

Radical chain polymerization: Kinetic scheme for polymerization in presence of initiator.

Ionic chain polymerization: Comparison of radical and ionic polymerizations.

Chain copolymerization: Types of copolymers, the copolymer equation, the Q-e scheme and rate of copolymerization. Ziegler-Natta catalysis and polymerization.

UNIT - II

Plastic Technology: Production of ethenic polymers (polythene, PVC polyvinyl acetate, polyvinyl alcohol, polymethyl methacrylate. Polyacrylonitrile). Production of polycondensation polymers (phenol – formaldehyde, urea formaldehyde and epoxy resins).

Polymer additives – use of fillers in plastics – antioxidants and other stabilizers – plasticizers – effect of plasticizers on polymer properties (Tg. Fluidity, mechanical properties and dielectric properties) – use of flame retardants and colourants.

UNIT - III

Fibre technology: Production of natural and synthetic fibre, cellulosic fibres, polyamide fibres, polyester and acrylic fibres. Properties of textile fibres – criteria for fibre formation orientation of molecules on drawing.

Spinning processes – melt spinning- dry spinning and wet spinning.

UNIT- IV

Nano materials: Preparation: - plasma assisted chemical vapour deposition-sol-gels-electro deposition.

Carbon nano materials: New form of carbon-fullerene C₆₀ nano tubes-types of nano tubes-single walled nano tube-multi walled nano tube. Formation, purification, properties and uses of nano tubes.

UNIT- V

Molecular nanotechnology: Scanning electron microscope (SEM) - modern transmission electron microscope (TEM) - Atomic force microscope (AFM)-scanning tunneling microscope (STM).

TEXT BOOKS:

1. Gowariker V. R & N. V. Viswanathan, 1986. Polymer Science. Wiley Eastern Ltd., New Delhi.
2. Pradeep, T, 2010, Nano: The essential, Understanding Nanoscience and Nanotechnology, Fifth Reprint, Tata McGraw-Hill Education Private limited, New Delhi.
3. Billmeyer, F.W., 2003. Text Book of Polymer Science. III Edition, Wiley Interscience Publications, New York.

REFERENCES:

1. George Odian, 2004. Principles of Polymerization. IV Edition, John Wiley Interscience and Sons, New York.
2. Richard Booker and Earl Boysen, 2008. Nanotechnology. Unique Color Carton, New Delhi.
3. Bhatnagar, M. S., 2004. A textbook of Polymers. Vol. I, II, III, S.Chand Publications, New Delhi.
4. Cowie, J. M. G 1998. Polymer Science. II Edition, Stanley Thomas Publishers Ltd., New Delhi.
5. Sinha, R 2003. Outlines of Polymer Technology Processing Polymers Q & A. Prentice Hall of India Pvt. Ltd., New Delhi.
6. Mick Wilson and Kamali Kannangara, 2005. Nano Technology-Basic Science and Emerging Technologies. I Edition, Overseas Press, New Delhi.
7. Mark Ratner and Daniel Ratner, 2005. Nano technology- A Gentle Introduction to the Neat Big Idea. Pearson Education, UK.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

The course enables the student

- To study about the basic concepts of polymerization.
- To explain the coordination polymerization and apply the Ziegler-natta catalyst in polymer synthesis.
- To understand the molecular weight determination methods of the polymer and apply it to identify the polymer properties.
- To discuss about the polymer processing and properties of commercial polymers
- To apply the polymer processing technique to prepare the polymer products
- To list out the commercial polymers and its application

Course outcomes

The students have

1. Studied about the basic concepts of polymerization.
2. Explained the coordination polymerization and apply the Ziegler-natta catalyst in polymer synthesis.
3. Understood the molecular weight determination methods of the polymer and apply it to identify the polymer properties.
4. Discussed about the polymer processing and properties of commercial polymers
5. Applied the polymer processing technique to prepare the polymer products
6. Remembered the commercial polymers and its application

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT – I

Polymer Basic Concepts: Monomers, repeat units, degree of polymerization, Linear, branched and network Polymers. Condensation Polymerization: Mechanism of stepwise polymerization. Kinetics and statistics of linear stepwise polymerization. Addition polymerization : Free radical, cationic and anionic polymerization. Polymerization conditions. Polymerization in homogeneous and heterogeneous systems.

UNIT – II

Co-ordination Polymerization: Kinetics, mono and bimetallic mechanism of co-ordination polymers. Ziegler Natta catalyst, co-polymerization: Block and graft co-polymers, kinetics of copolymerization. Types of co-polymerization. Reactivity ratio.

UNIT-III

Molecular Weight and Properties: Polydispersion – average molecular weight concept, number, weight and viscosity average molecular weights. Measurement of molecular weights. Viscosity, light scattering, osmotic and ultracentrifugation methods. Polymer

structure and physical properties – crystalline melting point T_m . The glass transition temperature. Determination of T_g . Relationship between T_m and T_g .

UNIT – IV

Polymer Processing: Plastics, elastomers and fibres. Compounding, processing techniques: calendering, die casting, rotational casting, film casting, injection moulding, blow moulding extrusion, moulding, thermoforming, foaming, reinforcing and fibre spinning.

UNIT – V

Properties of Commercial Polymers: Polyethylene, polyvinyl chloride, polyamides, polyesters, phenolic resins, epoxy resins and silicone polymers. Functional polymers, Fire retarding polymers and electrically conducting polymers. Biomedical polymers – contact lens, dental polymers, artificial heart, kidney, skin and blood cells.

TEXT BOOKS:

1. Billmeyer, F.W., 2003. Text Book of Polymer Science. III Edition, John Wiley, New York.
2. Gowariker, V. R., N. V. Viswanathan and J. Sreedhar, 1986. Polymer Science, New Age International Private Ltd., New Delhi.

REFERENCES:

1. Alcock H. R and F. W. Lamber, 1981. Contemporary Polymer Chemistry, Prentice Hall, Englewood Cliffs, NJ.
2. Flory, P. J., 1953. Principles of Polymer Chemistry, Cornell University Press, New York.
3. Odian, G., 1981. Principles of Polymerization. II Edition, John Wiley & Sons, New York.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

The course enables the student

- To understand about the classification, Chemical structure, production, properties and uses of fibers.
- To learn about the dyeing process on fibers.
- To discuss the classification of dyes
- To learn the Pollution Control in Textile Industry.
- To explain the various finishing process of fibers.
- To apply this fundamentals to fabricate the material and its dying process.

Course outcomes

On the successful completion of this course, Students

1. Understood about the classification, Chemical structure, production, properties and uses of fibers.
2. Learned about the dyeing process on fibers.
3. Discussed the classification of dyes
4. Learned the Pollution Control in Textile Industry.
5. Explained the various finishing process of fibers.
6. Applied these fundamentals to fabricate the material and its dying process.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Fibers: General classification of fibres-chemical structure, production, properties and uses of the following natural fibres (a) natural cellulose fibres (cotton and jute) (b) natural protein fibre (wool and silk).

Chemical structure, production, properties and uses of the following synthetic fibres. (i) Man made cellulosic fibres (Rayon, modified cellulose fibres) (ii) Polyamide fibres (different types of nylons) (iii) Poly ester fibres.

UNIT- II

Dyeing Process: Impurities in raw cotton and grey cloth, wool and silk- general principles of the removal – Scouring – bleaching – Desizing – Kierboiling- Chemicking.

Dyeing - Dyeing of wool and silk –Fastness properties of dyed materials – dyeing of nylon, terylene and other synthetic fibres.

UNIT- III

Finishing: Finishes given to fabrics- Mechanical finishes on cotton, wool and silk, method used in process of mercerizing –Anti-crease and Anti-shrink finishes –Water proofing

UNIT-IV

Types of Dyes: Quinonoid Dyes-Examples and structure-Anthroquinone and Mordant Dyes-Synthesis and Applications of Alizarin-Phthalocyanin dyes-Copper Phthalocyanin-Synthesis and Applications.

Diphenylmethane Dyes- Auramine-Triphenylmethane Dyes-Malachite Green, Crystal Violet, Pararosaniline-Preparation and applications.

Indigo Dyes-Preparation and application-Derivatives of Indigo- Synthesis and uses of Indigosol and tetrahaloindigo.

Phthalein Dyes-Phenolphthalein- Preparation and applications.

Xanthene Dyes-Rhodamine B, Fluorescein-Eosin- Preparation and applications.

UNIT-V

Pollution Control in Textile Industry: Textile Effluent-Characteristics, effect of untreated effluent, degradability of wastes. Effluent treatment plants-Aerated lagoon, photo oxidation process.

TEXT BOOKS:

1. Chatwal, R., 1995. Synthetic Dyes, Himalayan Publishing House, Mumbai.
2. Sadov F and M. Horschagin, 1978. Chemical Technology of fibrous Materials, A. Matetshy, Mir Publishers Easton's Books, Inc. Mount Vernon, WA, U.S.A.
3. Joseph, M. L., P. B. Hudson., A. C. Clapp., and D. Kness 1992. Joseph's Introductory Textile Science. VI Edition, Harcourt Brace Jovanovich College Publishers, Fort Worth.

REFERENCES:

1. Bruno Luniak, 1953. The Identification of Textile Fibres: The Identification of Textile Fibres: Qualitative and Quantitative Analysis of Fibre Blends. I. Pitman Publisher, London.
2. Sharma, B.K., 1997. Industrial Chemistry, Goel Publishing Co, New Delhi.
3. Prayag. R.S., 1989. Dyeing of Wool, Silk and Manmade Fibres. Noves Data Corporation, Dharwad.
4. Shenai. V.A., 1973. Chemistry of Dyes and Principles of Dyeing. Sevak Publication, Bombay.

ELECTIVE-II
15CHP305C INDUSTRIAL CHEMISTRY
(APPLIED BIOINORGANIC CHEMISTRY, INORGANIC
DRUG TARGETS AND METALS IN MEDICINE)

Semester - II
4H 4C

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

This course enables the students

- To give the knowledge of the role of metals in human body
- To learn about the physical methods in bioinorganic chemistry, metal biomolecules interactions, complexes, and drug discovery.
- To give knowledge in Binding of Metal Ions and Complexes to Biomolecules
- To Learn about complexes and chelating agents
- To Provide fundamental knowledge in Drug Discovery and Design
- To Apply these parameters to discover new pharmacokinetic molecules.

Course Outcomes

On the completion of this course, student should

1. Knew the knowledge of the role of metals in human body
2. Learned about the physical methods in bioinorganic chemistry, metal biomolecules interactions, complexes, and drug discovery.
3. Understood the knowledge in Binding of Metal Ions and Complexes to Biomolecules
4. Learned about complexes and chelating agents
5. Provided the fundamental knowledge in Drug Discovery and Design
6. Applied these parameters to discover new pharmacokinetic molecules.

Methodology

Black-board teaching, Powerpoint presentation and group discussion.

UNIT- I

Metals in the Human Body: General principles - the elements in the human body - biological significance, storage and transport of Fe, Zn, Cu, Mo, Co, Cr, V and Ni - metal functions in metalloproteins - metallo enzyme functions -supplying elements to the body - metals and human health.

UNIT- II

Physical Methods in Bioinorganic Chemistry: X-ray methods - magnetic resonance methods - Mossbauer spectroscopy - magnetic measurements -other instrumental methods -Atomic Force Microscopy - Fast and Time-Resolved Methods - Stopped-Flow Kinetic Methods - Flash Photolysis - Time-Resolved Crystallography.

UNIT- III

Binding of Metal Ions and Complexes to Biomolecules: Nucleic acid structures - fundamental interactions with nucleic acids - binding interactions of tris(phenanthroline) metal complexes with DNA - techniques to monitor binding - applications of metal complexes that bind to nucleic acids -biopolymer promoted metal ligand interactions.

UNIT- IV

Complexes and Cheating Agents: Labile and inert complexes - metal-ligand selectivity- HSAB approach-chelate effect and Irving-William series -survey of metals used for diagnosis and chemotherapy-radiodiagnostic agents-Magnetic Resonance Imaging(MRI) - gold and other metal phosphines-main-group and transition metal compounds - miscellaneous metals in medicine-chelating agents and therapy - EDTA-evolution, chemical properties, in vivo chelation of radionuclides, dosage and toxicity .

UNIT-V

Drug Discovery and Design: Outline- therapeutic index, chemotherapeutic index, structure- activity relationship (SAR) and quantitative structure-activity relationship (QSAR)- Factors governing drug design- Computer aided drug design-Cancer chemotherapy-bioinorganic chemistry (DNA binding) of platinum anticancer drugs (cisplatin and carboplatin)-mechanism of action studies-clinical trials and their significance- production and quality control- patent protection.

TEXT BOOKS:

1. David M. Taylor and David R. Williams, 1995. Trace element medicine and Chelation therapy, The Royal Society of Chemistry, United Kingdom.
2. Ashutosh Kar, 2000. Medicinal Chemistry, New Age International Publishers, New Delhi.
3. Gareth Thomas, 2000. Medicinal Chemistry, John-Wiley & Sons Ltd., United Kingdom.

REFERENCES:

1. Bertini I, Gray H. B, Lippard S. J, and Valentine J. S, 1994. Bioinorganic Chemistry, University Science books, California.
2. Rosette M. Roat-Malone, 2002. Bioinorganic Chemistry, John Wiley & Sons, Inc., NJ.

Instruction Hours/week:L: 4 T:0 P:0 Marks: Internal:40 External: 60 Total:100

Course Objectives

This course enables the students,

- To make non-chemistry graduates to get exposed to day to day chemistry related materials and science.
- To learn the terms and definitions in general chemistry and use of popularly used chemicals.
- To discuss the various fields about industrial fuels, sugar and paper industry.
- To understand the fertilizers in the agriculture field.
- To list some of the commercial polymers along with their application
- By applying these concepts they can get job opportunities in various industrial sectors.

Course Outcomes

This course enables the students,

1. Understood the non-chemistry graduates to get exposed to day to day chemistry related materials and science.
2. Learned the terms and definitions in general chemistry and use of popularly used chemicals.
3. Discussed the various fields about industrial fuels, sugar and paper industry.
4. Understood the fertilizers in the agriculture field.
5. Listed some of the commercial polymers along with their application
6. Applying these concepts they can get job opportunities in various industrial sectors.

Methodology

Black-board teaching, Powerpoint presentation and group discussion.

UNIT- I

Industrial Fuels: Energy sources: non-renewable, classification of fuels, solid, liquid and gaseous. Calorific value of fuels and its determination.

Solid fuels: Coal: types, properties and uses of lignite, sub-bituminous coal, bituminous coal and anthracite. Coking and non-coking coal.

Liquid fuels: Refining of crude petroleum and uses of fractions. Hydrodesulphurisation.

Cracking: thermal and catalytic (fixed bed and fluidized bed catalysis). Octane number.

Gaseous fuels: Natural gas and gobar gas: production, composition and uses, Gobar electric cell.

UNIT- II

Chemistry and agriculture: Fertilizers: Discussion on ammonium nitrate, urea, superphosphate, triple superphosphate, diammonium phosphate, potassium nitrate, uses of mixed fertilizers, micronutrients and their role.

Pesticides: Classification of pesticides with examples.

Insecticides: stomach poisons, contact insecticides, fumigants, manufacture and uses of insecticides. DDT, BHC(gammexane: conformation of gamma isomer) pyrethrin mention of aldrin, dieldrin, endrin and pentachlorophenol (and its Na salt) (structures excluded)
Herbicides: 2,4-D and 2,4,5-T.

Fungicides: Bordeaux mixture, mention of lime sulphur, creosote oil and formula.

UNIT- III

Sugar and Paper industry: Sugar industry: Double sulphitation process, refining, and grading of sugar.

Saccharin: synthesis and uses as a sugar substitute. Ethanol: manufacture from molasses by fermentation.

Paper industry: Manufacture of paper: production of sulphite pulp and conversion to paper (bleaching, filling, sizing and calendaring)

UNIT-IV

High Polymers: Classification, types of polymerization.

Natural polymers: polysaccharides (starch and cellulose), polyhydrocarbons (natural rubber) and proteins.

Synthetic polymers: Polyhydrocarbons (polythene, synthetic rubber), polychlorohydrocarbons (PVC, neoprene), polyamides (nylon) and polyphenols (phenolformaldehyde resin). Addition and condensation polymerization, step growth and chain growth polymers.

Comparison and properties of thermoplastics and thermosetting polymers, copolymers. Synthesis, structure and uses: a) rubber: cis-structure and elasticity, Synthetic rubber: neoprene and Buna-S, vulcanization of rubber, additives used in rubber manufacture. Plastics: polythene, polypropene (isotactic structure), Ziegler-Natta polymerization, PVC, PVA, Polystyrene and Bakelite. Blow moulding and injection moulding.

Fibres: rayon, terylene and nylon.

UNIT- V

Articles used in daily life: Glass: composition, manufacture and uses.

Cement: Manufacture: wet and dry processes, composition and setting of cement

Dyes: classification based on structure and application. Synthesis of congo red and malachite green.

Pharmaceuticals: Manufacture of aspirin and penicillin (fermentation process) mention of antibiotics.

TEXT BOOKS:

1. Biswas, A.K., 1989. Frontiers in Applied Chemistry, Narosa publishing House, New Delhi.

REFERENCES:

1. Vermani, O.P and A.K. Narula, 2008. Applied chemistry theory and Practice. New Age International Pvt Ltd Publishers, New Delhi.
2. Thiagarajan,V.T., 1995. Pharmaceutical chemistry, K. S. C. Desikan & Co, Chennai.

Instruction Hours/week:L: 4 T:0 P:0 **Marks: Internal:40 External: 60 Total:100**
End Semester Exam: 3 Hrs

Course Objectives

This course enables the students

- To learn about nature of the light source and its spectral properties.
- To understand about the colour mixing process and its applications in photography and printing.
- To study about the various color measurement techniques.
- To discuss about the colour matching technique through automatically and manually.
- To know about the colour differences and its effect in various application.
- To describe the various instrumentation and its handling in printing process.

Course Outcomes

On the completion of this course, students

1. Learned about nature of the light source and its spectral properties.
2. Understood about the colour mixing process and its applications in photography and printing.
3. Studied about the various color measurement techniques.
4. Discussed about the colour matching technique through automatically and manually.
5. Knew about the colour differences and its effect in various applications.
6. Described the various instrumentations and its handling in printing process.

Methodology

Blackboard teaching, Powerpoint presentation and group discussion.

UNIT- I

Light and colour: Sources of light. Colour rendering, reflection, refraction, transmission, absorption and scattering. Colour attributes. Relation between colour and optical spectrum. Spectral colours and metamerism.

Colour perception: Reflection, transmission and absorption spectra. The physical basis of colour. The human colour vision system. Scotopic and photopic vision. Colour receptors and their spectral response. Hue and saturation, lightness and luminance

UNIT- II

Colour Description: Arrangement of colour, visual attribution of colour, Beer-Lambert's law, colour primaries and color mixing, additive and subtractive color mixing. Applications in photography, electronic colour monitors and colour printing. Colour specification, colour order systems-Munsell colour order system and Ostwald colour order system.

UNIT- III

Colour measurement: Principles of colour measurement, Tristimulus values, CIE diagram, standard illuminant, standard observer and colour matching functions. Spectral reflectance, graphical representation and numeric representation. CIEXYZ and CIELab representation. Colour gamut, RGB, CMY and CYMK gamuts and limitations.

UNIT- IV

Colour matching: Definition. Manual colour matching, single constant (K/S) Kubelka-Munk theory, spectral match, tristimulus match. Color matching and metamerism.

Computer colour matching: Colour sensors, spectral sensitivity. Filters-neutral density and colour filters. Absorption and interference filters. Concept of computer color matching (CCM) system. Application of CCM system to textile processing. Advantages of CCM system. Limitations of CCM system. Colour reproduction-characteristics of electronic monitors.

UNIT- V

Color Differences: Perceptibility and acceptability, methods of assessment, colour difference formula. Measurement of fluorescence- Visual photoelectric and spectrophotometric colourimeter. Advantage of spot spectral measurements- fibre optic spectrophotometer.

TEXT BOOKS:

1. Xin J, 2006. Total colour Management in textiles. Woodhead Publishing Limited, Cambridge.
2. Shah H. S and Gandhi R.S, 1990. Instrumental Colour Measurements and Computer Aided Colour Matching for Textiles. Mahajan Publications, Ahmadabad.

REFERENCES:

1. Gulrajani M. L., 2010. Colour measurement: Principles, Advances and Industrial Applications. Woodhead Publishing Ltd., Cambridge.
2. McDonald R, 1997. Colour Physics for Industry. Woodhead Publishing Limited, Cambridge.
3. Lucas J and Valdeperas J., 1996. Eurotex Colour Measurement Fundamentals.Vol I, Guimaraes Portugal.
4. Volz H.G., 1994. Industrial colour testing-Fundamentals and Techniques.VCH, Weinheim, Germany.
5. Mc Laren K, 1983. The colour Science of Dyes and Pigments. Adam-Hilger, Bristol, U.K.
6. Peters A. T and Freeman H.S., 1996. Physio-Chemical Principles of Colour Chemistry. Blackie A & P, London.

Semester-III

15CHP311 PHYSICAL CHEMISTRY PRACTICAL -I 4H 2C
(MOLECULAR WEIGHT DETERMINATION AND CONDUCTOMETRIC
TITRATIONS)

Instruction Hours/week:L: 0 T:0 P:4 Marks: Internal:40 External: 60 Total:100

Course Objectives

This course enables the students should have

- To Learn about the heat of solution, determination of molecular weight and distribution coefficient
- To study about basic concepts of conductometric titrations.
- To understand the various laws in electrochemistry.
- To apply the conductometric method for the solutions and measure its conductivity
- To know about how to handle the conductivity meter, spectrophotometer.
- To may realize the how distribution co-efficient influence the solubility of various systems.

Course Outcomes

On the completion of this course, students

1. Learned about the heat of solution, determination of molecular weight and distribution coefficient
2. Studied about basic concepts of conductometric titrations.
3. Understood the various laws in electrochemistry.
4. Applied the conductometric method for the solutions and measure its conductivity
5. Knew about how to handle the conductivity meter, spectrophotometer.
6. Applied the knowledge to realize the how distribution co-efficient influence the solubility of various systems.

Methodology

Blackboard teaching and Demonstration.

Contents

Heat of solution from solubility.

Molecular weight determination by

- i. Freezing point depression of solvents benzene and water by Beckmann method
- ii. By Rast micro methods

Distribution of activity and activity co-efficient by freezing point method.

Distribution co-efficient and determination of equilibrium constant.

Conductivity experiments:

Determination of

- i) Equivalent conductance of a strong electrolyte and verification of Debye-Huckel Onsager law
- ii) Verification of Ostwald dilution law and Kohlraush law for weak electrolytes.

Conductometric determination of Pka of a weak acid.

Hydrolysis constant of aniline hydrochloride.

Determination of the solubility of a sparingly soluble salt.

Conductometric titrations:

Acid-base and precipitation titrations including mixture of halides.

REFERENCES:

1. Lepse, Paul A and Lyle B. Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.
2. Pandey, O.P, D. N. Bajpai and S. Giri, 2001. Practical Chemistry. VIII Edition, S.Chand Publications, New Delhi.
3. Santi Rajan palit and Sadhan Kumar, 1971. Practical Physical Chemistry. I Edition, Joy Publishers, Calcutta.
4. Siddhiqui, Zeba N, 2002. Practical industrial Chemistry. I Edition, Anmol Publications Pvt. Ltd., New Delhi.
5. Thomas, A.O, 2003. Practical Chemistry. Scientific Book Center, Cannanore.
6. Venkateswaran, V. R. Veeraswamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry. II Edition, S. Chand Publications, New Delhi.

15CHP312 PHYSICAL CHEMISTRY PRACTICAL- II 4H 2C
(CHEMICAL KINETICS AND POTENTIOMETRIC TITRATIONS)

Instruction Hours/week:L: 0 T:0 P:4 Marks: Internal:40 External: 60 Total:100

Course Objectives

This course enables the students should have

- To learn about the principles of electrochemistry and determination EMF
- To understand about the basic needs of Chemical Kinetics and Potentiometric titrations.
- To study the principles about adsorption process.
- To know about how to handle the potentiometer, electrodes and spectrophotometer.
- To apply the knowledge of chemical kinetics in various preparation organic/inorganic compounds.
- To investigate the metal concentration in water samples using adsorption technique.

Course Outcomes

On the completion of this course, students to

1. Learned about the principles of electrochemistry and determination EMF
2. Understood about the basic needs of Chemical Kinetics and Potentiometric titrations.
3. Studied the principles about adsorption process.
4. Knew about how to handle the potentiometer, electrodes and spectrophotometers.
5. Applying the knowledge of chemical kinetics in various preparation organic/inorganic compounds.
6. Investigating the metal concentration in water samples using adsorption technique.

Methodology

Blackboard teaching and Demonstration.

Contents

Electromotive force determination of standard potentials of Cu, Zn, Ag.

Determination of pH and pKa values using hydrogen and quinhydrone electrodes and glass electrode pH meter- potentiometric acid-base titrations.

Determination of formal redox potential of a redox system and redox titrations.

Determination of solubility product of a sparingly soluble salt concentration cell and chemical cell.

Determination of activity co-efficients from emf data.

Precipitation titration of a mixture of halides.

Chemical Kinetics:

- i . Evaluation of Arrhenius parameters using acid hydrolysis of an ester.
- ii. Base catalysed hydrolysis of an ester conductometrically.
- iii. Rate of reaction between persulphate and iodide ions study of salt over the persulphate- iodide reaction.

Evaluation of catalytic constants for weak acids and verification of Bronsted catalysis law.

Adsorption Experiments:

Adsorption of oxalic acid and acetic acid on activated charcoal-Fruendlich isotherm.

REFERENCES:

1. Lepse, Paul A and Lyle B. Peter, 1986. Lab Manual for Lingren's Essentials of Chemistry. Prentice Hall, New Delhi.
2. Pandey, O. P, D. N. Bajpai and S. Giri, 2001. Practical Chemistry. VIII Edition, S.Chand Publications, New Delhi.
3. Santi Rajan Palit and Sadhan Kumar, 1971. Practical Physical Chemistry. I Edition, Joy Publishers, Calcutta.
4. Siddhiqui, Zeba N, 2002. Practical industrial Chemistry. I Edition, Anmol Publications Pvt. Ltd., New Delhi.
5. Thomas, A. O, 2003. Practical Chemistry. Scientific Book Center, Cannanore.
6. Venkateswaran, V., R. Veeraswamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry. II Edition, S. Chand Publications, New Delhi.

Instruction Hours/week: L: 0 T: 0 P: 0**External: 100 Total: 100****Course Objectives**

The course enables the student

- To know the history and perspectives of Nanotechnology.
- To learn about the various types and significant of 1D, 2D and 3D nanoparticles
- To list the various types of nanoparticles and its application.
- To discuss about carbon based nanomaterials and its properties
- To explain the metal oxide based nano materials
- To motivate and lead the student in the field of nanotechnology.

Course Outcomes

The completion of this course, students

1. Knew about the history and perspectives of Nanotechnology.
2. Learned about the various types and significant of 1D, 2D and 3D nanoparticles
3. Remembered the various types of nanoparticles and its application.
4. Discussed about carbon based nanomaterials and its properties
5. Explained the metal oxide based nano materials
6. Motivated and lead them in the pathway of nanotechnology

Methodology

Self study

UNIT- I

Nanotechnology: Introduction-definition-origin of nanotechnology-difference between bulk and nanomaterials-size dependent properties (magnetic, electronic, transport and optical).

UNIT- II

Classification of nanomaterials: Classification based on dimensional property - zero D, 1D, 2D and 3D nanostructures.

UNIT- III

Types of nanomaterials: Metal oxides and metal nano particles-ceramic nano particles-semi conducting quantum dots-coveshell, quantum dots-nanocomposites - micellar nanoparticles

UNIT- IV

Carbon based nanomaterials: Fullerenes- Carbon nanotubes-single walled and multiwalled nano tubes- structures-carbon nanofibre.

UNIT- V

Metallic and oxide based nanomaterials: Metallic and oxide based nanomaterials – ceramic oxide nanomaterials – semiconductor oxide nanomaterials – nanocomposites and core-shell nanomaterials – micellar nanomaterials.

TEXT BOOKS:

1. Pradeep, T., 2007. Nano: The Essentials Understanding Nanoscience and Nanotechnology, Tata McGraw-Hill publishing company Ltd., New Dehli.
2. Charles P Poole Jr. & Frank J Owens, 2003. Introduction to Nano Technology, Wiley Interscience, New York.
3. Rao, C. N. R., A. Muller and A.K. Cheetham, 2005. The Chemistry of Nanomaterials. Synthesis, Properties and Applications, WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

REFERENCES:

1. Guozhong Cao and Ying Wang, 2004. Nanostructures and Nanomaterials: Synthesis, Properties and Applications. II Edition, Imperial College Press, London.
2. Mick Wilson, Kamli Kannangara, Geoff smith, Michelle Simmons and Burkhard Raguse, 2005. Nanotechnology: Basic Science and Emergic Technologies, Overseas Press, New Delhi.
3. Mark A. Rather, Daniel Rather and Mark Rather, 2002. Nanotechnology: A Gentle Introduction to the Next Big Idea. I Edition, Prentice Hall PTR, UK.
4. Robert W. Kel Sall, Mark Geoghenan and In W. Hamley, 2005. Nano Scale Science and Technology, John Wiley and Sons, New York.
5. Brain L.Cushing, Valdimir L. Kolesnichenko, and Charles J.O Connor, 2004. Recent advances I the Liquid Phase Synthesis of Inorganic Nanoparticles. Chem. Rev., 104, 3893-3946.
6. Palical M.Ajayan, Linda S.Schadles and Paul V. Braues, 2003. Nano Composite Science and Technology, Wiley-VCH Verlag Weileim.

Instruction Hours/week: L: 0 T: 0 P: 0

External: 100 Total: 100

Course Objectives

This course enables the students,

- To understand the basic concepts in UV-Visible, IR and Raman spectroscopic analysis.
- To study important terms in NMR of ^1H , ^{13}C , ^{31}P , ^{19}F .
- To discuss the ESR Spectroscopy and the magnetic property of molecules.
- To explain the colourimetric analysis and its relationship with UV-Visible spectroscopy.
- To learn about basic thermal analysis instruments.
- To apply this techniques to identify the molecular structure of compounds and predict their properties.

Course Outcomes

On the completion of this course, students have to

1. Understood the basic concepts in UV-Visible, IR and Raman spectroscopic analysis.
2. Studied the important terms in NMR of ^1H , ^{13}C , ^{31}P , ^{19}F .
3. Discussed the ESR Spectroscopy and the magnetic property of molecules.
4. Explained the colourimetric analysis and its relationship with UV-Visible spectroscopy.
5. Learned about basic thermal analysis instruments.
6. Apply these techniques to identify the molecular structure of compounds and predict their properties.

Methodology

Self study

UNIT- I

Analytical Chemistry: Introduction to Analytical Chemistry and its interdisciplinary nature. Concept of sampling. Importance of accuracy, precision and sources of error in analytical measurements. Presentation of experimental data and results, from the point of view of significant figures.

UNIT- II

Colourimetric Analysis and UV-Visible Spectroscopy: Beer Lambert's law, Principles of single and double beam instruments – applications for analysis of inorganic and organic samples.

Infrared spectrophotometric analysis – principle and instrumentation and molecular structure determination.

Raman Spectra – principle, basic instrumentation – structural analysis.

UNIT- III

NMR, NQR and Mossbauer Spectroscopy: Nuclear Magnetic Resonance – Principle, instrumentation, structure determination. NMR of ^1H , ^{13}C , ^{31}P , ^{19}F .

NQR - Nitrosyl compounds, Mossbauer of Fe and Sn systems.

UNIT- IV

Electron Spin Resonance: Principle, instrumentation, applications to coordination compounds.

Magnetic Susceptibility and measurements- Guoy method, Faraday method-applications.

UNIT-V

Thermal Analysis: Thermo gravimetric and differential thermal analysis, thermometric titrations, differential scanning colourimetry – basic instrumentation and applications.

TEXT BOOKS:

1. Skoog, D.A., F. J. Holler and S. R. Crouch, 2007. Principles of Instrumental Analysis. VI Edition, Thomson Brooks/Cole Publishers, UK.
2. Frank A. Settle, 1997. Handbook of Instrumental Techniques for Analytical Chemistry, Prentice Hall PTR (ECS Professional), UK.

REFERENCES:

1. Christian G.D, 2007. Analytical Chemistry. VI Edition, John Wiley & Sons, United States.
2. Skoog, D. A., D. M .West, F. J. Holler and S. R. Crouch, 2014. Fundamentals of Analytical Chemistry. IX Edition, Cengage Learning, United States of America.

B.COM.
Bachelor of Commerce
CHOICE BASED CREDIT SYSTEM
(CBCS)

Syllabus
2015 – 2016



DEPARTMENT OF COMMERCE
FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Pollachi Main Road, Eachanari (Post), Coimbatore – 641 021, Tamil Nadu, India

Phone: 0422- 2980011-2980015, Fax No: 0422 – 2980022 - 23

Email: info@karpagam.com, Web: www.kahedu.edu.in

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act 1956)
BACHELOR OF COMMERCE
B.Com.

(For the Students admitted during the year 2015 – 2018 Batch onwards)

Scheme of Examination

Course Code	Name of the Course	Objectives and Outcomes		Instruction Hours / Week			Credits	Maximum Marks		
		PEOs	Pos	L	T	P		CIA	ESE	Total
								40	60	100
Semester 1										
15LAU101	Language –I	II	b,e,f,	5	-	-	5	40	60	100
15ENU101	English - I	I, IV	a,g,i	4	-	-	4	40	60	100
15CMU101	Core : Principles of Accountancy	I, IV	a,g,i	6	-	-	5	40	60	100
15CMU102	Core : Business Organization and Office Management	I, IV	a,g,i	5	-	-	5	40	60	100
15CMU103	Allied : Business Mathematics	II	b,e,f,	6	-	-	4	40	60	100
15FCA101	Foundation Course – A (Value Education)	III	c,d,h	2	-	-	1	100	-	100
15SSD101	Soft Skill Development -I	I, IV	a,g,i	2	-	-	-	-	-	-
				30	-	-	24	300	300	600
Semester II										
15LAU201	Language –II	II	b,e,f,	5	-	-	5	40	60	100
15ENU201	English - II	I, IV	a,g,i	4	-	-	4	40	60	100
15CMU201	Core: Financial Accounting	I, IV	a,g,i	6	-	-	5	40	60	100
15CMU202	Core : Banking Law and Practice	I, IV	a,g,i	5	-	-	5	40	60	100
15CMU203	Allied – II : Business Statistics	II	b,e,f,	6	-	-	4	40	60	100
15FCB201	Foundation Course –B (Environmental Studies)	III	c,d,h	2	-	-	1	100	-	100
15SSD101	Soft Skill Development -I	I, IV	a,g,i	2	-	-	1	100	-	100

				30	-	-	25	400	300	700
Semester III										
15ENU301	English – III	I, IV	a,g,i	4	-	-	4	40	60	100
15CMU301	Core : Advanced Financial Accounting	I, IV	a,g,i	5	-	-	5	40	60	100
15CMU302	Core : Marketing Management	III	c,d,h	5	-	-	5	40	60	100
15CMU303	Core: Business Law	III	c,d,h	4	-	-	4	40	60	100
15CMU304A	Business Economics	III	c,d,h	4	-	-	4	40	60	100
15CMU304B	Principles of Management	I, IV	a,g,i	4	-	-				
15CMU304C	Business Ethics	III	c,d,h	4	-	-				
15CMU311	Practical - Ms- Office and Tally	II	b,e,f,	-	-	6	3	40	60	100
15SSD201	Soft Skill Development -II			2	-	-	-	-	-	-
				24		6	25	240	360	600
Semester IV										
15ENU401	English IV	I, IV	a,g,i	4	-	-	4	40	60	100
15CMU401	Core: Corporate Accounting	III	c,d,h	5	-	-	4	40	60	100
15CMU402	Core : Company Law and Secretarial Practice	III	c,d,h	5	-	-	4	40	60	100
15CMU403	Core: Financial Management	III	c,d,h	5	-	-	4	40	60	100
15OEU401	Executive Business Communication	I, IV	a,g,i	-	-	-	3	-	100	100
15CMU404	Core: Principles of Auditing	I, IV	a,g,i	4	-	-	4	40	60	100
15CMU405A	Indian Economy	III	c,d,h	5	-	-	4	40	60	100
15CMU405B	Retail Management	III	c,d,h	5	-	-				
15CMU405C	Advertising and Sales Promotion	III	c,d,h	5	-	-				
15SSD201	Soft Skill Development – II	I, IV	a,g,i	2	-	-	1	100	-	100
				30	0	0	28	340	460	800

Semester V										
15CMU501	Core : Advanced Corporate Accounting	III	c,d,h	5	-	-	5	40	60	100
15CMU502	Core: Cost Accounting	III	c,d,h	5	-	-	4	40	60	100
15CMU503	Core : Income Tax Law and Practice -I	II	b,e,f,	5	-	-	4	40	60	100
15CMU504	Core: Entrepreneurial Development	III	c,d,h	5	-	-	4	40	60	100
15CMU505A	Investment Management	II	b,e,f,	5	-	-	4	40	60	100
15CMU505B	Business Environment	III	c,d,h	5	-	-				
15CMU505C	Industrial Relations	III	c,d,h	5	-	-				
15CMU511	Core : Commerce Practical	II	b,e,f,	5	-	-	4	40	60	100
15CMU521	Institutional Training	II	b,e,f,	-	-	-	3	-	-	-
				30	0	0	28	240	360	600
Semester VI										
15CMU601	Core : Management Accounting	III	c,d,h	5	-	-	5	40	60	100
15CMU602	Core : Income Tax Law and Practice –II	II	b,e,f,	5	-	-	5	40	60	100
15CMU603A	Indirect Taxation	II	b,e,f,	5	-	-	5	40	60	100
15CMU603B	Research Methodology	II	b,e,f,	5	-	-				
15CMU603C	Export Management	III	c,d,h	5	-	-				
15CMU691	Project and Viva – Voce	II	b,e,f,	15	-	-	5	80	120	200
				30	0	0	20	200	300	500
ECA / NCC / NSS / Sports / General interest etc							Good			
							150	1720	2080	3800

PROGRAM OUTCOMES (PO)

- a. Graduates will demonstrate solid foundation in bookkeeping, accounting and professional fundamentals required to record the business transaction ability.
- b. Graduates will apply IT skills in Accounting, Taxation and business management for effective decision making.
- c. Graduates will obtain the ability to analyse and solve the complex business problems using quantitative; qualitative tools and technologies.
- d. Graduates will exhibit critical thinking skills in understanding the real-time business issues and advocate solutions.
- e. Graduates will acquire and demonstrate the interpersonal and communication skills to convey and negotiate ideas for achieving the common goals.
- f. Graduates will attain and exhibit skills to work as team to take effective decisions in achieving the common goals.
- g. Graduates will demonstrate the leadership skills to initiate, lead and deliver the best performance together with the team members.

PROGRAM SPECIFIC OUTCOMES (PSO)

- h. Graduates will gain lifelong learning practice by identifying, formulating, and analysing complex business problems to reach substantiated conclusions through research considering the changing environmental factors.
- i. Graduate will demonstrate legal, ethical code and socially sustainable code of conduct in both personal and professional decision making process pertaining to their career.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- I. Graduates will acquire knowledge in accounting, taxation, finance and management concepts and apply it in business to become qualified professionals.
- II. Graduates will possess the professional skills and competence to perform effectively in higher studies, jobs and entrepreneurial ventures.
- III. Graduates will develop a lifelong learning by applying the gained knowledge and skills in research and practice.
- IV. Graduates will demonstrate high standard of ethical conduct and become socially responsible citizens contributing to the sustainable growth of the career and the community.

Program Educational Objectives	Program Outcomes								
	a	b	c	d	e	f	g	h	i
Graduates will acquire knowledge in accounting, taxation, finance, management concepts and computer applications and apply it in business to become qualified professionals.	✓		✓	✓			✓	✓	✓
Graduates will possess the professional skills, computer skills and competence in field related to accounting and commerce which will enable them to perform effectively in higher studies, KPO/BPO field of IT sector and entrepreneurial ventures.	✓	✓			✓	✓ ✓			✓
Graduates will continuously improve accounting and computer skills required to develop a life long learning through IT enabled research and practice.			✓	✓				✓	
Graduates will demonstrate high standard of ethical conduct in application of computer in accounting and finance and become socially responsible citizens contributing to the sustainable growth of profession and the community.	✓		✓	✓			✓	✓	✓

L	T	P	C
5	-	-	5

பகுதி – I. தமிழ் பருவம் I
15LAU101 : தமிழ் முதல் தாள்
(இளநிலை கலையியல் பட்ட வகுப்புகளுக்குரியது)

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயர்ப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு I தற்கால இலக்கியம்	
1.மனோன்மனீயம்	- கந்தரம்பிள்ளை
2.பாரதியார்	- பாரதியார் கவிதைகள்
3.பாரதிதாசன்	- குன்றம் (அழகின் சிரிப்பு)
4.நாமக்கல் கவிஞர்	- தமிழன் இதயம்
5.அப்துல் ரகுமான்	- கூடுதற்கும் பறவைகள்
6.சிற்பி	- ஒடு ஒடு சங்கிலி (ஒரு கிராமத்து நதி)
7.எவாழ்ந்து	- மரங்களைப்பாடுவேன்
8.நாமரை	- அவசரம் ஒரு அகர ஊசி
9.புதியமாதவி	- (ஒருகதவும் கொஞ்சம் கள்ளிப்பாலும்) மகளே வந்துவிடு (ஹேராம்)
அலகு II பகுதி இலக்கியம்	
1. சைவம் - பன்னிரு திருமுறைகளில் 12 பாடல்கள்	
2. வைணவம் - ஆழ்வார் பாடல்கள் 12)	
அலகு III உரைநடை	
1. பழந்தமிழ்நாடு	- டாக்டர். கு. கதிரேசன்
2. நொய்யல் நாகரிகம்	- புலவர் செ. இராக
3. அறிவியல் தமிழாக்கம் இன்றைநிலை	- வா.செ. குழந்தைசாமி
4. கணிப்பொறி	- கஜாதா
5. கற்றுச்சூழல் மேலாண்மை	- தமிழ்நாடு அரசு
அலகு IV பயிற்சி	
இலக்கணம், கடிதங்கள் - அலுவலகநிலை, மொழிபெயர்ப்பு நிகழ்ச்சித் தொகுப்புகள்	
(பயிற்சி ஏடு - கல்லூரி வெளியீடு)	
அலகு V இலக்கிய வரலாறு	
1.தற்காலத் தமிழ்க் கவிதைகளின் வரலாறும், வளர்ச்சியும்	
2.புதுக்கவிதைப் பிதாமகன்கள் குறித்த அறிமுகம்	
3.பாரதியார், பாரதிதாசனின் தமிழ்த்தொண்டு	
4.உரைநடையின் தோற்றமும் வளர்ச்சியும்	

Course Objectives:

1. To enable the learners to acquire English language skills at a faster pace.
2. To introduce different kinds of literary works
3. To familiarize different genres of Literature
4. To instruct moral values through literature.
5. To improve their productive and receptive skills
6. To strengthen the basic knowledge about grammar.

Course Outcomes:

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O’ Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

Rao, G. Chandralekha and et al. *Spring 2013*. Emerald Publishers: Chennai.

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

COURSE OBJECTIVES:

To make the students

1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.
2. To know about the accounting process and preparation of final accounts
3. To understand about the Accommodation of bills, Average Due Date and Account Current.
4. To understand and apply the techniques for preparing accounts in different business organizations like consignment and joint venture.
5. To know about the Bank Reconciliation Statement process and Accounting Standards
6. To have a in depth knowledge on partnership accounts

COURSE OUTCOMES:

Learners should be able to

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Acquire knowledge on accounting process and preparation of final accounts
3. To apply appropriate judgment derived from knowledge about bill of exchange
4. Recognize the accounting process of financial statement and critically think in preparing Accounts, rectification of errors, Consignment and Joint Venture.
5. Recognize the Bank Reconciliation Statement process and Accounting Standards
6. Acquired an in-depth knowledge on various partnership concepts

UNIT I

Introduction: Need for Accounting-Definition, Branches and Functions of Accounting-Book-Keeping Vs Accounting-Principles- Concepts and Conventions-Nature of Accounts and Rules of Debit and Credit – Journal – Ledger – **Trail Balance**.

UNIT II

Subsidiary Books and Final Account: Subsidiary Books - Cash book - Single, Two Columnar, Three Columnar and **Petty Cash Book** - Errors and its Rectifications - Preparation of Final Accounts with Adjustments.

UNIT III

Bills of Exchange: Introduction - Definition - Features - Advantages -Trade Bills and Accommodation of Bills-Distinguish between Bills of Exchange and Promissory Note - Accounting for Bills of Exchange-Recording Bills Transaction in Journal and Ledger-**Retiring Bills under Rebate - Dishonour and Renewal of Bills.**

UNIT IV

Bank Reconciliation Statement (BRS), Average Due Date and Account Current: BRS-Meaning, Definition and Causes for Differences-Method of Preparation of BRS. **Average Due Date and its Calculation- Preparation of Account Current.**

UNIT V

Consignment and Joint Venture: Consignment - Meaning, Features, Important terms - Differences between Sale and Consignment-Recurring and Non-recurring Expenses-Accounting treatment. Joint Venture Accounts-Meaning, Features and Distinguish between Joint Venture and Partnership-Different method of Joint Venture account.

Note: Distribution of marks between problems and theory shall be 80% and 20%.

TEXT BOOK

N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2010) Principles of Accountancy, S.Chand & Company Ltd, New Delhi

REFERENCES

1. T.S.Grewal,(2010) Introduction to Accountancy, New Delhi S.Chand & Company Ltd.
2. R.L.Gupta, V.K.Gupta and M.C.Shukla,(2010) New Delhi Financial Accounting,Sultan Chand .
3. T.S.Grewal, S.C.Gupta and S.P.Jain, (2010) New Delhi Advanced Accountancy, Sultan Chand .
4. K.L.Narang and S.N.Maheswari ,(2010) New Delhi Advanced Accountancy-Kalyani Publishers.
5. T.S.Reddy and A.Murthy (2012) , “Financial Accounting” Margham Publications, Chennai.

COURSE OBJECTIVES :

To make the students

1. To understand the concept, functions and form of business organization.
2. To know the different finance sources of business and location of the business.
3. To impart the importance of human behavior and personality to resolve conflict and managing change.
4. To understand the leadership and motivation theories and realise the practical implication in the individual performance and organization behavior.
5. To realise the importance of groups and teamwork and managing of conflict between the members of the organization.
6. To demonstrate the importance and functions of stock exchange in India

COURSE OUTCOMES:

Learners should be able to

1. Understand the concepts of business and form of business organization.
2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.
3. Assess the impact of the personality traits and their perception in day to day performance.
4. Exhibit the leadership skills whenever required and work in groups and teams by motivating and resolving conflict arising in groups and adapting to change.
5. Understand the Office machines and equipments.
6. In depth knowledge about the functioning of stock exchange in India

UNIT I

Business and Organization: Nature and Scope of Business- Forms of Business Organisation –Sole Trader, Partnership Firms, Companies and Co-operative Societies –Public Enterprise.

UNIT II

Location of Business: Factors Influencing Location, Localization of Industries- Sources of Finance – Shares, Debentures, Public Deposits, Bank Credit and Trade Credit –Merits and Demerits.

UNIT III

Stock Exchange: Functions – Procedure of Trading – Functions of SEBI – DEMAT of Shares- Trade Association-Chamber of Commerce.

UNIT IV

Office: Functions - Significance – Office Layout and Office Accommodation – Filing and Indexing

UNIT V

Office Machines and Equipments: Data Processing Systems – EDP –Uses and Limitations – Office Furniture.

TEXT BOOK

1. M.C. Shukla - Business Organisation and Management – (2012) S.Chand & Company Ltd.,

REFERENCES

1. R.K.Chopra – Office Management– (2009)Himalaya Publishing House
2. Y.K.Bhushan – Business Organisation and Management–(2009)Sultanchand & sons
3. S.C Saksena – Business Administration and Management– (1983)Sahitya Bhawan
4. Singh.B.P & Chopra - Business Organisation and Management –(1985) Dhanpat Rai & sons

COURSE OBJECTIVES**To make the students**

1. To understand the concept of matrices
2. To acquire the knowledge of differential calculus
3. To know the concepts of central tendency and dispersion
4. To understand the correlation and regression concepts
5. To be aware of the index numbers and trend analysis
6. To understand the concept of Linear Programming Problem Formulation and Graphical Method

COURSE OUTCOMES:**Learners should be able to**

1. Utilize the concept of matrices, differential calculus to solve business problems
2. Calculate and apply the measure of central tendency and dispersion in decision making.
3. Evaluate the relationship and association between variables to formulate the strategy in business.
4. Apply the concept of index numbers and trend analysis in business decisions.
5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
6. Understand the concept of Linear Programming Problem Formulation and Graphical Method

UNIT I

Matrix - Basic Concepts –Addition and Multiplication of matrices – Inverse of a Matrix – Rank of a matrix – Solution of Simultaneous Linear equations by matrix method.

UNIT II

Basic concept - Simple and Compound Interest – Effective Rate of Interest, Depreciation. Annuities – Present value of an immediate annuity, present value of an annuity due, Amount of an immediate annuity, Amount of an annuity due.

UNIT III

Limits of Algebraic Functions – Simple Differentiation of Algebraic Functions – Meaning of Derivatives – Evaluation of First and Second order derivatives – Maxima and Minima – Application to Business problems.

UNIT IV

Elementary Integral Calculus – Determining Indefinite and definite Integrals of simple functions – Integration by parts-Applications to business problems.

UNIT V

Linear Programming Problem Formulation – Solution by Graphical Method - Solution by Simplex Method(problems using slack variables only).

TEXT BOOK

1. Navanitham.Pa., 2004. Business Mathematics and Statistics, Jai Publishers, Trichy.
2. Sundaresan.V.,K.S.Ganapathy Subramanian.,K. Ganesan.,Operations Research (Resource Management Techniques), 2005, A.R.Publications, Nagapattinam.

REFERENCES

1. Vital.P.R., 2000.Business Mathematics and Statistics, Margham Publications, Chennai.
2. Sundaresan.V. & S.D. Jeyaseelan .,1999, An Introduction to Business Mathematics, S.Chand & Company Ltd, New Delhi.
3. Eugene Don.,& Joel lerner., 2004. Basic Business Mathematics, Tata Mc Graw-Hill, New Delhi.

COURSE OBJECTIVES

To make the students

1. To improve the integral development of human beings
2. To train the students towards sustainable lifestyle
3. To create awareness about the values and their significance and role
4. To imbibe the concept of discipline and freedom
5. To impart the Indian family traditions in students
6. To learn the concept of personality and personality development

COURSE OUTCOMES:

Learners should be able to

1. Impart knowledge on both human beings and Life Style.
2. Gain knowledge on human values roles and its significance.
3. Develop a sense of competitive spirit, co-operation, leadership and diligence.
4. Enrich on punctuality, and team-spirit as well as to provide a backdrop for the development of their creative talents
5. Acquired the knowledge about the importance of Indian family values and traditions
6. Acquired knowledge about the concept of personality and personality development

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

COURSE OBJECTIVES**To make the students**

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To gain knowledge about the data interpretation
6. To improve the writing skill of the students

COURSE OUTCOMES:**Learners should be able to**

1. Impart knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Acquired understanding about the data interpretation
6. Enhanced the writing skill of the students

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

L	T	P	C
5	-	-	5

பகுதி - I. தமிழ்

பருவம் II

தமிழ் இரண்டாம் தாள்
(இளநிலை கலையியல் பட்ட வகுப்புகளுக்குரியது)

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு I செய்யுள்	
1.சங்கஇலக்கியம்	அகநானூறு, புறநானூறு, நற்றிணை,குறுந்தொகை, ஐங்குறுநூறு, பதிற்றுப்பத்து,பரிபாடல்
2. நீதி இலக்கியம்	திருக்குறள் (ஈகை, தெரிந்து செயல்வகை) நாலடியார் (நல்லிளம் சேர்தல்)
3.பக்தி இலக்கியம்	திருஞானசம்பந்தர் தேவாரம், திருவாசகம், பெரியாழ்வார் திருமொழி, நாச்சியார் திருமொழி
அலகு II சிறுகதை	
காலனும் கிழவியும்	- புதுமைப்பித்தன்
அக்கிளிப்பிரவேசம்	- ஜெயகாந்தன்
கன்னகி	- இராஜம் கிருஷ்ணன்
பாதுகை	- பிரபஞ்சன்
உருமாற்றம்	- க. வேணுகோபால்
அலகு III இலக்கணம்	
அகம்,புறம், திணை,துறை	
அலகு IV. பயிற்சி	
விண்ணப்பங்கள்- கட்டுரைகள்- கடிதங்கள்	
அலகு V இலக்கிய வரலாறு	
1.எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள் அறிமுகம்	
2. பன்னிரு திருமுறை, நாலாயிரதில்யபிரபந்தம்	
3. சைவ, வைணவ இலக்கியங்கள் தமிழுக்குச் செய்த தொண்டு	
4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்	

Course Objectives:

1. To enable the learners to acquire English language skills through literature.
2. To familiarize them with English literature.
3. To acquire Grammar knowledge.
4. To help learners imbibe cultural values.
5. To acquire skill of making correct sentences.
6. To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

COURSE OBJECTIVES:**To make the students**

1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.
2. To know about the accounting process and preparation of final accounts
3. To understand about the Accommodation of bills, Average Due Date and Account Current.
4. To understand and apply the techniques for preparing accounts in different business organizations like consignment and joint venture.
5. To know about the Bank Reconciliation Statement process and Accounting Standards
6. To give an insight about the company accounts

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Acquire knowledge on accounting process and preparation of final accounts
3. To apply appropriate judgment derived from knowledge about bill of exchange
4. Recognize the accounting process of financial statement and critically think in preparing Accounts, rectification of errors, Consignment and Joint Venture.
5. Recognize the Bank Reconciliation Statement process and Accounting Standards
6. Apply the concepts of company accounts

UNIT I

Depreciation Accounting: Meaning – Types – Definition – Causes of Depreciation - Need and Significance of Depreciation- Methods of Providing Depreciation- Reserves and Provisions.

UNIT II

Investment Accounts and Royalty: Meaning - Nature of Investment- Types of Securities- Purchase and Sale of Investment- Cum- Interest and Ex-Interest Quotations-Investments in Equity Shares. **Meaning of Royalty- Explanation of Technical Terms - Preparation of Royalty Accounts (Excluding Sublease).**

UNIT III

Single Entry System: Meaning- Features- Difference between Double Entry and Single Entry -Difference between Balance Sheet and Statement of Affairs - Step for Calculating Profit or Loss - Statement of Affairs Method and Conversion Method.

UNIT IV

Branch Accounts and Departmental Accounts: Branch - Meaning, Objectives, Types of Branches - Dependant Branches - Goods Invoiced at Cost Price and at Selling Price-Stock and Debtors System - Final Account System. **Departmental Accounts - Meaning, Need, Features - Distinction between Departmental and Branches - Types and Techniques of Departmental Accounting.**

UNIT V

Hire Purchase and Installment Purchase System: Hire Purchase - Definition, Features and Distinction between Hire Purchase and Installment Purchase Systems - Accounting Treatment-Calculation of Interest - Default and Repossession-Hire Purchase Trading Account. Installment Accounting-Installment Purchase System - Accounting Treatment.

Note: - Distribution of Marks: Theory - 20% and Problems - 80%

TEXT BOOK

1. Vinayagam N, Mani.P.L. and Natarajan.K.L, Financial Accounting, Sultan Chand and sons, New Delhi(2010)

REFERENCES

1. S. P. Jain & K. L. Narang, 2010, Advanced Accountancy, Sultan Chand & Sons. New Delhi
2. M.C. Shukla, 2010, Advanced Accounting, Sultan Chand & Sons. New Delhi
3. S.N. Maheshwari, 2009, Advanced Accounting, Kalyani Publishers.
4. M.A. Arulanandam and K.S. Raman, 2010, Advanced Accounting, Vikas Publishers.
5. R.L. Gupta and Rathaswamy, 2009, Advanced Accounting , Sultan Chand & Sons. New Delhi

COURSE OBJECTIVES:**To make the students**

1. To apply the learning of the bank functions and operations lifelong.
2. To comprehend and apply the laws related to banking.
3. To Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.
4. To imparting knowledge about the Collecting and Paying Banker.
5. To know the process of Negotiable Instruments.
6. To have a knowledge about banking principles and practice in India.

OBJECTIVES

1. Apply the learning of the bank functions and operations lifelong.
2. Critically evaluate the appropriate alternative products and services suitable for customer needs and draw a solution.
3. Comprehend and apply the laws related to banking.
4. Imparting knowledge about the Collecting and Paying Banker.
5. The process of Negotiable Instruments.
6. knowledge about banking principles and practice in India.

UNIT I

Introduction: Definition of Banker and Customer - General Relationship – Special Relationship.

UNIT II

Types of Bank Account: Opening of a New Account – General Precautions – Types of Accounts – Fixed Deposit – Savings Account – Current Account – Recurring Deposits – Pass Book – Functions – Nomination – Special Types of Customers – Minor – Lunatic – Married Women – Drunkards – Joint Account – Partnership Account – Limited Company – Non Trading Associations – Trust Accounts – Closure of a Bank Account.

UNIT III

Negotiable Instruments: Characteristics of Negotiable Instruments – Different Types of Negotiable Instruments – Bills of Exchange – Essentials – Promissory Note – Cheques – Kinds - Characteristics – Crossing of Cheques – Material Alteration – Signature - Endorsement – Definition – Types – Significance.

UNIT IV

Collecting and Paying Banker: Collection and Payment of Cheques – Collecting Banker – Duties and Responsibilities -Statutory Protection – Paying Banker – Duties and Responsibilities - Statutory Protection – Precautions for the Paying Banker – Cheque Transaction System.

UNIT V

Employment of Funds: Meaning -Loans and Advances – Principles of Sound Lending – Modes of Creating Charge – Lien, Pledge, Hypothecation and Mortgage – Advances against Collateral Securities – Guarantees – Stock Exchange Security – Goods – Documents of Title to Goods – Immovable Property – LIC Policy – Gold and Silver- Recent Trends in Banking- ATM, Debit Card, Credit Card – Smart Card.

TEXT BOOK

1. Sundaram and Varshney, Banking Theory Law and Practices, S.Chand & Company, New Delhi (2012)

REFERENCES

1. Tandon. M.L, Banking Law and Practice in India. India Law House, New Delhi(2013)
2. Shekhar. K.C, Banking Theory and Practice, Vikas Publishing House Pvt Ltd. New Delhi(2010)
3. Santhanam.B, Banking Theory, Law and Practice, Margham Publications, Chennai(2012)

COURSE OBJECTIVES**To make the students**

1. To understand the concept of matrices
2. To acquire the knowledge of differential calculus
3. To know the concepts of central tendency and dispersion
4. To understand the correlation and regression concepts
5. To be aware of the index numbers and trend analysis
- 6 To be able to apply various analysis needed for business research

COURSE OUTCOMES:**Learners should be able to**

1. Utilize the concept of matrices, differential calculus to solve business problems
2. Calculate and apply the measure of central tendency and dispersion in decision making.
3. Evaluate the relationship and association between variables to formulate the strategy in business.
4. Apply the concept of index numbers and trend analysis in business decisions.
5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
- 6 Apply various analysis needed for business research

UNIT I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

UNIT II

Measures of central tendency : Arithmetic Mean , Median , Mode . Measures of dispersion – Range, Quartile deviation, Standard deviation and Coefficient of variation.

UNIT III

Correlation : Definition , Type of correlation , Method of correlation - scatter diagram – Karl Pearson's coefficient of correlation – Spearman's Rank correlation.

Regression: Definition, Regression equations – Methods of forming the regression equations - Problems.

UNIT IV

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre's, Paasche's and Fischer's method – Tests for an ideal index number – Wholesale and Cost of living index .

UNIT V

Time Series: Meaning – Components – Models – Business forecasting – methods of estimating trend – graphic, semi average, moving average and least square method – Seasonal variation – Methods of Simple Average.

TEXT BOOK

Pillai.R.S.N., & V.Bagavathi., 2002.Statistics, S. Chand & Company Ltd, New Delhi.

REFERENCES

1. Gupta.S.P., 2001. Statistical methods, Sultan Chand & Sons, New Delhi.
2. Navnitham.Pa., 2009,Business mathematics And Statistics, Jai Publications, Trichy.
3. Richard .I.Levin.,&David.s.Rubin., 1998. Statistics for management,Seventh edition, Prentice hall of India, New Delhi.

15FCB201

FOUNDATION COURSE – B
ENVIRONMENTAL STUDIES

2H - 1C

Total hours/week: L:2 T:0 P:0

Marks: Internal: 100 External: - Total: 100

COURSE OBJECTIVES:**To make the students**

1. To understand the ecosystem and its functions
2. To be aware of the difference between the renewable and non-renewable resources.
3. To know about biodiversity and the importance of conservation.
4. To be aware of the different pollution that affects the environment.
5. To know about the social issues prevailing in the environment.
6. To impart the students with the importance of nature and thus create a responsibility towards protecting the natural resources

COURSE OUTCOMES:**Learners should be able to**

1. Understand the ecosystem and its impact on human beings.
2. Preserve the non – renewable energy and effectively utilize the renewable energy.
3. Avoid the threats to biodiversity habitat losses.
4. Prevent pollution in the environment
5. Apply the laws relevant to the environment conservation
6. Develop a responsibility in protecting the natural resources

Unit I

Eco system and natural resources: Environment – Definition – components - Ecosystem - Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

Unit II

Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit III

Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit IV

Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilitation. Natural resources and associated problems and sustainable utilization. Environmental Education

Unit V

Environment and human health: Environment and human health-physical fitness, human rights, value of education, Environmental Ethics, EPA Act, Population-Growth explosion-Family welfare programs- population control methods, HIV and AIDS.

Text:

Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.

Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

References:

Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.

Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.

Shaw, R and Krishnamurthy, R.R. (2009). Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.

Sorokin Pitirim. A, Man And Society In Calamity. New York: Dutton, 1942

Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page No: 1-7

COURSE OBJECTIVES**To make the students**

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To improve the interpersonal skill of students

COURSE OUTCOMES:**Learners should be able to**

1. Impart knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Develop the writing skill of students
6. Improve the interpersonal skill of students

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Course Objectives:

1. To develop confidence to respond in English during situations where the use of English is imperative.
2. To develop fluency in actual conversation in the English language.
3. To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
4. To develop confidence to respond in English during situations where the use of English is imperative.
5. To develop fluency in actual conversation in the English language.
6. To develop knowledge about business communication.

Course Outcomes:

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.

(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Reference Books:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr.Francis M.Peter S.J. “Lets Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

COURSE OBJECTIVES

- 1 To understand the basic accounting concepts like average due date, Ledger
- 2 To understand the concept of depreciation.
- 3 To knowledge in departmental accounts
- 4 To knowledge in various accounting standards
- 5 To understand the concepts Branch Accounts
- 6 To be aware of the Partnership Accounts

COURSE OUTCOMES:**Learners should be able to**

1. Understand the basic accounting concepts like average due date, ledgers
2. Comprehend the accounting methods in depreciation accounting .
3. Acquire knowledge on accounting process and preparation of branch accounts
4. To apply appropriate judgment derived from knowledge about Hire Purchase and Installment System.
5. Recognize the concepts of accounting Standards
6. Acquire knowledge on partnership accounts.

UNIT 1

Partnership Accounts: Fixed and Fluctuating Capital- Admission and Retirement of a Partner - Death of a Partner.

UNIT II

Dissolution: Insolvency of a Partner(s) – Rule in Garner Vs Murray-Piecemeal Distribution.

UNIT III

Fire Insurance and Farm Accounting: Claim for Loss of Stock and Loss of Profits - Farm Accounting- Objectives – Characteristics - Preparation of Final Accounts of Farms.

UNIT IV

Voyage Accounts: Voyage Accounts – Meaning – Objectives – Characteristics – Preparation of Voyage Accounts.

UNIT V

Insolvency: Insolvency Accounts – Statement of Affairs and Deficiency Account - Insolvency of an Individual.

Note: Distribution of marks for theory and problems shall be 20% and 80% respectively.

TEXT BOOK

1. S.P.Jain, K.L.Narang (2012), Advanced Accounting. Ludhiana, Kalyani Publishers, New Delhi

REFERENCES

1. M.C.Shukla, T.S.Grewal, S.C.Gupta. (2007). Advanced Accounts. New Delhi: Sultan Chand and sons.
2. R.L.Gupta M.Radhaswamy. (2006),Advanced Accountancy. New Delhi: Sultan Chand and Sons.
3. S.N.Maheswari S.K.Maheswari.(2008).Advanced Accounting . New Delhi: Vikas Publishing House Pvt. Ltd.
4. T.S.Reddy and A.Murthy (2012), Financial Accounting, Chennai Margham Publications
5. Vinayaham Charumathi. 2008. Financial Accounting New Delhi: Sultan Chand and Sons.

COURSE OBJECTIVES :

To make the students

1. To Understand the Concept of marketing, and 4Ps of Marketing
2. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. To apply the marketing concepts and skills lifelong.
4. To give an in depth knowledge about the consumer buying behavior
5. To understand the product policy, product life cycle, product strategies and new product development
6. To have an in depth knowledge about Pricing

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of marketing, and 4Ps of Marketing
2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. Apply the marketing concepts and skills lifelong.
4. Understand the consumer buying behavior
5. Apply the concepts of product life cycle, product strategies and new product development
6. Gain the knowledge about various pricing strategies

UNIT I

Marketing: Meaning – Definition - Concept – Marketing Management – Meaning, Importance – Functions of Marketing – Marketing Environment - Factors Affecting the Marketing Functions.

UNIT II

Consumer Behaviour and Customer Relationship Management(CRM): Buyer Behaviour – Buying Motives –Market Segmentation – Meaning – Definition – Bases – Marketing Strategy – Market Structure —CRM - Meaning – Concepts – Functions

UNIT III

Product: Product – Marketing Characteristics – Consumer Goods – Industrial Goods – Production Policy – Product Life Cycle (PLC) – Product Mix – Modification and Elimination –Developing New Products – Strategies.

UNIT IV

Pricing: Pricing Policies – Objectives - Factor Influencing Pricing Decision –Pricing Strategy - Physical Distribution – Management of Physical Distribution – Marketing Risk – Storage and Warehousing

UNIT V

Promotion: Advertisement – Personal Selling and Sales Promotion – Importance – Channels of Distribution – Meaning – Types - Functions of Middlemen – Elimination of Middlemen.

TEXT BOOK

R.S.N. Pillai and Bagavathy,(2012),Marketing Management, S.Chand & Co, New Delhi.

REFERENCES

- 1. CB Gupta and Dr. Rajan Nair (2014),** Marketing Management, Sultan Chand & Sons, New Delhi.
- 2. Philip Kotler (2014),** Principles of Marketing, Prentice Hall of India, New Delhi.

COURSE OBJECTIVES:

To make the students

1. To know the essential elements of contract and also the Indian Contract Act 1872.
2. To learn the fundamental regulation about the sale of goods act, 1930.
3. To impart basic knowledge of Partnership Law and Indian Partnership Act 1932.
4. To understand about the Limited Liability Partnership Act, 2008
5. To enhance knowledge in the Negotiable Instruments Act 1881.
6. To familiarize with the concepts in Indian Contract Act.

COURSE OUTCOMES:

Learners should be able to

1. Identify the basic legal principles behind contractual agreements.
2. Understand the relevance of business law in economic and social context.
3. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.
4. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.
5. Obtain the capacity to do lifelong learning in modifications and revision done in the legal environment of business.
6. Prepare various agreements related to contract

UNIT I

Indian Contract Act 1872 – Contract – Definition – Obligation and Agreement – Nature of Contract and Classification – Components of Valid Contract – Offer and Acceptance – Consideration - Capacity – Free Consent – Unlawful Agreements – Quasi Contracts.

UNIT II

Different Modes of Discharge of Contract – Remedies for Breach of Contract – Contract of Indemnity and Guarantee – Rights of Surety – Discharge of Surety- Pawn or Pledge – Rights of Payee – Rights and Liabilities of Finder of Lost Goods - Law of Agency – Kinds of Agency – Ex-post Facto Agency Requirements – Rights and Liabilities of Principals and Agents.

UNIT III

Indian Partnership Act 1932 – Definition and Tests of Partnership – Implied Authority of Partners – Limitations – Firms Debts and Private Debts – Priority in Discharge – Rights and Liabilities of Partners – Dissolution of Partnership Firm.

UNIT IV

Sale of Goods Act 1930 – Definition of Sale and Distinction Between Sale and Related Transaction Resembling Sale – Sale and Agreement to Sell – Rules Regarding Passing of Property in Goods – Condition and Warranties – Actual and Implied- Principle of Caveat Emptor - Limitations - Rights of Unpaid Vendor.

UNIT V

Common Carriers: Definition - Rights and Duties of Common Carriers – Contract of Carriage of Goods by Sea – Bill of Lading and Charter Party – Distinction.

TEXT BOOK

Kapoor N.D.(2010)Elements of Mercantile Law, S.Chand & Co, New Delhi.

REFERENCES

1. P.C Tulsian , Business Law, S.Chand and Co (2014), New Delhi
2. R.S.N. Pillai and Bagavathy,(2006),Business Laws, S.Chand & Co, New Delhi.
3. M.C. Kuchhal. (1999) Mercantile Law,Vikas Publishing House Pvt Ltd ,New Delhi.
4. S.S.Gulshan and G.K. Kapoor (1997) Business Law., New Age International Pvt Ltd , New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of micro and macroeconomic factors and its application in business.
2. To communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.
3. To apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.
4. To understand demand supply functions
5. To gain knowledge on production function especially the long run and short run cost of production
6. To understand the various forms a competition prevails in market

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of micro and macroeconomic factors and its application in business.
2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.
3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.
4. Familiarize the concept of demand and supply
5. Apply the concept of production function for fulfilling the managerial responsibilities
6. Understand the market structure

UNIT I

Business Economics and Economic Theory: Meaning – Definition - Scope of Business Economics –Profit Maximization- Economic Cost of using Resources - Social Responsibilities of Business -Maximizing the Value of a Firm – Basic Techniques of a Firm.

UNIT II

Demand, Supply and Market Equilibrium: Demand - Law of Demand – Determinants – Elasticity - Demand Function – Forecasting – Law of Diminishing Marginal Utility- Supply – Law of Supply – Elasticity of Supply - Supply Functions- Market Equilibrium- Changes in Market Equilibrium.

UNIT III

Production and Cost Analysis: Production Function - Iso-quant curves - Production in the Short Run and Long Run - Law of Diminishing Marginal Product - Short Run and Long Run Cost of Production – Total Costs - Cost Curves - Cost Analysis - Concept of Cost – Types - Cost Output Relationship.

UNIT IV

Market Structure And Pricing Decisions: Classification of Markets - Pricing under Perfect Competition - Monopoly - Monopolistic Competition - Duopoly and Oligopoly - Kinked Demand Curve.

UNIT V

National Income: Concepts and Components – Methods of Computation of National Income – Importance- Fiscal Quality of Life Index - Inflation and Deflation- Types- Causes- Effects- Measures- Trade Cycle.

TEXT BOOK

Varshney and Maheswari (2014) Business Economics, Sultan Chand and Sons, New Delhi

REFERENCES

1. Heynes, Mole and Paul (2007) Managerial Economics, Tata Mc Graw Hill Publications, New Delhi
2. Joel Dean (2011) – Business Economics, Mangal Deep Publications, Jaipur
3. Sumitra Pal (2011) Managerial Economics, Mac Millan

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of management, Behaviour as individual, group and organization.
2. To communicate orally and in written form Concept of management, Behaviour as individual, group and organization.
3. To apply the Concept of management, Behaviour as individual, group and organization life long.
4. To be familiar with various managerial theories
5. To demonstrate the concept of planning
6. To acquire knowledge about the business ethics

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of management, Behaviour as individual, group and organization.
2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.
3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.
4. Apply managerial theories in business
5. Understand the concept of planning
6. Gained insight about the business ethics

UNIT-I

Introduction to Management: Nature and Scope of Management – Meaning and Definition- Features – Functions – Importance – Administration and Management- Differences. Planning - Meaning – Characteristics – Objectives – Importance of Planning – Steps in Planning Process – Advantages of Planning.

UNIT II

Organization and Decision Making: Organization – Meaning and Definition – Functions – Principles – Characteristics – Classifications – Types of Organization. Delegation and Decentralization: Meaning – Importance of Delegation – Types – Advantages and Disadvantages of Decentralization. Decision making – Meaning and Definition- Characteristics – Decision Making Process- Problems involved in Decision Making

UNIT-III

Directing and Controlling: Meaning – Definition – Principles of Direction- Techniques of Direction – Issuing Orders – Importance – Characteristics . Controlling : Meaning –

Definition – steps in Control Process – Requirements of Effective control System – Features – need – Advantages and Limitations – Types of managerial Control.

UNIT-IV

Staffing: Introduction – Functions of Staffing – Process of Staffing – Recruitment: Sources of Recruitment – Internal Sources and External Sources – Selection – Importance – Stages of Selection Procedures – Interview – Kinds of Interview – Process. Communication: Importance – Objectives – Types – Process – Barriers to Communication.

UNIT-V

Leadership and Motivation : Leadership: Need of Leadership- Functions - Qualities – Types of Leaders– Techniques – Characteristics – Leadership Styles. Motivation : Importance – Types of Motivation – Theories of Motivation : X, Y and Z Theories – Maslow's Hierarchy of Needs.

TEXT BOOK:

L.M. Prasad, Principles and Practice of Management, (2014) Sultan Chand & Sons , New Delhi

REFERENCES:

1. C.B.Gupta, Business Management , (2014) Sultan Chand & Sons , New Delhi
2. S.A.Sherlekar, Principles of Business Management,(2010) Himalaya Publishing House
3. Gulshan and Lallan Prasad , Management ,(2011) Principles and Practice,S.Chand & Co.,
4. T.Ramasamy, Principles of Management ,(2010) Himalaya Publishing House , New Delhi

COURSE OBJECTIVES :**To make the students**

1. To make the concept, process and importance of Business ethics.
2. To know the ethical issues in business and managerial decisions.
3. To make students aware of the social responsibilities of business.
4. To know marketing strategy in ethical issues
5. To understand Ethical Issues in Mergers and Acquisitions
6. To impart the students with enhanced Ethical Issues in Mergers and Acquisitions

COURSE OUTCOMES:**Learners should be able to**

1. Make the concept, process and importance of Business ethics.
2. ethical issues in business and managerial decisions.
3. Getting aware of the social responsibilities of business.
4. Give the basics of marketing strategy in ethical issue
5. Ethical Issues in Mergers and Acquisitions
6. Enhanced the Ethical Issues in Mergers and Acquisitions

UNIT I

Introduction to Business Ethics – Definition – Meaning - Nature and Objectives of Ethics - Factors Affecting Business Ethics – Ethical Organization -Characteristics of an Ethical Organization - Corporate Moral Excellence – Corporate Citizenship, Theories of Ethics – Utilitarian, Separatist and Integrative view of Ethics - Stages of Ethical Consciousness in Business - Relationship between Law and Moral Standards.

UNIT II

Ethical Issues in Human Resource Management – The Principle of Ethical Hiring – Equality of Opportunity – Ethics and Remuneration – Ethics in Retirement - Ethical Issues in Operation and Purchase Management – Quality Control - Ethical Problems and dilemmas in Operations Management - Role of Purchase Manager – Code of Ethics for Purchases - Ethical Issues in Global buyer – Supplier Relationships.

UNIT III

Ethical Issues in Marketing Strategy – Ethical Issues in Marketing Mix – Product – Price – Promotion – Place – Process – People – Physical evidence - Ethical issues and Consumerism – Consumer Protection – Consumer Welfare – Consumer Delight – Consumer Rights.

UNIT IV

Ethical Issues in Finance – Ethical Issues in Mergers and Acquisitions – Hostile Takeovers – Insider Trading – Money Laundering - Ethical Issues in Accounting Professional Conduct of Accountants - Ethics and Financial Statements – Fictitious Revenues – Fraudulent Timing Differences – Concealed Liabilities and Expenses – Fraudulent Disclosures and Omissions – Fraudulent Valuation of Assets – Ethical Auditing.

UNIT V

Corporate Social Responsibility (CSR) - Meaning – Definition – Methods – Evaluation - Internal Stakeholders – Share holders – Employees – Management - External Stakeholders – Consumers – Suppliers – Creditors – Competitors – Community - Global and Local issues in Management – Black Money – Poverty – Child Labour – Gender equality and so on. Ethical issues in MNCs - Environmental Ethics – Environmental Issues in India – Greening and green Initiatives – Sustainable Development – Waste Management.

TEXT BOOK

1. John R Boatright (2009), Ethics and the conduct of Business, Pearson Education (Singapore) Pvt.Ltd, Indian Branch, Delhi.

REFERENCES

1. AC Fernando, (2009), ‘Business Ethics – An Indian Perspective’, Pearson Education, New Delhi.
2. Fr. McGrath, (2008), SJ Basic Managerial skills for all, Prentice Hall of India, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand Tally, its features and its importance in supporting accounting activity.
2. To communicate orally and in written form the Features of Tally in capturing accounting procedures.
3. To gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.
4. To be familiar with the incorporation of GST standards into accounting and computerised accounting process.
5. To learn how to use Tally for preparing final accounts
6. To use tally for inventory control and ratio analysis

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the knowledge of Tally, its features and its importance.
2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.
3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.
4. Familiarize on the incorporation of GST standards into accounting and computerised accounting process.
5. Able to make use of Tally in preparing final accounts
6. Apply tally for inventory control and ratio analysis

MS WORD

1. Type Chairman's speech/ Auditor's report / Minutes/ Agenda and perform the following operations: Bold, Underline, Font Size, style, Background color, Text color, Line spacing, Spell Check, Alignment, Header & Footer, Inserting pages and page numbers, Find and Replace.
2. Prepare a Class Time Table and perform the following operations:
3. Inserting the table, Data Entry, Alignment of Rows and Columns, Inserting and Deleting the Rows and Columns and Change of Table Format.
4. Prepare a Shareholders meeting letter for 10 members using mail merge operation.

MS EXCEL

1. Prepare a mark list of your class (minimum of 5 subjects) and perform the following operations: Data Entry, Total, Average, Result and Ranking by using arithmetic and logical functions and sorting.
2. Draw the different type of charts (Line, Pie, Bar) to illustrate year-wise performance of sales, purchase, profit of a company by using chart wizard.
3. Prepare a Product Life Cycle which should contain the following stages: Introduction, Growth, Maturity, Saturation, Decline.

MS POWERPOINT

1. Design presentation slides for a product of your choice. The slides must include name, brand name, type of product, characteristics, special features, price, special offer etc. Add voice if possible to explain the features of the product. The presentation should work in manual mode.
2. Design presentation slides for organization details for 5 levels of hierarchy of a company by using organization chart.
3. Design slides for the headlines News of a popular TV Channel. The Presentation Should contain the following transactions: Top down, Bottom up, Zoom in and Zoom out. - The presentation should work in custom mode.

MS ACCESS

1. Prepare a payroll for employee database of an organization with the following Details: Employee id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other deductions if any. Perform queries for different categories.
2. Create mailing labels for student database which should include atleast three Table must have atleast two fields with the following details: Roll Number, Name, Course, Year, College Name, University, Address, Phone Number.
3. Create report for the PRODUCT database.

Tally:

1. Create a new company in integrate accounts mode and account with inventory mode
2. Create a primary and sub groups using single or multiple ledger mode
3. Create minimum 10 ledgers using single or multiple ledger, and alter and delete any 2 ledger
4. Enter the following voucher
 - Payment vouchers
 - Receipt
 - Purchase
 - Sales
 - Credit note
 - Debit note
 - Journals
 - Memo
 - Optional
5. Preparation of reports for the following
 - Trail Balance
 - Profit & loss a/c
 - Balance sheet
 - Bank reconciliation statement

TEXT BOOK

1. .R.K.Taxali. 1999 P.C.Software Made Simple. Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Semester III

COURSE OBJECTIVES**To make the students**

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To impart the students with discipline and time management

COURSE OUTCOMES:**Learners should be able to**

1. Impart knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Improve the writing skill
6. Impart the students with discipline and time management

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives:

1. To train the students in understanding the concepts of communication.
2. To be familiar with the four basic skills of English.
3. To train students in developing their written communication.
4. To train students in developing their presentation skills.
5. To acquire the skill of making grammatically correct sentences.
6. To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I –

Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II

Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III

Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV

Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V

Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference:

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To understand the accounting process for Share capital and debenture and its application
2. To prepare final accounts for corporate
3. To understand the accounting standard and its application in inter-holding companies
4. To solve problems relating to Holding Company Accounts,
5. To understand the process related to Liquidation of Companies.
6. To familiarize the concepts of acquisition in business

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend and apply the accounting process related corporate accounting
2. Prepare final accounts for corporate entity.
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.
4. Understand the accounting for Holding Companies.
5. Enhance the problem-solving skills and analytical skills in the accounting context.
6. Apply the concept of Acquisition

UNIT I

Shares and Debentures: Books of Accounts and Statutory Books – Issue of Shares and Debentures- Forfeiture and Re- issue of Shares - Underwriting.

UNIT II

Redemption and Acquisition: Redemption of Preference Shares and Debentures – Acquisition of Business- Profits Prior to Incorporation.

UNIT III

Final Accounts of Joint Stock Companies: Preparation and Presentation of Final Accounts of Joint Stock Companies as per Company Law Requirements – Determination of Managerial Remuneration.

UNIT IV

Reconstruction: Reduction and Reorganization of Share Capital – Amalgamation, Absorption and Reconstruction (Excluding inter-company holdings and owing)

UNIT V

Valuation: Valuation of Shares and Valuation of Goodwill – Liquidation of Companies (Liquidator's Final Statement only)

Note: Distribution of marks for theory and problems shall be 20% and 80 % respectively.

TEXT BOOK

T.S.Reddy & A.Murthy, (2012) ,Corporate Accounting, Margham Publicatuions, Chennai.

REFERENCES

1. Maheswari S.N.,Maheswari,(2010) S.K, Advanced Accounting New Delhi. Vikas Publishing House Pvt Ltd,.
2. Gupta R.L and V.K.Gupta (2014), Corporate Accounting, New Delhi ,Sultan Chand & Co.New Delhi
3. Jain S.P.,Narang K.L, (2010), Advanced Accountancy. Ludhiana, Kalyani Publishers.
4. Dr. M.A. Arulanandam, Dr. K.S. Raman, (2008) ,Advanced Accountancy, Part-I, New Delhi. Himalaya Publications.

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of laws related to constitution of company, finance structure, management team.
2. To comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. To analyze few real time cases relevant to company laws
4. To communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. To be familiar with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. To have an in depth knowledge about the company directors

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of laws related to constitution of company, finance structure, management team.
2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. Analyze few real time cases relevant to company laws
4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. Understand the responsibilities of company directors

UNIT I

Introduction : Companies Act 1956 - Formation of Companies – Promotion – Meaning – Promoters – Functions – Duties of Promoters – Incorporation – Meaning – Certificate of Incorporation – Memorandum of Association – Meaning – Purpose – Alteration of Memorandum – Doctrine of Ultravires – Articles of Association - Meaning – Forms – Contents – Alteration of Articles.

UNIT II

Directors: Qualification and Disqualification of Directors – Appointment of Directors – Removal of Directors – Director's Remuneration – Powers of Directors – Duties of Directors – Liabilities of Directors.

UNIT III

Company Meetings: Kinds - Board of Directors Meeting – Statutory Meeting – Annual General Meeting – Extra Ordinary General Meeting - Duties of a Company Secretary – Drafting of Correspondence – Notice – Agenda – Chairman’s Speech – Writing of Minutes.

UNIT IV

Company Secretary : Meaning - Definition – Types – Positions – Qualities – Qualifications – Appointment and Dismissal – Power – Rights – Duties – Liabilities of a Company Secretary – Role of a Company Secretary

UNIT V

Accounts of Companies: Audit and Auditors’ – Prevention of Oppression and Mismanagement – Winding up – Official Liquidators – National Company Law Tribunal.

TEXT BOOK

N.D.Kapoor, Company Law, Sultan Chand & Sons, New Delhi, (2013)

REFERENCES

- 1.M.C.Shukla and S.S.Gulshan, Principles of Company Law, S.Chand & Co(2010) New Delhi
- 2.M.C.Kuchhal, Secretarial Practice, Vikas Publications, (2010) New Delhi

COURSE OBJECTIVES:**To make the students**

1. Explain importance and role of financial management
2. Describe theories and factors affecting capital structure
3. Evaluate Dividend policies and
4. Discuss financial decision making and sources of finance
5. Analysis financial information from a wide variety of sources and use this information to research and assess corporation
6. Demonstrate the importance of working capital management

COURSE OUTCOMES:**Learners should be able to**

1. Familiarize the basic concepts of financial management
- 2 Understand the different financing decision and estimate the value of different financial instruments (including stocks and bonds)
- 3 Decide the source of finance for an organisation and formulate the optimum Capital Structure
- 4 Estimate cash flows and make capital budgeting decisions under both certainty and uncertainty
- 5 Analyze the factors influencing the dividend decision and formulate the dividend policy of the firm.
- 6 Describe and assess how companies manage the components of working capital to minimize the cost of carrying current assets and the cost of short-term borrowing.

UNIT I

Finance Functions: Meaning - Definition and Scope of Finance Functions - Objectives of Financial Management - Profit Maximization and Wealth Maximization. Sources of Finance - Short Term - Bank Sources – Long Term - Shares - Debentures, Preferred Stock - Debt.

UNIT II

Financing Decision: Cost of Capital - Cost of Specific Sources of Capital - Equity -Preferred Stock Debt - Reserves - Weighted Average Cost of Capital, Operating Leverage and- Financial Leverage.

UNIT III

Capital Structure: Factors Influencing Capital Structure – Optimal Capital Structure - Dividend and Dividend policy: Meaning, Classification - Sources Available for Dividends - Dividend Policy - General - Determinants of Dividend Policy.

UNIT IV

Working Capital Management: Working Capital Management - Concepts - Importance - Determinants of Working Capital. Cash Management: Motives for Holding Cash -Objectives and Strategies of Cash Management. Receivables Management: Objectives -Cost of Credit Extension, Benefits - Credit Policies - Credit Terms - Collection Policies.

UNIT V

Capital Budgeting: Meaning – Objectives - Methods of Evaluation of Capital Budgeting – Traditional Methods – Payback Period Methods – Rate of Return - Discounted Cash flow Methods – Net Present Value Methods- Internal Rate of Return – Profitability Index Methods.

Note : Distribution of marks for theory and problems shall be 60% and 40% respectively.

TEXT BOOK

S.N.Maheswari. 2008. Financial Managemt, vikas Publishing house, Noida.

REFERENCES

1. Chandra P , Financial Management , Tata Mc Graw Hill Education India Private Ltd (2012)
2. Khan and Jain.(2014), Financial Management. New Delhi: Tata Mc Graw Hill Publishers Pvt. Ltd.
3. I.M. Pandey. (2010).Financial Management. New Delhi: Vikas Publications.

COURSE OBJECTIVES:**To make the students**

1. To understand the types of communication and barriers of communication.
2. To acquire knowledge on the different business correspondence used in organization
3. To be aware of the different types of reports prepared for the organization.
4. To understand the importance of vocabulary in business communication.
5. To be aware of the use of technology and the oral presentation techniques used in communication.
6. To use updated technology for various types of communication globally.

COURSE OUTCOMES:**Learners should be able to**

1. Communicate effectively with the optimal mix of verbal and nonverbal communication mitigating the barriers.
2. Draft business correspondence for the organization requirement.
3. Prepare business reports for organization needs.
4. Use appropriate technology for business communication.
5. Draft the resume and develop the skills to face the interview
6. Use appropriate technology for business communication.

UNIT I

Communication: Meaning and Significance of communication - Types of Communication – Media - Barriers to Communication - Principles of Effective Communication.

UNIT II

Correspondence : Norms for Business Letters - Letter for Different Kinds of Situations - Personalized Standard Letters, Enquiries, Customers Complaints, Collection Letters - Sales Promotion Letters.

UNIT III

Report Writing: Structure of Reports - Long and Short Reports - Formal and Informal Reports - Writing Research Reports, Technical Reports - Norms for Including Exhibits and Appendices.

UNIT IV

Non-Verbal Communication: Personal Appearance, Posture - Body Language - Use of Charts , Diagrams & Tables - Audio Visual Aids For Communication - Dyadic Communication - Face To Face Communication - Telephonic Conversation.

UNIT V

Conducting Meetings: Procedure - Preparing Agenda, Minutes and Resolutions - Conducting Seminars and Conferences - Procedure of Regulating Speech - Evaluating Oral Presentation - Group Discussion - Drafting Speech.

TEXT BOOK

Sinha KK Business Communication, (2012), Taxmann Publications Private Limited, New Delhi.

REFERENCE

1. Krishna Mohan & Meera Bannerjee, Developing Communication Skills, , (2010) Mcmillan publishers
2. Chaturvedi , Fundamentals Business Communication, (2012) Pearson in India.
3. Lesikar and Flatly, Business Communication , (2010) Tata McGraw Hill Education Ltd.

COURSE OBJECTIVES:**To make the students**

1. To impart knowledge about the principles and practices of auditing
2. To know procedure of vouching of transactions
3. To impart the knowledge on verification and valuation of assets and liabilities
4. To impart knowledge about the **Vouching of Cash Transactions**
5. To know procedure of **Position of External Auditors to Internal Audit**
6. To impart the knowledge on company audit

COURSE OUTCOMES:**Learners should be able to**

1. Imparting the knowledge about the principles and practices of auditing
2. Knowing the procedure of vouching of transactions
3. Imparting the knowledge on verification and valuation of assets and liabilities
4. Knowing the knowledge about the **Vouching of Cash Transactions**
5. Knowing the **Position of External Auditors to Internal Audit**
6. Imparting the knowledge on company audit

UNIT I

Introduction to Auditing: Definition – General Objectives of Auditing – Advantages and Limitations of Auditing – Auditing and Investigation – Qualification of an Auditor.

UNIT II

Types of Audit: Continuous Audit – Final Audit - Interim Audit – Balance Sheet Audit – Merits and Demerits – Audit Procedure – Planning of Audit – Audit Programme – Audit Note Book – Audit Working Papers – Internal Control – Internal Check – Internal Checks as Regards Cash, Wages, Sales etc – Position of External Auditors to Internal Audit - Revenue Audit and Concurrent Audit.

UNIT III

Vouching: Vouching of Cash Transactions – Trading Transactions – Impersonal Ledger – Definition, Nature and Scope of Internal Auditing- Auditor Position – Auditors Duty Regarding Depreciation, Reserves and Provisions

UNIT IV

Verification and Valuation of Assets and Liabilities: – Auditor Position – Auditors Duty Regarding Depreciation, Reserves and Provisions

UNIT V

Company Audit: Appointment and Removal of Auditor– Rights and Duties of Company Auditors - Liabilities – Audit of Share Capital and Share Transfer.

TEXT BOOK

B.N.Tandon, (2012) , A Hand Book of Practical Auditing, New Delhi S.Chand & Company.

REFERENCES

1. Saxena, R.G. Kuriakose, K.K. Venugopal. S, (2010) Auditing Theory and Practicals. Mumbai Himalaya Publishing House.
2. Saxena. (2009) Principles and practices of Auditing. Mumbai Himalaya Publishing House.
3. Kamal Gupta, (2010) Contemporary Auditing. New Delhi Tata McGraw-Hill Publishing Company Ltd
4. M.S Ramasawamy, (2009) Principles and Practices of Auditing , New Delhi. Vikas Publishing House Pvt Ltd,

INDIAN ECONOMY

COURSE OBJECTIVES:**To make the students**

1. To study the working of the various sectors in the Indian Economy;
2. To grasp how the service sector contributes to the growth of the Indian Economy.
3. To study the various aspects of human resources and their related areas.
4. To know procedure of public trade, fiscal policy and EXIM policy.
5. To impart the knowledge of various aspects of industrialization.
6. To impart the knowledge on Agricultural Productivity and Reforms.

COURSE OUTCOMES:**Learners should be able to**

1. Studying the working of the various sectors in the Indian Economy;
2. Grasping how the service sector contributes to the growth of the Indian Economy.
3. Studying the various aspects of human resources and their related areas.
4. Knowing procedure of public trade, fiscal policy and EXIM policy.
5. Imparting the knowledge of various aspects of industrialization.
6. Imparting the knowledge on Agricultural Productivity and Reforms.

UNIT I

Under Development – Meaning, Characteristics and Causes –Determinants of Economic Development – Economic and Non-Economic Factors – Concepts of Growth and Development.

UNIT II

Human Resources – Population Growth as a Retarding Factor – Population Policy, National Income – Concept – Its Measurement – Limitations – Recent Trends in National Income.

UNIT III

Agriculture – Features – Role of Agriculture – Agricultural Productivity and Reforms – Food Problem– Green Revolution.

UNIT IV

Industrialisation – Role of Industries in Economic Development – Major Industries – Iron and Steel, Cotton, Textiles, Sugar – Cottage and Small Scale Industries – Industrial Sickness – Industrial Labour Organisation – Industrial Relation –Industrial Policy – 1948, 1956, 1977, 1980 and 1991.

UNIT – V

Foreign Trade and Public Finance: Composition, direction, and EXIM policy- Fiscal policy - Components, fiscal policy in the liberated era.

TEXT BOOK:

Dhinagara (2012), I.C Indian Economy, 1 st edition, Sulthan Chand and Sons

REFERENCES

1. **Ruddar Datt and K.P.M.Sundharam**, Indian Economy -, 10th edition , Sulthan Chand and Sons, (2013) New Delhi
2. **A.N.Agarwal** , Indian Economy - Problem of Development and Planning, New Age International Publishers Ltd, (2010)

COURSE OBJECTIVES:**To make the students**

1. To make the students understand the features of retailing
2. To enhance the students knowledge in the theories of retail development
3. To enlighten the students knowledge in global retail markets.
4. To provide the strategies, ethics in retailing and trends in international retailing.
5. To give an insight about the competition commission in India
6. To learn about the importance of retail location, site selection and merchandise management in retailing

COURSE OUTCOMES:**Learners should be able to**

1. Make the students understand the features of retailing
2. Enhance the students knowledge in the theories of retail development
3. Enlighten the students knowledge in global retail markets.
4. Provides the strategies, ethics in retailing and trends in international retailing.
5. Acquire understanding about the competition commission in India
6. Insight about the importance of retail location, site selection and merchandise management

UNIT I

Introduction to Retailing: Retail Functions - Rise of Retailing - Consumerism - Challenges - Consumer Proximity - Technology - Rise of Retailing in India - Key Markets - FDI in Retail - Challenges in India - New Entrants - Emerging Sectors - Suppliers and Buyers – Rivalry.

UNIT II

Evolution of Retail: Theories - Retail Lifecycle - Business Models - Ownership, Merchandise Offered, Franchise, Non Store, Direct Marketing, Tele, Vending Machines, Kiosks, Cash & Carry Global Experience - Brand Management.

UNIT III

Customer Relationship Management: Definition - Goals - Concepts - Components - Customer Lifecycle - B2B, B2C, Innovations - Customer Touch Points - CRM leaders, Choice and Establishment, Training - CRM Functions - Support Channels – Strategy Development - Building Components, Analysis, Customer Segments, Common Barriers - Building Infrastructure, Information Base, Process, Technology, People, Ensuring Quality, Privacy Issues.

UNIT IV

Service Operations: Characteristics - Operations - Bench Marking - Strategy – Enterprise Design - Service Quality - Facility Location - Management of Operations -Supply Relationships - Vehicle Routing - Optimizing Techniques - Models – Training.

UNIT V

Marketing Channel Systems: Concepts - Participants - Environment - Behavioral Process - Developing a Marketing Channel - Strategy - Design - Platform - Product / Pricing Issues - Brand Management - Positioning - Repositioning – Franchising.

TEXT BOOK

Ansuya Angadi, A text of Retail Management, S.Chand & co Ltd , New Delhi (2009).

REFERENCE

1. J.N.Jain & P.P.Singh, “Modern Retail Management”, Deep & Deep Publications,(2007)
New Delhi
2. Pradhan Swapna, “Retailing Management: Text and Case’s”, McGraw Hill Education.
4th Ed., (2008) New Delhi

COURSE OBJECTIVES:**To make the students**

1. To know about the concepts of advertising.
2. To know about the various types of advertising
3. To understand the motivational aspects of salesmen
4. To understand the concept of sales force management
5. To know about the social effects of advertising
6. To know about the promotional strategy.

COURSE OUTCOMES:**Learners should be able to**

1. Knowing the concepts of advertising.
2. Getting the details about the various types of advertising
3. Understanding the motivational aspects of salesmen
4. Understanding the concept of sales force management
5. Knowing about the social effects of advertising
6. Knowing about the promotional strategy.

UNIT I

Advertising: Meaning - Importance – Objectives – Media - Forms of Media- Press - Newspaper, Trade Journal- Magazines- Outdoor Advertising – Posters - Banners- Neon Signs, Publicity, Literature Booklets, Folders - House Organizations - Direct Mail Advertising- Cinema and Theatre Programme – Radio And Television Advertising- Exhibition - Trade Fair – Transportation Advertising.

UNIT II

Advertising Agencies: Advertising Budgets - Advertising Appeals - Advertising Organisations – Social Effects of Advertising - Advertising Copy - Objectives – Essentials – Types - Elements of Copy Writing - Headlines, Body Copy- Illustration- Catchy Phrases and Slogans - Identification Marks.

UNIT III

Advertising Layout: Functions - Design of Layout- Typography Printing Process- Lithography – Printing Plates and Reproduction Paper, and Cloth - Size of Advertising - Repeat Advertising - Advertising Campaign - Steps In Campaign Planning.

UNIT IV

Sales Force Management: Importance- Sales Force Decision- Sales Force Size – Recruitment and Selection - Training – Methods - Motivating Salesman Controlling - Compensation and Incentives - Fixing Sales Territories - Quota – Evaluation.

UNIT V

Sales Promotion: Meaning - Methods – Promotional Strategy – Marketing Communication and Persuasion – Promotional Instruments - Techniques of Sales Promotion – Consumer and Dealers Promotion - After Sales Service – Packing – guarantee – Personal Selling – Objectives – Salesmanship – Process of Personal Selling – Types of Salesman.

TEXT BOOK

Sarangi S.K. Advertising and Sales Management. Asian Books (2011).

REFERENCES

1. Advertising Theory and Practice , (2011) , Himalaya Publishing House, New Delhi.
2. S.A.Chunuwalla, K.C.Sethia. 1997. Foundations of Advertising Theory and Practice, Mumbai: Himalaya Publishing House.
3. Sandage Fryburger Rotzoll. 1996. Advertising Theory and Practice. Delhi: A.I.T.B.S Publishers and Distributors.

COURSE OBJECTIVES

To make the students

1. To impact knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To acquire the knowledge of importance of discipline and time management

COURSE OUTCOMES:

Learners should be able to

1. Impact knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Improved writing skill
6. Enhanced discipline and time management

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

COURSE OBJECTIVES:

To make the students

1. To understand the concepts on Amalgamation of companies and financial statement of insurance companies.
2. To gain knowledge in the Accounting practices in electricity companies and banking companies.
3. To understand the accounting standard and its application in inter-holding companies
4. To solve problems relating to Holding Company Accounts, Liquidation of Companies and various other Accounts
5. To understand and apply accounting process for Banking industry.
6. To have a knowledge about the life insurance and General Insurance

COURSE OUTCOMES:

Learners should be able to

1. To enable the students to understand the concepts on Amalgamation of companies and financial statement of insurance companies.
2. To make the students gain knowledge in the Accounting practices in electricity companies and banking companies.
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.
4. Understand the difference of banking balance sheet and non-banking balance sheet
5. Enhance the problem-solving skills and analytical skills in the accounting context.
6. Understand the Life insurance and General Insurance

UNIT I

Banking: Banking Company Accounts – Introduction – General Information - Principal Accounting Policies – Final Accounts – Profit and Loss Account and Balance Sheets

UNIT II

Insurance: Insurance Company Accounts - Types of Insurance – LIC - Fire - Marine- Accounting Principles for Preparation of Financial Statements Form A - Revenue Account - Profit and loss Account - Balance Sheet.

UNIT III

Holding Company: Definition - Holding Companies and Subsidiary - Treatment of Fictitious Assets - Unrealized Profit - Contingent Liabilities – Revaluation of Assets – Bonus Shares - Treatment of Dividend - Debentures of Subsidiary Company - Number of Subsidiary Companies.

UNIT IV

Double Accounting System: Double Accounts (Excluding Trial Way) including Final Statement of Accounts of Electricity Companies - Treatments of Repairs and Renewals.

UNIT V

Human Resources Accounting: Introduction to Government Accounts – Human Resources Accounting – Accounting Standards – Basic Knowledge of Financial Reporting Practice – Accounting for Price Level Changes (Theoretical Aspects only).

Note: Distribution of marks for theory and problems shall be 20 % and 80 % respectively.

TEXT BOOK

S.P. Jain and Narang (2010) Advanced Corporate Accounting, Kalyani Publishers, New Delhi

REFERENCES

1. R.L. Gupta (1998) Corporate Accounts, Sultan Chand and Company, New Delhi
2. Singhal A.K. (2010), Corporate Accounting, Vayu Education of India, New Delhi
3. T.S.Reddy and A.Murthy(2012), Corporate Accounting, Margham Publications, Chennai.

COURSE OBJECTIVES:**To make the students**

1. To Understand the cost concepts, types of costing methods and book keeping for cost accounting
2. To learn the tools and techniques to calculate cost and solve the problems.
3. To select the best methods of costing and apply critically based on the situation
4. To communicate orally and in written form the cost accounting concepts, methods and book keeping procedure for cost accounting.
5. To gain a lifelong learning for applying the cost concepts in analyzing the business problems.
6. To understand the computation of stock levels

COURSE OUTCOMES:**Learners should be able to**

1. Understand the cost concepts, types of costing methods and book keeping for cost accounting
2. Apply tools and techniques to calculate cost and solve the problems.
3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation
4. Communicate orally and in written the cost concepts
5. Gain the lifelong learning of cost concepts and apply in the business environment.
6. Acquire knowledge about the need and importance of maintaining the stock level in business

UNIT I

Cost Accounting: Definition, Meaning and Scope – Relationship of Cost Accounting with Financial Accounting and Management Accounting – Methods of Costing – Cost Analysis – Concepts and Classifications – Elements of Cost – Preparation of Cost Sheet and Tender – Costing as an Aid to Management – Limitations of Cost Accounting.

UNIT II

Materials: Purchasing of Materials, Procedure and Documentation Involved in Purchasing – Requisitioning for Stores. Methods of Valuing Material Issues – Maximum, Minimum and Reordering Levels – EOQ- Methods of Pricing - Perpetual Inventory – Control Over Wastage, Scrap and Spoilage, Labour – Systems of Wage Payment, Idle Time, Control Over Idle Time – Labour Turnover.

UNIT III

Overhead: Classification of Overhead – Allocation and Absorption of Overhead- Simultaneous Equation Method- Trial and Error Method- Repeated Distribution Method.

UNIT IV

Process Costing: Features of Process Costing – Process Losses, Waste, Scrap, Normal Process Loss, Abnormal Process Loss, Abnormal Gain, Inter Process Profit (Excluding Equivalent Production)

UNIT V

Costing: Operation Costing, Contract Costing, Costing of Joint Products and By- Products. Reconciliation of Costs and Financial Accounts.

Note : Distribution of marks for theory and problems shall be 20% and 80% respectively.

TEXT BOOK

S.P. Jain and K.L. Narang (2012) Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi

REFERENCES

1. S.N. Maheswari (2013) Cost Accounting, Sultan Chand and Sons, New Delhi
2. S.P.Iyyengar (2005) Cost Accounting Principles and Practices, Sultan Chand and Sons, New Delhi
3. R.S.N. Pillai and Bhagavathi (2010) Cost Accounting, Sultan Chand and Sons, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of assessment, assessee, Income heads and the Income Tax laws.
2. To learn the tools and techniques to compute the tax for the various income heads.
3. To select the best ways to compute the income tax based on the income heads for various assessee and to gain a lifelong learning for applying the IT calculation for various income heads based on each case of assessee.
4. To communicate orally and in written form the income tax concepts and computations.
5. To be familiar with the laws pertaining to the Income Tax and apply it lifelong.
6. To prepare a statement of income for a person.

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.
2. Compute Income Tax Returns.
3. Formulate the Income Tax calculations by critically analyzing the assessee's situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee
4. Communicate orally and in written the Income tax computation under various income heads and deductions.
5. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.
6. Prepare a statement of income for a person.

UNIT I

Income Tax Act 1961: Definition of Income – Assessment Year – Previous Year – Assessee – Assessee in Default – Scope of Income – Charge of Tax – Residential Status – Exempted Income.

UNIT II

Salaries and House Property: Computation of Income from Salaries and Income from House Property.

UNIT III

Business Income: Profits and Gains of Business or Profession – Meaning of Business or Profession – Computation of Profits and Gains of Business or Profession of an Individual – Expenses Expressly Allowed – Expenses Expressly Disallowed.

UNIT IV

Capital Gain and Income from Other Sources: Computation of Capital Gain – Computation of Income from other Sources.

UNIT V

Computation of Total Income: Set off and Carry forward of Losses - Deductions to be made in Computing Total Income of Individual - Rates of Tax for Individuals – Computation of Total Income.

Note: Distribution of marks for theory and problems shall be 40 % and 60 % respectively.

TEXT BOOK

Gaur and Narang, (2015) “Income Tax Law and Practice”. Kalyani Publishers.Ludhiana

REFERENCES

1. Mehrothra, (2010) Income Tax Law and Practice. Snow White publications. New Delhi
2. Jayaprakash Reddy, (2010) Taxation. APH Publishing Corporation. New Delhi
3. Dinkare Pagarae, (2009) Direct Tax. Sultan Chand and Sons. New Delh

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
2. To communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. To apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. To Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.
5. To Work in team and exhibit leadership skills
6. To analyse the case studies and try to apply the theoretical learning into lifelong practice

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.
2. Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. Analyse the case studies and try to apply the theoretical learning into lifelong practice.
5. Critically evaluate the appropriate alternatives available as entrepreneur and draw a solution.
6. Work in team and exhibit leadership skills

UNIT I

Entrepreneurship – Meaning – Nature and Characteristics of an Entrepreneur – Qualities, Types and Functions of an Entrepreneur – Role of Entrepreneur in Economic Development.

UNIT II

Entrepreneurial Motivation: Meaning Theories of Motivation – Maslow and McGregor – Motive for Starting an Enterprise – Entrepreneurial Behaviour.

UNIT III

Establishing an Enterprise: The Start up process – Project Identification and Selection – Project Formulation – Assessment of Project Feasibility, Marketing Survey, Risk Analysis, Break Even Analysis – Preparation of Project Report, Selection of Site – Legal Considerations – Basic start-up Problems.

UNIT IV

Institutional Finance to Entrepreneurs: National Small Industries Corporation (NSIC), Small Industries Development Organisation (SIDO), Small Industries Development Organisation (SIDO), Small Scale Industries Board (SSIB) Small Industries Development Corporations, District Industrial Centres (DIC), Tamilnadu Industries Investment Corporation TIIC and Commercial Banks.

UNIT V

Entrepreneurial Development : Programmes in India – Role of SISI, SIPCOT and SIDBI.

TEXT BOOK

Khanka S. S, (2012), Entrepreneurial Development, Sultan Chand Publications

REFERENCES

1. Gupta C.B, & Srinivasan N.P,(2014), Entrepreneurial Development, Sultan Chand & Sons
2. Suresh Jayasree, (2010), Entrepreneurial Development, Margham Publications

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of investing and mechanics for formulating investment decisions.
2. To communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. To apply the investing concepts and skills lifelong.
4. To acquire knowledge about the capital market and stock exchange in India
5. To apply Fundamental analysis, Forecasting techniques an Industry analysis
6. To demonstrate Markowitz theory, Portfolio construction and portfolio revision

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of investing and mechanics for formulating investment decisions.
2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. Apply the investing concepts and skills lifelong.
4. Gained understanding about the capital market and stock exchange in India
5. Apply Fundamental analysis, Forecasting techniques and Industry analysis
6. Acquiring knowledge about the Portfolio construction and Portfolio revision

UNIT I

Investment: Nature - Meaning - Scope of Investment – Importance of Investment – Factors Influencing Investment - Investment Media – Features of an Investment Programme – Investment Process – Alternative Forms of Investment - Risk – Systematic Risk – Unsystematic Risk.

UNIT II

Capital Market and Stock Exchange in India: Structure of Capital Market – New Issue Market – Stock Exchanges in India – Mechanics of Trading – Legal Control of Stock Exchanges – SEBI - Role, Guide Lines – NSE – OTCEI – Recent Trends – Stock Market Operation – Security Market Indicators.

UNIT III

Fundamental Analysis: Economic Analysis – Economic Forecasting – Forecasting Techniques. Industrial Analysis – Industry Classification – Economy and Industry Analysis – Industry Life Cycle.

UNIT IV

Company analysis: Measuring Earnings – Forecasting Earnings – Technical Analysis – Charting Methods – Market Indicators – Trend – Moving Average - Fundamental Vs Technical Analysis.

UNIT V

Portfolio Analysis: Markowitz Theory – Optimum Portfolio – Portfolio Construction – Performance Evaluation – Portfolio Revision.

Note : Distribution of marks for theory and problems shall be 80% and 20% respectively.

TEXT BOOK

Preeti Singh (2014) Investment Management – Himalaya Publishing House, Bangalore

REFERENCES

1. Prasanna Chandra (2012) Investment Analysis and Portfolio management , TMH, 2nd Edition.
2. Fisher Donald (2000) Security Analysis & Portfolio Management, Prentice Hall of India, New Delhi
3. V A Avadhani (2011) Securities Analysis & Portfolio Mgmt., Himalaya Publishing House, Bangalore
4. Kevin S (2005) Portfolio Management, Prentice Hall of India Pvt., Ltd., New Delhi

COURSE OBJECTIVES:

To make the students

- To enable the students to have an overview of Business Environment – Political, social and Global.
- To enable the students to know the importance of environment and its impact on business and society.
- To Understand the Concept of **Functions of the State and Economic Roles of the Government**
- To communicate orally and in written form the concepts of **Constitutional Environment**
- To acquire knowledge about the **Business and Society (Ecology and Consumerism), Consumer rights**
- To acquire knowledge about the **Role of WTO , GATT and Trading Blocks in Globalisation**

COURSE OUTCOMES:

Learners should be able to

- Enabling the students to have an overview of Business Environment – Political, social and Global.
- Enabling the students to know the importance of environment and its impact on business and society.
- Understanding the Concept of **Functions of the State and Economic Roles of the Government**
- Communicating orally and in written form the concepts of **Constitutional Environment**
- acquiring knowledge about the **Business and Society (Ecology and Consumerism), Consumer rights**
- To acquire knowledge about the **Role of WTO , GATT and Trading Blocks in Globalisation**

UNIT I:

Business Environment :Definition and Meaning of Business – Scope of Business – Characteristics of Business – Business Goals – Business During the 21st century - Knowing the Environment – Factors Influencing the Indian Business Environment – Environmental Analysis.

UNIT II

Economic Environment: Economic Environment – Nature of the Economy – Structure of the Economy – Economic Policies & Planning the Economic Conditions.

UNIT III

Political Environment- Political and Government Environment – Functions of the State – Economic Roles of the Government – Government and Legal Environment – the Constitutional Environment

UNIT IV

Social Environment - Business and Society (Ecology and Consumerism), Consumer rights – Business Ethics – Social Responsibility of Business towards stakeholders – Natural Environment and Ecology

UNIT V

Global Environment – Globalisation – Meaning and Rationale for Globalisation – the Role of WTO – GATT – Trading Blocks in Globalisation – Impact of Globalisation on India

TEXT BOOK:

Francis Cherunilum (2014) Business Environment: Text and Cases, Himalaya Publishing House, Mumbai.

REFERENCES

1. Ashish Bhalla (2011) Business Environment, Vayu Education of India, New Delhi
2. Gopal Namita (2010) Business Environment, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi
3. K. Ashwathappa (2011) Essentials of Business Environment, Himalaya Publishing House, Mumbai.

		Semester V
	CORE ELECTIVE I :	LTPC
15CMU505C	INDUSTRIAL RELATIONS	5 - - 4

COURSE OBJECTIVES:

To make the students

1. To impart knowledge on managing industrial relations and the processes, regulations and the authorities regarding industrial relations.
2. To impart knowledge on Labour Problems and Labour Market, Indian Labour Market.
3. To communicate orally and in written form the understanding various aspects of industrial disputes.
4. To impart the knowledge about the trade unionism and their functions.
5. To have an in depth knowledge about the **Management and Personnel Administration**
6. To impart the knowledge about the Indicators of Organisational Health

COURSE OUTCOMES:

Learners should be able to

1. Imparting the knowledge on managing industrial relations and the processes, regulations and the authorities regarding industrial relations.
2. Imparting the knowledge on Labour Problems and Labour Market, Indian Labour Market.
3. Communicating orally and in written form the understanding various aspects of industrial disputes.
4. Imparting the knowledge about the trade unionism and their functions.
5. Having an in depth knowledge about the **Management and Personnel Administration**
6. Imparting the knowledge about the Indicators of Organisational Health

UNIT – I

Introduction: Labour Problems and Labour Market, Indian Labour Market -Employers Organisations Definition – Types – Role – Functions – Origin - Growth and Pattern of Employers Organisations in India - Issues relating to Employers Organisations in India.

UNIT - II

Trade Unionism: Definition, Approaches to Trade Unions - Types of Union - Functions and Role - History of Trade Unions in India - Problems and Future.

UNIT - III

Industrial Disputes: Forms - Causes Prevention and Settlement - Legislative Measures others - Analysis of Disputes - Industrial Relations Machinery in India.

UNIT - IV

Management and Personnel Administration: Managing - Working and living in a Changing world - Managers and their Personnel Concepts - Personnel Administration and the Line Organisation - Organisation Structure and Management Development

UNIT -V

Diagnosing Organisational Health Situational Thinking: A Systematic Approach - Interviewing -Indicators of Organisational Health -Personnel Research Turnover and Internal Mobility - Complaints and Grievances - Occupational Safety and Health Trends.

TEXT BOOK

C.B. Memoria, Satish Mamorai and S.V. Gankar (2013), Dynamic of Industrial Law, Himalaya Publishing House Pvt. Ltd.,

REFERENCES

1. Monappa Arun (2012) Industrial Relations and Labour Laws, Tata Mc Graw Hill New Delhi
2. Singh (2008) Industrial Relations and Labour Laws, Excel Books, New Delhi
3. Arora (2007) Industrial Relations, Excel Books, New Delhi

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.
2. To comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.
3. To communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.
4. To apply the learning of the insurance procedures, products, services and operations lifelong.
5. To comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.
6. To have an in depth knowledge about the Risk

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.
2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.
3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.
4. Apply the learning of the insurance procedures, products, services and operations lifelong.
5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.
6. Understand the concept of Risk and Uncertainty

UNIT I

Introduction to Insurance: Purpose and Need of Insurance- Insurance as a Social Security Tool- Insurance and Economic Development.

UNIT II

Procedures for Becoming an Agent: Pre- Requisite for Obtaining a License- Duration of License - Cancellation of License - Revocation or Suspension- Termination of Agent- Appointment - Code of Conduct- Unfair Practices.

UNIT III

Functions of the Agent: Proposal Form and Other Forms for Grant of Cover- Financial and Medical Underwriting- Material Information- Nomination and Assignment- Procedure - Regarding Settlement of Policy Claims.

UNIT IV

Company Profile: Organizational Set-up of the Company- Promotion Strategy- Market Share- Important Activities- Structure- Product- Actuarial Profession- Product Pricing - Actuarial Aspects- Distribution Channels.

UNIT V

Fundamental and Principles- Life Insurance – Marine – Fire- Medical- General Insurance: Contract of various kinds - Insurance Interest.

TEXT BOOK

Mishra M.N, Misra SB, Insurance Principles and practice; S. Chand and Company,(2012)
New Delhi.

REFERENCE

1. Madhukar R Pawar Fundamentals of Insurance, Chanderlok Prakashan Publications, 2008

COURSE OBJECTIVES:**To make the students**

1. To Prepare of Entry Pass, Gate Pass.
2. To Prepare of Inward mill and Outward mill register.
3. To Prepare of Cost Sheet and Bin Card.
4. To Filling up application forms for admission to Co-operative Societies.
5. To Filling up loan application forms and deposit Challan.
6. To Filling Jewel application for, releasing of Jewellery in jewel loans and repayment.

COURSE OUTCOMES:**Learners should be able to**

1. Preparing of Entry Pass, Gate Pass.
2. Preparing of Inward mill and Outward mill register.
3. Preparing of Cost Sheet and Bin Card.
4. Filling up application forms for admission to Co-operative Societies.
5. Filling up loan application forms and deposit Challan.
6. Filling Jewel application for, releasing of Jewellery in jewel loans and repayment.

EXERCISES

1. Preparation of Purchase Book, Sales Book, Purchase Return Book, Sales Return Book, Bills Receivable Book and Bills Payable Book.
2. Preparation of Entry Pass, Gate Pass.
3. Preparation of Inward mill and Outward mill register.
4. Preparation of Cost Sheet and Bin Card.
5. Applications for shares & allotment, letter of shares and transfer of shares.
6. Opening of Savings Account, Current Account and FDR's.
7. Filling up application forms for admission to Co-operative Societies.
8. Filling up loan application forms and deposit Challan.
9. Filling Jewel application for, releasing of Jewellery in jewel loans and repayment.
10. Preparation of Agenda and Meeting minutes.
11. Computation of Tax liability, PAN, Filling form-16, Preparation of Saral form.
12. Drawing, endorsing and Crossing of Cheques, Bills of Exchange and Promissory Note.
13. Preparation of an Advertisement copy, collection of advertisement in dailies and journal, critically evaluating the advertisement copy.
14. Life Insurance and mutual fund -account opening form.
15. Post Office- Money order form.

Computer Applications Oriented

1. Online Purchase and settlement
2. Online Electricity Bill payment
3. E-Ticket Reservation (Bus, Railways, Airways, etc.)
4. Online Insurance Premium payment
5. Online Mobile recharge
6. Usage of resume wizard
7. Creation of Website
8. Online fund transfer, RTGS, NTF

NOTE:

Students may be asked to collect original or Xerox copies of the documents and affix them on the record note book after having filled up. Drawing of the documents should not be insisted. Distribution of Marks: Practical 75% and Record Note Book 25%

COURSE OBJECTIVES:

To make the students

1. To identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. To analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To utilize the IT applications for analysis and preparation of report.

COURSE OUTCOMES:

Learners should be able to

1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Utilise the IT applications for analysis and preparation of report.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. To comprehend on the contemporary issues relevant to accounting concepts.
3. To analyse the alternatives using appropriate tools and techniques.
4. To solve the problems and take decisions based on the result.
5. To communicate orally and in written form the concepts and solutions.
6. To have an knowledge about the ratio analysis

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. Comprehend on the contemporary issues relevant to accounting concepts.
3. Analyse the alternatives using appropriate tools and techniques.
4. Solve the problems and take decisions based on the result.
5. Communicate orally and in written form the concepts and solutions.
6. Apply ratio analysis to take important business decisions

UNIT I

Management Accounting: Meaning - Nature - Scope - Functions - Comparison of Management Accounting, Cost accounting and Financial Accounting - Role of Management Accounting in Decision Making – Management Accountant – Functions.

UNIT II

Financial Statements Analysis: Meaning - Nature – Objectives - Limitations –Tools - Common Size Statement - Comparative Statement – Trend Analysis - Ratio Analysis- Meaning – Objectives - Significance - Limitations - Classifications of Ratio – Short term Solvency Ratio – Long term Solvency Ratio - Activity Ratio - Profitability Ratio.

UNIT III

Fund Flow Statement and Cash Flow Statement: Meaning - Definition - Objectives - Uses - Limitation – Procedure. Cash Flow Statement - Meaning – Objectives - Significance - Distinguish between Fund Flow Statement and Cash Flow Statement.

UNIT IV

Marginal Costing: Meaning – Definition - Objectives - Scope - Advantages and Disadvantages of Marginal Costing - Cost Volume Profit Analysis - Profit Volume Ratio – Contribution - Break Even Point - Margin of Safety - Break Even Chart.

UNIT V

Budgetary Control: Definition – Objectives - Advantages - Limitations - Classification of Budgets – Time – Flexibility – Functions - Zero Based Budgets(ZBB) – Steps in Budgetary Control

Note: Distribution of marks for theory and problems shall be 20 % and 80 % respectively.

TEXTBOOK

1. SN Maheswari, (2007) Management Accounting. Kalyani Publishers. Ludhiana

REFERENCES

1. Battacharya, S.K. John Dearden. (2005). Accounting for management. New Delhi. Vikas Publishing House Pvt. Ltd.
2. Srinivasan. N.P. (2008). Management and Financial Accounting. New Delhi. Sterling Publishers Pvt Ltd.
3. Khan M.Y. and Jain. P.K. (2008). Management and Cost Accounting. New Delhi Tata McGraw-Hill Publishing Company Ltd.

COURSE OBJECTIVES:**To make the students**

- To Understand the Concept of assessment, assessee, Income heads and the Income Tax laws.
- To learn the tools and techniques to compute the tax for the various income heads.
- To understand various aspects of tax administration..
- To communicate orally and in written form the income tax concepts and computations.
- To be familiar with the laws pertaining to the Income Tax and apply it lifelong.
- To prepare a statement of income for a person.

COURSE OUTCOMES:**Learners should be able to**

- Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.
- Compute Income Tax Returns.
- Understanding the various aspects of tax administration
- Communicate orally and in written the Income tax computation under various income heads and deductions.
- Familiar with the laws pertaining to the Income Tax and its apply it lifelong.
- Prepare a statement of income for a person.

UNIT I

Tax Administration: Various Authorities – Powers – Appointment – Jurisdiction – Functions. Procedure for assessment – Income Tax Returns – Various types of returns – Types of Assessment.

UNIT II

Individuals and HUF: Assessment of Individuals - Assessment of Hindu Undivided Family.

UNIT III

Partnership Firms and Association of Persons: Assessment of Partnership Firms and Association of Persons – Deductions allowable from Gross Total Income in respect of certain payment and receipts (Sec 80).

UNIT IV

Companies and Co-operative Societies: Assessment of Companies – Assessment of Co-operative Societies

UNIT V

Collection and Recovery of Taxes: Deduction of Tax at source – Advance tax – Direct payment of Tax – Payment of Tax – Modes of Recovery of Tax – Penalties and Prosecutions.

Note: Distribution of marks for theory and problems shall be 60 % and 40 % respectively.

TEXT BOOK

Gaur and Narang, (2015) Income Tax Law and Practice. Kalyani Publishers.Ludhiana

REFERENCES

1. Mehrothra, (2010) Income Tax Law and Practice. Snow White publications. New Delhi
2. Jayaprakash Reddy, (2010) Taxation. APH Publishing Corporation. New Delhi
3. Dinkare Pagarae, (2009) Direct Tax. Sultan Chand and Sons. New Delh

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. To learn and compute the Taxation under the constitution.
3. To know how to register CST and apply the CST provisions.
4. To communicate orally and in written form the indirect taxations concepts and provisions.
5. To be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. To demonstrate custom duties in India

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. Learn and compute the Taxation under the constitution.
3. Know how to register CST and apply the CST provisions.
4. Communicate orally and in written form the indirect taxations concepts and provisions.
5. Be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. To have an understanding of custom duties

UNIT I

Indian Tax System : Direct and Indirect Taxes – Principles of Taxation – Taxable capacity – Scope and Functioning - Shifting and Incidence of Indirect Taxes

UNIT II

Central Exercise: Nature and Scope of Central Excise – Important Terms and Definitions under Central Excise Act – General Procedure of Central Excise – Clearance and Excisable Goods – Concession to Small Scale Industry under central excise Act, CENVAT.

UNIT-III

Customs Duty - Different Types of Customs Duties - Abatement of duty in Damaged or Deteriorated Goods - Remission on duty on lost, destroyed or abandoned goods - Customs Tariff Act 1985 - Customs Duty Drawback – Export Promotion Schemes – Import and Export Procedures

UNIT-IV

Central Sales Tax Act 1956 - Objectives of the CST – Levy and Collection of CST – Sales and Deemed Sales - Subsequent Sales - Registration - Compulsory Registration - Voluntary Registration - Security from Dealer - Registration Procedure.

UNIT-V

VAT: Introduction to VAT - Goods and Dealers – Categories of Sales – Assessment and Audit – Registration of Dealers – Input and Output Tax – Exempted Sales and Zero-Rated Sales — Filing of Returns- Penalties.

TEXT BOOK

V.S.Datey, “Indirect Taxes”, Taxmann Publications (P) Ltd., New Delhi (2010)

REFERENCES:

1. V.Balachandran (2006) Indirect Taxation, Sultan Chand & Sons, New Delhi
2. P.RadhaKrishnan (2006) Indirect Taxation, Kalyan Publishers, New Delhi .
3. Sethurajan (2005) Indirect Taxation including Wealth Tax, Speed Publications
4. Singhanian (2014), Indirect Taxes”, Taxmann Publications (P) Ltd., New Delhi (2010)

COURSE OBJECTIVES:

To make the students

- 1.Explain need of Research, introduction to business research
- 2.Analyze various types of research and the sampling techniques
- 3.Analyze collections of data and to draft the questionnaire
- 4.Describe Knowledge on the application of various statistical tools
- 5.Experiment preparation of reports
- 6.To understand the scaling techniques

COURSE OUTCOMES:

Learners should be able to

- 1.Describe the Basics, types and the stages of the research process and enables to apply and adapt them with relevance to specific research context
- 2.Apply an advanced understanding of business research design options, methodologies, sampling technique in a research.
- 3.Analyze the collected data using appropriate statistical tools for interpretation of the data.
- 4.Apply various statistical tools in a research.
- 5.Understand and prepare and present research findings in the report.
- 6.Gain an in depth knowledge about the scaling techniques

UNIT I

Research: Meaning – Objectives – Types of Research – Significance of Research – Research Process – Criteria of Good Research – Identification of Research Problem – Research Design.

UNIT II

Sampling: Meaning – Steps in Sample Design – Characteristics of a Good Sample Design – Determination of Sample Size – Sampling Techniques – Probability and Non-Probability Sampling – Sampling Error

UNIT III

Sources of Data: Methods of Data Collection – Primary Data – Interview Method – Observation Method – Questionnaire – Schedule – Secondary Data – Processing of Data - Editing – Coding - Classification – Tabulation

UNIT IV

Analysis of Data: Hypothesis – Characteristics – Concepts of Hypothesis – Null Hypothesis - Alternative Hypothesis - Level of Significance - Test of Hypothesis - Type I and Type II error – Chisquare test – t test – F test – ANOVA – Scaling Techniques.

UNIT V

Interpretation and Report Writing: Interpretation – Meaning – Technique of Interpretation, Precautions – Report Writing- Steps in Writing Report – Types of Reports – Technical and Popular Report – Oral Presentation – Precaution for Writing Research Reports.

Note: The question paper shall cover 80% theory and 20% problem.

TEXT BOOK

C. R. Kothari, (2014) Research Methodology – Methods and Techniques, New Age International (P) Limited, Publishers, New Delhi

REFERENCES

- 1. Anil Kumar Gupta** (2011) Research Methodology: Methods and Techniques, Vayu Education of India, New Delhi
- 2. O.R. Krishnaswami and M. Ranganatham** (2014) Methodology of Research in Social Sciences, Himalaya Publishing House Pvt. Ltd., Mumbai.
- 3. S.P. Gupta** (2014), Practical Statistics, S. Chand and Co., New Delhi.

		Semester VI
	CORE ELECTIVE II	LTPC
15CMU603C	EXPORT MANAGEMENT	5 - - 5

COURSE OBJECTIVES:

To make the students

1. To make the students understand the features of exports.
2. To learn about the scope and activities of export management
3. To enlighten the students' knowledge in global exports markets.
4. To provide the strategies, ethics in export financing
5. To give an insight about the EXIM policy
6. To learn about the importance of **Export Financing**

COURSE OUTCOMES:

Learners should be able to

1. Making the students understand the features of exports.
2. Learning about the scope and activities of export management
3. Enlightening the students' knowledge in global exports markets.
4. Providing the strategies, ethics in export financing
5. Giving an insight about the EXIM policy
6. Learning about the importance of **Export Financing**

UNIT-I

Foreign Trade : Importance – Trends of India's Foreign Trade – Theories of Foreign Trade – Scope and Stages of Export Marketing – Barriers of Exporting – Identification of Foreign Markets - Selection of Export Products – Export Strategies.

UNIT-II

Entering Foreign Markets: Methods of Entering Foreign Markets – Direct and Indirect Exporting – Licensing – Joint Ventures – Foreign Subsidiaries – Export Procedures – Excise and Custom Formalities – Shipping – Documentation.

UNIT-III

EXIM Policy: EXIM Policy 2002-2007 – Restrictive List – Negative List – Registration of Exporters – Duty Entitlement Pass Book Scheme – Duty Exemption Entitlement Certificate – Export Promotion Capital Goods Scheme – Software Technology Parks – Export House – Trading House – Advance Licenses.

UNIT-IV

Export Financing: Export Pricing – INCOTERMS – Export Incentives – Export Finance – EXIM Bank – Export Credit Guarantee Corporation of India.

UNIT-V

Export Institutions: Ministry of Commerce – Director General of Foreign Trade – Indian Trade Promotion Organisation – Commodity Boards – Export Promotion Councils – Special Economic Zones – Export Processing Zones – Export Oriented Units – Federation of Indian Export organization.

TEXT BOOK :

M.A Shewan, Export Management, Sonali Publications, (discovery Pub.house), Darya Ganj, (2010)

REFERENCES:

P K. Kurana , Export Management, Golgotia Publishing company, New Delhi (2008)

COURSE OBJECTIVES:**To make the students**

1. Describe nature and scope of Human Resources management
2. Evaluate human resource planning, recruitment process and selection methods in the organization
3. Discuss need for motivating employees in an organisation.
4. Assess labour relations, industrial disputes and settlement in the organization
5. To know the concept of industrial relations.
6. To describe the performance appraisal, Job evaluation, promotion and punishment

COURSE OUTCOMES:**Learners should be able to**

1. Understand the HR environment in India and human resource functions within organizations
2. Plan human resources requirement and formulate HR policy of the organisation with regard to recruitment, selection, training and career planning.
3. Appraise the employee's performance and formulate compensation policy which helps to make organizational excellence.
4. Understand the importance of career planning, job evaluation and factors influencing compensation levels.
5. Analyse the ethical issues in HR management
6. Understand the performance appraisal, Job evaluation, Promotion and Punishment

UNIT –I

Introduction to HRM: Definition, Objectives and Functions of HRM –Role and Structure of Personnel Functions in Organization - Personal Principles and Policies.

UNIT –II

Human Resource Planning(HRP): - Characteristics of HRP, Need for Planning HRP Process - Job Analysis, Job Design, Job Description, Job Specification. Selection Process - Placement and Induction, Training and Development, Promotion, Demotions, Transfers, Separation.

UNIT –III

Wage and Salary Administration: - Factors Principles - Compensation Plan – Individuals and Group Incentives – Bonus - Fringe Benefits - Job Evaluation Systems.

UNIT –IV

Employee Maintenance and Integration:- Welfare and Safety - Accident Prevention - Administration of Discipline - Employee Motivation - Need and Measures.

UNIT –V

Personnel Records and Reports: - Personnel Research and Personnel Audit – Objectives - Scope and Importance.

TEXT BOOK:

S.S.Khanka. (2013), Human Resource Management, Sultan Chand & Sons, New Delhi

REFERENCE

- 1) V.S.P.Rao (2010) Human Resource Management Text and Cases. New Delhi: Excel Books.
- 2) Tripathi P C, Personnel Management and Industrial Relations, Sulhan Chand & Sons , (2013), New Delhi

COURSE OBJECTIVES:

To make the students

1. To identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. To analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To Work in team and exhibit leadership skills
7. To utilise the IT applications for analysis and preparation of report.

COURSE OUTCOMES:

Learners should be able to

1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills
7. Utilise the IT applications for analysis and preparation of report.

KARPAGAM ACADEMY OF HIGHER EDUCATION
COIMBATORE-641021
Department of Commerce
B.COM (Hons)

For the Student admitted during the year 2015 Batch
Scheme of Examination

Code	Subjects	Ins*	Marks			Exams/hrs	Credit
			CIA	ESE	TOT		
SEMESTER-V							
15CMU507	Financial Services	-	-	100	100	3	5
SEMESTER-V1							
15CMU605	Working Capital Management	-	-	100	100	3	5
	TOTAL	-	-	200	200	-	10

Note: The candidates who have secured 75% aggregate marks in each I, II, III and IV semester passed in single attempt are eligible to register for Honours Degree.

The Student who have registered for Honours Degree shall have to write two theory papers(self study) of 5 credit each one with 5th semester regular papers and another one with 6th semester regular papers.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of Financial markets, Financial Institutions and regulatory body.
2. To communicate orally and in written form the Concept of Financial markets, Financial Institutions and regulatory body.
3. To apply the Concept of Financial markets, Financial Institutions and regulatory body in lifelong practice.
4. To Understand the Concept of banking and treasury operations.
5. To communicate orally and in written form the Concept of investment banking and private equity
6. To apply the Concept of mutual fund and commodity market.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of Financial markets, Financial Institutions and regulatory body.
2. Communicate orally and in written form the Concept of Financial markets, Financial Institutions and regulatory body.
3. Apply the Concept of Financial markets, Financial Institutions and regulatory body in lifelong practice.
4. Understand the Concept of banking and treasury operations.
5. Communicate orally and in written form the Concept of investment banking and private equity
6. Apply the Concept of mutual fund and commodity market.

Unit – I

Financial Services: Meaning – Classification – Scope – Fund Based Activities – Non Fund Based Activities – Modern Activities – Sources of Revenue – Causes for Financial Innovation – Challenges facing the Financial Service Sector. Merchant Banking in India- Merchant Banks and Commercial Banks – Services of Merchant Banks.

Unit – II

Hire Purchase: Meaning – Features – Legal Position – Hire Purchase and Credit Sale – Hire Purchase and Installment Sale – Hire Purchase and Leasing – Origin and Development – Banks and Hire Purchase Business – Bank Credit for Hire Purchase. Leasing – Definition – Steps in Leasing Transactions – Types of Lease – Advantages and Disadvantage of Lease – Problems of Leasing.

Unit – III

Venture Capital: Concept – Meaning – Features – Scope of Venture Capital – Importance – Method of Venture Financing – Suggestion for the Growth of Venture Capital – Factoring – Meaning – Functions – Types – Factoring Vs Discounting – Benefits of Factoring.

Unit – IV

Mutual Funds: Types – Importance – Selection of a Fund – Securitization – Stages of Securitization – Benefits – Derivatives – Kinds – Forward, Future, Options and Swaps.

Unit – V

Credit Rating: Definition and Meaning – Functions of Credit Rating – Origin – Credit Rating in India – Benefits of Credit Rating – Credit Rating Agencies in India: CRISIL, ICRA, CARE- Limitations of Rating – Future of Credit Rating in India

TEXT BOOK

E Gordon and K. Natarajan Financial Markets and Services, Himalaya Publishing House, Mumbai

REFERENCES

1. Khan M.Y. (1997), Financial Services, Tata McGraw Hill Company Ltd, New Delhi.
2. Dharmaraj (2007) Financial Services, S. Chand & Sons Ltd., New Delhi
3. Tripathy Nalini Prava (2007) Financial Services, Prentice Hall of India, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To make students understand the importance of working capital in an industrial undertaking
2. To communicate orally and in written form the Concept of Working Capital Policy Overall Considerations
3. To understand the Concept of Cash Control Monitoring Collections and Disbursement, Cash Management Models
4. To Understand the Concept of various Techniques for Managing Inventories.
5. To communicate orally and in written form the Concept of Credit Policy and Credits Evaluation Credit Granting Decisions
6. To apply the Concept of Trade Credit and Short-Term Bank Finance

COURSE OUTCOMES:**Learners should be able to**

1. Making the students understand the importance of working capital in an industrial undertaking
2. Communicating orally and in written form the Concept of Working Capital Policy Overall Considerations
3. Understanding the Concept of Cash Control Monitoring Collections and Disbursement, Cash Management Models
4. Understanding the Concept of various Techniques for Managing Inventories.
5. Communicating orally and in written form the Concept of Credit Policy and Credits Evaluation Credit Granting Decisions
6. Applying the Concept of Trade Credit and Short-Term Bank Finance

Unit - I

Working Capital Policy Overall Considerations: Importance of Working Capital Management - Concept of Working Capital - Risk And Return Trade off Financing Working Capital - Sources and Uses of Working Capital - Factor influencing Working Capital Requirements Issues in Working Capital Policy - Size of Working Capital Forecasting and Management of Working Capital.

Unit - II

Cash Management: Importance - Factors influencing Cash Balance - Determining Minimum Cash Balance - Cash Budgeting - Cash Control Monitoring Collections and Disbursement - Cash Management Models.

Unit - III

Inventory Management: Need for Inventories and Importance of its Management - Techniques for Managing Inventory - Different Models Recorder - Point - Pricing of Raw Materials and Valuation of Stock - Monitoring and Control of Inventories

Unit - IV

Receivables Management: Credit Policy - Credits Evaluation Credit Granting Decisions - Control Receivables - Collection Policy

Unit - V

Financing Current Assets: Trade Credit - Short Term Bank Finance - Commercial Paper - Public Deposits - Committees on Working Capital Regulation of Bank credit – Recommendation.

TEXT BOOK

Prasanna Chandra, Financial Management Theory and Practice, Tata McGraw Hill

REFERENCE BOOKS

1. Gitmen L.J Basic Managerial Finance Harper & Raw
2. Weston J.F and Copeland T.E Managerial Finance, Dryden P. New York 1995.
3. I.M Pandey Financial Management, Vikas Pub, New Delhi
4. V.E. Ramamurthy, Working Capital Management IFMR Madras 34.

BACHELOR OF COMMERCE (PROFESSIONAL ACCOUNTING)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum

(2015 – 2018)



DEPARTMENT OF COMMERCE

FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Pollachi Main Road, Eachanari (Post), Coimbatore- 641021, Tamil Nadu, India

Phone: 0422 – 2980011 –15 Fax No: 0422 – 2980022-23

Email: info@karpagam.com Web: www.kahedu.edu.in

DEPARTMENT OF COMMERCE
FACULTY OF ARTS, SCIENCE AND HUMANITIES
UG PROGRAM (CBCS) – B.COM.(PA)
(2015–2018 Batch and onwards)

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
SEMESTER – I										
15LAU101	Language – I	I, II, III	a, e	05	0	0	05	40	60	100
15ENU101	English – I	I, II, III	a, e	04	0	0	04	40	60	100
15PAU101	Core - Principles of Accountancy	I, II, III, IV	a, c, d,e, h,i	05	01	0	05	40	60	100
15PAU102	Core - Mercantile Law	I,III,IV	a,c,d,e,h,i	05	0	0	05	40	60	100
15PAU103	Allied - Business Mathematics	I, II, III, IV	a, c, d,e, h,i	04	02	0	04	40	60	100
15FCA101	Foundation Course – A Value Education	I,III,IV	a,c,d,e,h,i	02	0	0	01	100	-	100
15SSD101	Soft Skill Development - I	I, II, III	a, e, g, f	02	0	0	0	-	-	-
Semester Total				27	03	0	24	300	300	600
SEMESTER – II										
15LAU201	Language - II	I, II, III	a, e	05	0	0	05	40	60	100
15ENU201	English - II	I, II, III	a, e	04	0	0	04	40	60	100
15PAU201	Core - Financial Accounting	I, II, III, IV	a, c, d,e, h,i	05	01	0	05	40	60	100
15PAU211	Core – Practical – MS	I, II,	a, c, d,e,	0	0	05	03	40	60	100

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
				PEOs	POs	L		T	P	CIA
		40	60							100
	Office	III	h							
15PAU202	Allied - Business Statistics	I, II, III	a, c, d,e, h	04	02	0	04	40	60	100
15FCB201	Foundation Course – B Environmental Studies	I,III, IV	a, e,h, i	02	0	0	01	100	-	100
Semester Total				22	03	05	23	400	300	700
SEMESTER – III										
15ENU301	English - III	I, II, III	a, e	04	0	0	04	40	60	100
15PAU301	Core - Higher Financial Accounting	I, II, III	a, c, e, d, h	04	01	0	05	40	60	100
15PAU302	Core - Direct Taxation - I	I, II, III, IV	a, c, d,e, h,i	04	01	0	05	40	60	100
15PAU303	Core – Principles of Auditing	I, II, III, IV	a, c, d,e, h,i	04	0	0	04	40	60	100
15PAU311	Core – Practical – Accounting Package –Tally	I, II, III, IV	a, e, h,i	0	0	04	02	40	60	100
15PAU304A	Managerial Economics	I, II, III, IV	a, e, h,i	06	0	0	05	40	60	100
15PAU304B	Principles of Management									
15PAU304C	Management Information System									
15SSD301	Soft Skill Development - II	I, II, III	a, e, g, f	02	0	0	0	-	-	-
Semester Total				24	02	04	25	240	360	600
SEMESTER – IV										
15ENU401	English - IV	I, II, III	a, e	05	01	0	05	40	60	100

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
15PAU401	Core - Corporate Accounting	I, II, III, IV	a, c, d,e,h	05	01	0	05	40	60	100
15PAU402	Core - Direct Taxation - II	I, II, III, IV	a, c, d,e, h,i	06	0	0	05	40	60	100
15PAU403	Core – Company Law and Secretarial Practice	I, II, III, IV	a, c, d,e, h,i	06	0	0	05	40	60	100
15PAU404A	Business Organization and Office Management	I, II, III, IV	a, c, d,e, h,i	06	0	0	05	40	60	100
15PAU404B	Business Ethics and Communication									
15PAU404C	Marketing Management									
15SSD401	Soft Skill Development - II	I, II, III	a, c, d,e,h	02	0	0	01	100	-	100
Semester Total				28	02	0	25	300	300	600
SEMESTER V										
15PAU501	Core - Advanced Corporate Accounting	I, II, III, IV	a, c, d,e,f,g, h,i	04	01	0	05	40	60	100
15PAU502	Core - Applied Cost Accounting	I, II, III	a, c, d,e, f,g,h	04	01	0	05	40	60	100
15PAU503	Core – Research Methodology	I, II, III	a, c, d,e, h	05	0	0	05	40	60	100
15PAU504	Core – Indirect Taxation	I, II, III	a, c, d,e, h	05	0	0	05	40	60	100
15PAU505	Core – Industrial Law	I, II, III	a, e,h	05	0	0	05	40	60	100
15PAU506A	Financial Management	I, II,	a, c,	05	0	0	05	40	60	100

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
15PAU506B	Fundamentals of Insurance	III, IV	d,e,f,g, h,i							
15PAU506C	Retail Business Management									
15OEU501	Open Elective	I, II, III	a, e,h	0	0	0	03	-	100	100
Semester Total				28	02	0	33	240	460	700
SEMESTER – VI										
15PAU601	Core - Management Accounting	I, II, III, IV	a,e,h,i	04	01	0	05	40	60	100
15PAU602	Core – Service Tax and VAT	I, II, III, IV	a,e,h,i	04	01	0	05	40	60	100
15PAU603A	Investment Management and Financial Analysis	I, II, III	a,e,h	05	0	0	05	40	60	100
15PAU603B	Human Resource Management									
15PAU603C	Entrepreneurial Development									
15PAU691	Project and Viva Voce			0	0	15	05	80	120	200
15EAU601	NSS/NCC/Sports/ Club Activity etc.,			0	0	0	0	-	-	-
Semester Total				13	02	15	20	200	300	500
Programme Total				142	14	24	150	1680	2020	3700

CIA– Continuous Internal Assessment

ESE – End Semester Examination

PROGRAM OUTCOMES [PO]

- a. Graduates will have a knowledge in bookkeeping, accounting, compliance abiding norms of financial services industry.
- b. Graduates will apply the IT skills in accounting, taxation and finance career for effective decision making.
- c. Graduates will obtain ability to analyze and solve the complex business problems with professional expertise and accuracy using quantitative and qualitative tools and techniques for effective decision making.
- d. Graduates will exhibit critical thinking skills to understand the accuracy in financial reporting, real-time business issues and advocate suitable solutions.
- e. Graduates will acquire and demonstrate the interpersonal and communication skills to convey the audited findings and negotiate for the conformity of the results got through in-depth analysis.
- f. Graduates will attain and exhibit skills to work as team to take effective decisions in achieving the common goals.
- g. Graduates will demonstrate the leadership skills to initiate, lead and deliver the best performance together with the team members.

PROGRAM SPECIFIC OUTCOMES (PSO)

- h. Graduates will apply a lifelong learning in research and practice gained through knowledge and skills in continuous adaption of the changes in environment factors pertaining to accounting, auditing, and finance.
- i. Graduates will demonstrate legal, ethical compliance and socially sustainable code of conduct in both personal and professional decision-making process.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- I. Graduates will gain knowledge of accounting, taxation, auditing, finance and management to perform effectively in professional courses like CA, CMA,CS, ICWA and other courses.
- II. Graduates will obtain and demonstrate skills pertaining to professional courses to perform effectively in studies, jobs and entrepreneurial ventures.
- III. Graduates will develop a life-long learning by applying the gained knowledge and skills in Professional practice and research.

- IV. Graduates will demonstrate high standard of ethical conduct and become socially responsible citizens contributing to the sustainable growth of profession and the community

Program Educational Objectives	Program Outcomes								
	a	b	c	d	e	f	g	h	I
Graduates will gain knowledge of accounting, taxation, auditing, finance and management to perform effectively in professional courses like CA, CMA, CS, ICWA and other courses.	√	√	√	√					
Graduates will obtain and demonstrate skills pertaining to professional courses to perform effectively in studies, jobs and entrepreneurial ventures.		√	√	√	√	√	√	√	√
Graduates will develop a lifelong learning by applying the gained knowledge and skills in Professional practice and research.	√	√	√	√	√	√		√	
Graduates will demonstrate high standard of ethical conduct and become socially responsible citizens contributing to the sustainable growth of profession and the community.				√	√	√	√	√	√

COURSE OBJECTIVES**To make the students**

1. Learning way of thinking and expressive ability.
2. Improving the scope of research.
3. Realizing the subtle parts of life that literature conveys.
4. Realizing the role that literature plays in the maturation of the human mind.
5. Awareness raising on awareness, culture etc. in the growing community.
6. Preparing students for government exams.

COURSE OUTCOMES**Learners should be able to**

1. Complete introduction to 'History of Tamil Literature', which is an optional subject in competitive examinations such as Indian Citizenship.
2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.
3. 'Scientific Tamil', the field of development of Tamil; Development of multi-pronged research thinking on 'Internet Tamil'.
4. Having creative self-improvement and creativity development for employment.
5. An attitude of seeking literature in support of social and biological values.
6. Skill development for translation-based employment.

அலகு I தற்கால இலக்கியம்

- | | | |
|-------------------|---|--|
| 1.மனோன்மனீயம் | - | சுந்தரம்பிள்ளை |
| 2.பாரதியார் | - | பாரதியார் கவிதைகள் |
| 3.பாரதிதாசன் | - | குன்றம் (அழகின் சிரிப்பு) |
| 4.நாமக்கல் கவிஞர் | - | தமிழன் இதயம் |
| 5.அப்துல் ரகுமான் | - | கூடுதற்கும் பறவைகள் |
| 6.சிற்பி | - | ஒடு ஒடு சங்கிலி (ஒரு கிராமத்து நதி) |
| 7.வைரமுத்து | - | மரங்களைப்பாடுவேன் |
| 8.தாமரை | - | அவசரம் ஒரு அசுர ஊசி |
| 9.புதியமாதவி | - | (ஒருகதவும் கொஞ்சம் கள்ளிப்பாலும்)
மகளே வந்துவிடு (ஹேராம்) |

அலகு II பக்தி இலக்கியம்

1. சைவம் - பன்னிரு திருமுறைகளில் 12 பாடல்கள்
2. வைணவம் - ஆழ்வார் பாடல்கள் 12)

அலகு III உரைநடை

- | | | |
|----------------------------------|---|-----------------------|
| 1. பழந்தமிழ்நாடு | - | டாக்டர். கு. கதிரேசன் |
| 2. நொய்யல் நாகரிகம் | - | புலவர் செ. இராக |
| 3. அறிவியல் தமிழாக்கம் இற்றைநிலை | - | வா.செ. குழந்தைசாமி |
| 4. கணிப்பொறி | - | சுஜாதா |
| 5. சுற்றுச்சூழல் மேலாண்மை | - | தமிழ்நாடு அரசு |

அலகு IV பயிற்சி

இலக்கணம், கடிதங்கள் - அலுவலகநிலை, மொழிபெயர்ப்பு
நிகழ்ச்சித் தொகுப்புகள்
(பயிற்சி ஏடு - கல்லூரி வெளியீடு)

அலகு V இலக்கிய வரலாறு

- 1.தற்காலத் தமிழ்க் கவிதைகளின் வரலாறும், வளர்ச்சியும்
- 2.புதுக்கவிதைப் பிதாமகன்கள் குறித்த அறிமுகம்
- 3.பாரதியார், பாரதிதாசனின் தமிழ்த்தொண்டு
- 4.உரைநடையின் தோற்றமும் வளர்ச்சியும்

Course Objectives:**To make the students**

1. To enable the learners to acquire English language skills at a faster pace.
2. To introduce different kinds of literary works
3. To familiarize different genres of Literature
4. To instruct moral values through literature.
5. To improvise their productive and receptive skills
6. To strengthen the basic knowledge about grammar.

Course Outcomes:**Learners should be able to**

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O’ Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

1. Rao, G. Chandralekha and et al. Spring 2013. Emerald Publishers: Chennai.

REFERENCES

1. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

COURSE OBJECTIVES:**To make the students**

1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.
2. To know about the accounting process and preparation of final accounts
3. To understand about the Accommodation of bills, Average Due Date and Account Current.
4. To understand and apply the techniques for preparing accounts in different business organizations like consignment and joint venture.
5. To know about the Bank Reconciliation Statement process and Accounting Standards
6. To have a in depth knowledge on partnership accounts

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Acquire knowledge on accounting process and preparation of final accounts
3. To apply appropriate judgment derived from knowledge about bill of exchange
4. Recognize the accounting process of financial statement and critically think in preparing Accounts, rectification of errors, Consignment and Joint Venture.
5. Recognize the Bank Reconciliation Statement process and Accounting Standards
6. Acquired an in depth knowledge on various partnership concepts

Unit I

Theoretical Frame work: Meaning and scope of Accounting- Accounting concepts, principles and conventions- Accounting standards, Concepts, objectives and benefits- Accounting policies- Accounting as a measurement discipline, valuation principles, Accounting estimates and ASI. Accounting Process: Preparation of journal, Ledger, trial balance, capital and revenue Expenditure, Capital and Revenue Receipts, Contingent Liabilities

Unit II

Fundamental Errors including rectifications thereof- Bank Reconciliation Statement- Stock Reconciliation Statement - Debtor Reconciliation Statement - Creditor Reconciliation Statement.

Unit III

Preparation of Final Accounts for Sole proprietors.

Unit IV

Consignment and Joint Venture - Accounting entries in the books of Consignor and Consignee - Joint Venture Accounting.

Unit V

Partnership Accounts: Past adjustments and guarantees- Basic concepts of Admission, Retirement and death of a partner including treatment of goodwill.

Note: Distribution of marks between problems and theory shall be 80% and 20%.

TEXT BOOKS

1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2010), Principles of Accountancy, S.Chand & Company Ltd, New Delhi.

REFERENCES

1. ICAI Study material
2. Gupta. R.L and Shukla. (2011) M.C, Principles of Accountancy, S.Chand & Company Ltd., New Delhi.
3. T.S.Grewal,(2010), Introduction to Accountancy, S.Chand & Company Ltd, New Delhi.
4. R.L.Gupta, V.K.Gupta, (2014) Financial Accounting, Sultan Chand & Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To know the essential elements of contract and also the Indian Contract Act 1872.
2. To understand about the Banking Regulation Act 1949
3. To learn the fundamental regulation about the sale of goods act, 1930.
4. To impart basic knowledge of Indian Partnership Act 1932 and Limited Liability Partnership Act, 2008
5. To enhance knowledge in the Negotiable Instruments Act 1881.
6. To make the students learn about the various laws essential for working in a competitive business environment

COURSE OUTCOMES:**Learners should be able to**

1. Recognize the basic legal principles behind contractual agreements.
2. Understand the workings of banking companies and RBI.
3. Understand the relevance of business law in economic and social context.
4. Acquire problem solving techniques and will be able to present coherent, concise legal argument in partnership for achieving common goals.
5. Exhibit attributes in understanding various negotiable instruments, its features and utilization in real-time.
6. Gained knowledge about the mercantile law to work in a competitive business environment

Unit I

The Indian Contract Act 1872- An Overview of Sections 1 to 75 covering the general nature of contract, Considerations.

Unit II

Other Essential elements of a valid contract- Capacity to Contract- Free consent- Elements vitiating free contract- Lawful object and the consideration- Unlawful object- Unlawful consideration- Agreements expressly declared void.

Unit III

Performance of Contract- Breach of Contract- Contingent and Quasi – Contracts

Unit IV

The Sale of Goods Act, 1930: Formation of the contract of sales- Conditions and warranties- Transfer of Ownerships and delivery of goods- Unpaid seller and his rights.

Unit V

The Indian Partnership Act, 1932: General nature of Partnership- Rights and Duties of Partners- Registration and Dissolution of firm.

TEXT BOOKS

1. Kapoor N.D, (2013), Elements of Mercantile Law, S.Chand & Co, New Delhi.

REFERENCES

1. Shukla M.C. (2010), Mercantile Law. PHI India Pvt., Ltd., New Delhi.
2. R.S.N. Pillai and Bagavathy, (2007), Business Laws, S.Chand & Co, New Delhi.
3. M.C. Kuchhal, (2012), Mercantile Law, Vikas Publishing House Pvt Ltd, New Delhi.
4. S.S.Gulshan and G.K. Kapoor (2011), Business Law, New Age International Pvt Ltd, New Delhi.

COURSE OBJECTIVES**To make the students**

1. To understand the concept of matrices
2. To acquire the knowledge of differential calculus
3. To know the concepts of central tendency and dispersion
4. To understand the correlation and regression concepts
5. To be aware of the index numbers and trend analysis
6. To be aware on of issues in the construction of index numbers

COURSE OUTCOMES:**Learners should be able to**

1. Utilize the concept of matrices, differential calculus to solve business problems
2. Calculate and apply the measure of central tendency and dispersion in decision making.
3. Evaluate the relationship and association between variables to formulate the strategy in business.
4. Apply the concept of index numbers and trend analysis in business decisions.
5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
6. To overcome on issues in the construction of index numbers

UNIT I

Ratio: Concept of Ratio, inverse ratio, Proportion as equality of two ratios – Proportions: properties of proportion,

Indices: laws of indices, Logarithm: fundamental laws of logarithm, change of base properties of logarithm - Word problems.

UNIT II

Equations: Introduction- Simple Equation- Simultaneous linear Equation with three variable- Quadratic Equation- Nature of Roots- Cubic Equation- Graphical Solution of Linear Equation.

UNIT III

Set theory- Simple and Compound Interest: Definition, Related Terms- Effective rate of interest- Annuity- Future value- Present value- Sinking Fund- Applications.

Permutation and Combination: Introduction- Factorials- Permutations- Circular permutations- Combinations.

UNIT IV

Sequence and series: AP, GP, Geometric Mean- Sets, Function, Relations- De Morgans Law- Domain, Range and Functions- Various types of Functions

UNIT V

Limits and Continuity: Introduction- Types of Functions- Concepts- Important Limits- Continuity. Basic Concepts of differential and integral calculus: Introduction- Iterative- Implicit Function- Parametric Equation- Logarithmic differentiation- Integration. Basic formulae- Substitution- Integration by Parts- Partial Fraction- Definite Integration

TEXT BOOKS

1. P.R.Vittal, (2012). Quantitative Aptitude for the CA-CPT, Pearson Education, New Delhi.

REFERENCES

1. P.R. Praveen,(2013). Quantitative Aptitude and Reasoning, PHI Learning Pvt. Ltd., Delhi.
2. Quantitative Aptitude for CA-CPT by Trivedi
3. D.R.Agarwal, (2005). Business Mathematics, Vrinda Publications Pvt. Ltd., Delhi.
4. Navnitham.PA. (2009), Business Mathematics and Statistics, Jai Publications, Trichy.

COURSE OBJECTIVES**To make the students**

1. To improve the integral development of human beings
2. To train the students towards sustainable lifestyle
3. To create awareness about the values and their significance and role
4. To imbibe the concept of discipline and freedom
5. To impart the Indian family traditions in students
6. To learn the concept of personality and personality development

COURSE OUTCOMES:**Learners should be able to**

1. Impact knowledge on both human beings and Life Style.
2. Gain knowledge on human values roles and its significance.
3. Develop a sense of competitive spirit, co-operation, leadership and diligence.
4. Enrich on punctuality, and team-spirit as well as to provide a backdrop for the development of their creative talents
5. Acquired the knowledge about the importance of Indian family values and traditions
6. Acquired knowledge about the concept of personality and personality development

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.
-

COURSE OBJECTIVES**To make the students**

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To gain knowledge about the data interpretation
6. To improve the writing skill of the students

COURSE OUTCOMES:**Learners should be able to**

1. Impart knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Acquired understanding about the data interpretation
6. Enhanced the writing skill of the students

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT**– IV**

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

COURSE OBJECTIVES:**To make the students**

1. Learning way of thinking and expressive ability.
2. Improving the scope of research.
3. Realizing the subtle parts of life that literature conveys.
4. Realizing the role that literature plays in the maturation of the human mind.
5. Awareness raising on awareness, culture etc. in the growing community.
6. Preparing students for government exams.

COURSE OUTCOMES:**Learners should be able to**

1. Complete introduction to 'History of Tamil Literature', which is an optional subject in competitive examinations such as Indian Citizenship.
2. Access to literature with a research-oriented approach to inscriptional, manuscript, and archaeological research.
3. 'Scientific Tamil', the field of development of Tamil; Development of multi-pronged research thinking on 'Internet Tamil'.
4. Having creative self-improvement and creativity development for employment.
5. An attitude of seeking literature in support of social and biological values.
6. Skill development for translation-based employment.

09ABTLA201 : தமிழ் இரண்டாம் தாள்

4-H,3-C

அலகு I செய்யுள்**1.சங்கஇலக்கியம்**

அகநானூறு, புறநானூறு, நற்றிணை,குறுந்தொகை, ஐங்குறுநூறு,
பதிற்றுப்பத்து,பரிபாடல்

2. நீதி இலக்கியம்

திருக்குறள் (ஈகை, தெரிந்து செயல்வகை)
நாலடியார் (நல்லினம் சேர்தல்)

3.பக்தி இலக்கியம்

திருஞானசம்பந்தர் தேவாரம், திருவாசகம், பெரியாழ்வார் திருமொழி,
நாச்சியார் திருமொழி

அலகு II சிறுகதை

காலனும் கிழனியும்	- புதுமைப்பித்தன்
அக்கினிப்பிரவேசம்	- ஜெயகாந்தன்
கண்ணகி	- இராஜம் கிருஷ்ணன்
பாதுகை	- பிரபஞ்சன்
உருமாற்றம்	- சு. வேணுகோபால்

அலகு III இலக்கணம்

அகம்,புறம், திணை,துறை

அலகு IV. பயிற்சி

விண்ணப்பங்கள்- கட்டுரைகள்- கடிதங்கள்

அலகு V இலக்கிய வரலாறு

- 1.எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள் அறிமுகம்
2. பன்னிரு திருமுறை, நாலாயிரதிவ்யபிரபந்தம்
3. சைவ, வைணவ இலக்கியங்கள் தமிழுக்குச் செய்த தொண்டு
4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

Part I TAMIL 2009. Karpagam University, Coimbatore - 21, India

COURSE OBJECTIVES:**To make the students**

1. To enable the learners to acquire English language skills through literature.
2. To familiarize them with English literature.
3. To acquire Grammar knowledge.
4. To help learners imbibe cultural values.
5. To acquire skill of making correct sentences.
6. To reflect originality on the application of soft skills and express in writing their views.

COURSE OUTCOMES:**Learners should be able to**

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

1. Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

REFERENCES

1. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

COURSE OBJECTIVES:

To make the students

1. To make the students learn the basic concepts, conventions, nature of accounting and also to acquire Conceptual Knowledge in different accounting standards.
2. To know about the accounting process and preparation of final accounts
3. To understand about the Accommodation of bills, Average Due Date and Account Current.
4. To understand and apply the techniques for preparing accounts in different business organizations like consignment and joint venture.
5. To know about the Bank Reconciliation Statement process and Accounting Standards
6. To give an insight about the company accounts

COURSE OUTCOMES:

Learners should be able to

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Acquire knowledge on accounting process and preparation of final accounts
3. To apply appropriate judgment derived from knowledge about bill of exchange
4. Recognize the accounting process of financial statement and critically think in preparing Accounts, rectification of errors, Consignment and Joint Venture.
5. Recognize the Bank Reconciliation Statement process and Accounting Standards
6. Apply the concepts of company accounts

Unit I

Depreciation Accounting- Methods – Straight Line Method, Written Down Value Method, Sinking Fund Method, Sum of Digit Method, Machine Hours Method, Production Units Method computation and accounting treatment of Depreciation - Change in Depreciation methods

Unit II

Bills of exchange and promissory notes- Sale of goods on approval or return basis

Unit III

Basis of inventory - valuation and record keeping

Unit IV

Company Accounts - Issue of Shares - Forfeiture of shares - Re issue of Forfeited of shares

Unit V

Issue of Debentures and Redemption of Debentures- Issue of preference shares and redemption of preference shares – Types of preference share, Types of debentures.

Note: - Distribution of Marks: Theory- 20% and Problems -80% respectively.

TEXT BOOKS

1. Vinayagam N, Mani.P.L. and Natarajan.K.L, (2010), Financial Accounting, Sultan Chand and sons, New Delhi.

REFERENCES

1. S. P. Jain and K. L. Narang, (2010), Advanced Accountancy, Sultan Chand & Sons, New Delhi.
2. M.C. Shukla, (2010), Advanced Accounting, Sultan Chand & Sons, New Delhi.
3. S.N. Maheshwari, (2012), Advanced Accounting, Kalyani Publishers, Ludhiana.
4. M.A. Arulanandam and K.S. Raman, (2010), Advanced Accounting, Vikas Publishers, New Delhi.
5. R.L. Gupta and Rathaswamy, (2009), Advanced Accounting, Sultan Chand & Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To understand the accounts heads available to create a company in the accounting software
2. To know the mechanics of creating the vouchers and ledgers
3. To be aware of the inventory valuations methods available in the software
4. To understand various financial statements that are built in the software
5. To be aware of financial analysis tools available in the software
6. To make students capable in preparing power point presentation

COURSE OUTCOMES:**Learners should be able to**

1. Understand the different accounting heads and its importance
2. Create vouchers and ledgers by understanding the reason for posting under different heads
3. Calculate valuation of assets using the software
4. Prepare the financial statements and analyze the financial statement using the option of ratio analysis
5. Exhibit communication skills to communicate the output derived from the program
6. Apply power point presentation

MS WORD

1. Type Chairman's speech/ Auditor's report / Minutes/ Agenda and perform the following operations:
Bold, Underline, Font Size, style, Background color, Text color, Line spacing, Spell Check, Alignment, Header & Footer, Inserting pages and page numbers, Find and Replace.
2. Prepare an invitation for the college function using Text boxes and clip parts.
3. Design an invoice and Account sales by using Drawing tool bar, Clip Art, Word Art, Symbols, Borders and Shading.
4. Prepare a Class Time Table and perform the following operations: Inserting the table, Data Entry, Alignment of Rows and Columns, Inserting and Deleting the Rows and Columns and Change of Table Format.
5. Prepare a Shareholders meeting letter for 10 members using mail merge operation.
6. Prepare Bio-Data by using Wizard/ Templates.

MS EXCEL

1. Prepare a mark list of your class (minimum of 5 subjects) and perform the following operations:
Data Entry, Total, Average, Result and Ranking by using arithmetic and logical functions and sorting.

2. Prepare Final Accounts (Trading, Profit & Loss Account and Business Sheet) by using formula.
3. Draw the different type of charts (Line, Pie, Bar) to illustrate year-wise performance of sales, purchase, profit of a company by using chart wizard.
4. Prepare a statement of Bank customer's account showing simple and compound interest calculations for 10 different customers using mathematical and logical functions.
5. Prepare a Product Life Cycle which should contain the following stages:
Introduction, Growth, Maturity, Saturation, Decline.

MS POWERPOINT

1. Design presentation slides for a product of your choice. The slides must include name, brand name, type of product, characteristics, special features, price, special offer etc. Add voice if possible to explain the features of the product. The presentation should work in manual mode.
2. Design presentation slides for organization details for 5 levels of hierarchy of a company by using organization chart.
3. Design slides for the headlines News of a popular TV Channel. The Presentation Should contain the following transactions: Top down, Bottom up, Zoom in and Zoom out. - The presentation should work in custom mode.
4. Design presentation slides about an organization and perform frame movement by interesting clip arts to illustrate running of an image automatically.
5. Design presentation slides for the Seminar/Lecture Presentation using animation effects and perform the following operations: Creation of different slides, changing background color, font color using word art.

MS ACCESS

1. Prepare a payroll for employee database of an organization with the following Details:
Employee id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other deductions if any. Perform queries for different categories.
2. Create mailing labels for student database which should include at least three Table must have at least two fields with the following details: Roll Number, Name, Course, Year, College Name, University, Address, Phone Number.
3. Gather price, quantity and other descriptions for five products and enter in the Access table and create an invoice in form design view.
4. Create forms for the simple table ASSETS.
5. Create report for the PRODUCT database.

TEXT BOOKS

1. R.K.Taxali. (2010), P C Software Made Simple, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

COURSE OBJECTIVES**To make the students**

1. To understand the concept of matrices
2. To acquire the knowledge of differential calculus
3. To know the concepts of central tendency and dispersion
4. To understand the correlation and regression concepts
5. To be aware of the index numbers and trend analysis
- 6 To be able to apply various analysis needed for business research

COURSE OUTCOMES:**Learners should be able to**

1. Utilize the concept of matrices, differential calculus to solve business problems
2. Calculate and apply the measure of central tendency and dispersion in decision making.
3. Evaluate the relationship and association between variables to formulate the strategy in business.
4. Apply the concept of index numbers and trend analysis in business decisions.
5. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
- 6 Apply various analysis needed for business research

UNIT I

Statistical description of data - Tabular Representation – Diagrammatic Representation – Frequency distribution- Graphical Representation – Ogives.

UNIT II

Measures of Central Tendency: Introduction to Mean - Median - Harmonic Mean – Standard deviation – Quartile Deviation – Mode –Mean Deviation – Range.

UNIT III

Probability – definitions – addition and multiplication rules (only statements) – simple business problems.

Probability distribution - Binomial, Poisson and Normal – simple problems applied to business.

UNIT IV

Correlation : Definition , Type of correlation , Method of correlation - scatter diagram – Karl Pearson's coefficient of correlation – Spearman's Rank correlation.

Regression: Definition, Regression equations – Methods of forming the regression equations - Problems.

UNIT V

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre’s, Paasche’s and Fischer’s method – Tests for an ideal index number – Wholesale and Cost of living index .

TEXT BOOKS

1. Pillai.R.S.N., and V.Bagavathi, (2002). Statistics, S. Chand & Company Ltd, New Delhi.

REFERENCES

1. P.R.Vittal, (2012). Quantitative Aptitude for the CA-CPT, Pearson Education, New Delhi.
2. Quantitative Aptitude for CA-CPT by Trivedi
3. Navnitham.PA. (2009). Business Mathematics and Statistics, Jai Publications, Trichy.
4. Richard .I.Levin., & David.s .Rubin., (1998). Statistics for Management, Seventh edition, Prentice hall of India, New Delhi.

FOUNDATION COURSE - B
ENVIRONMENTAL STUDIES

15FCB201

2 - - 1

COURSE OBJECTIVES:

To make the students

1. To understand the ecosystem and its functions
2. To be aware of the difference between the renewable and non-renewable resources.
3. To know about biodiversity and the importance of conservation.
4. To be aware of the different pollution that affects the environment.
5. To know about the social issues prevailing in the environment.
6. To impart the students with the importance of nature and thus create a responsibility towards protecting the natural resources

COURSE OUTCOMES:

Learners should be able to

1. Understand the ecosystem and its impact on human beings.
2. Preserve the non – renewable energy and effectively utilize the renewable energy.
3. Avoid the threats to biodiversity habitat losses.
4. Prevent pollution in the environment
5. Apply the laws relevant to the environment conservation
6. Develop a responsibility in protecting the natural resources

Unit – I

Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

Unit – II

Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit – III

Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit – IV

Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilisaion. Natural resources and associated problems and sustainable utilization. Environmental Education

Unit – V

Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, (2002). A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, (2002). Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, (2004). Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., (2005). Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. (2009). Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, (1942). Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, (2008). Natural Disasters, Mc Graw Hill, New York. Page: 1-7

	Semester II
SOFT SKILL DEVELOPMENT – I	LTPC
15SSD201	2 - - 1

COURSE OBJECTIVES

To make the students

1. To impact knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To improve the interpersonal skill of students

COURSE OUTCOMES:

Learners should be able to

1. Impact knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Develop the writing skill of students
6. Improve the interpersonal skill of students

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions **UNIT -**

V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

COURSE OBJECTIVES:

To make the students

1. To develop confidence to respond in English during situations where the use of English is imperative.
2. To develop fluency in actual conversation in the English language.
3. To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
4. To develop confidence to respond in English during situations where the use of English is imperative.
5. To develop fluency in actual conversation in the English language.
6. To develop knowledge about business communication.

COURSE OUTCOMES:

Learners should be able to

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.
6. Students will have honed the skills of communication which is needed for business purpose

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders.

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions. (Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose – Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions.

Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

REFERENCES

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

COURSE OBJECTIVES:

To make the students

1. To understand the basic accounting concepts like average due date, Ledger
2. To understand the concept of depreciation.
3. To knowledge in departmental accounts
4. To knowledge in various accounting standards
5. To understand the concepts Branch Accounts
6. To be aware of the Partnership Accounts

COURSE OUTCOMES:

Learners should be able to

1. understand the basic accounting concepts like average due date, ledgers
2. Comprehend the accounting methods in depreciation accounting.
3. Acquire knowledge on accounting process and preparation of branch accounts
4. To apply appropriate judgment derived from knowledge about Hire Purchase and Installment System.
5. Recognize the concepts of Accounting Standards
6. Acquire knowledge on partnership accounts.

Unit I

Average due date – account current – self – balancing ledgers.

Unit II

Financial statements of not – for – profit making organization – Accounts from incomplete records - Statement of affairs methods, conversion methods.

Unit III

Accounting for special transactions – Hire purchase and installment sale transactions – investment accounts – insurance claims for loss of stock and loss of profit.

Unit IV

Departmental account – accounting for branches including foreign branches.

Unit V

Accounting standards – AS1: Disclosure of Accounting Policies – AS2: valuation of inventories – AS3: cash flow statements – AS6: depreciation accounting – AS7: construction contracts – AS9: Revenue recognition – AS10: accounting for fixed assets – AS13: Accounting for investments – AS 14: Accounting for amalgamations.

Note: Distribution of marks for theory and problems shall be 20% and 80% respectively.

TEXT BOOKS

1. S.P.Jain, K.L.Narang (2010), Advanced Accounting, Kalyani Publishers, Ludhiana.

REFERENCES

1. M.C.Shukla, T.S.Grewal, S.C.Gupta. (2007). Advanced Accounts, Sultan Chand and sons, New Delhi.
2. R.L.Gupta M.Radhaswamy, (2006), Advanced Accountancy, Sultan Chand and Sons, New Delhi.
3. S.N.Maheswari S.K.Maheswari,(2011), Advanced Accounting, Vikas Publishing House Pvt. Ltd, New Delhi.
4. A.Mukherjee M. Hanid,(2007), Modern Accountancy, Tata McGraw-Hill, New Delhi.
5. Vinayaham Charumathi, (2008), Financial Accounting, Sultan Chand and Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To understand the basic principles underlying the provisions of direct tax laws and to develop a broad understanding of the tax laws and accepted tax practices.
2. To recognize the income from property and profession and mode of assessing the same in income tax.
3. To understand the computation of Profits and Gains of Business or Profession of an Individual
4. To obtain the importance of capital gain in computation of Income tax.
5. To gain the exposure on practical aspects of tax planning as an important managerial decision-making process.
- 6 To make the students aware of important concepts in tax

COURSE OUTCOMES:**Learners should be able to**

1. Distinguish sources of income
2. Distinguish between deductible and nondeductible expenses
3. Acquire knowledge on business income and Computation of Profits and Gains of Business
4. Apply the tax code provisions and calculate tax for natural and legal persons
5. Comprehend and apply the practical aspects of tax planning
6. Gain knowledge on important concepts in tax

Unit I

Income Tax Act 1961: Definition of Income – Assessment Year – Previous Year – Assessee – Assessee in default – Scope of income – Charge of tax – Residential status of HUF, individual, company – income which do not form part of total income.

Unit II

Salaries and House Property: Computation of Income from Salaries and Income from House Property.

Unit III

Business Income: Profits and gains of Business or Profession – Meaning of Business or Profession – Computation of Profits and gains of Business or Profession of an Individual – expenses expressly allowed – expenses expressly disallowed.

Unit IV

Capital Gain: Meaning – Definition of Capital assets, types, Computation of Capital gain – Income From Other Sources - Various income taxable under this head and Computation of Income from other sources

Unit V

Computation of Total Income: Set off and Carry forward of losses. Aggregation of agriculture income with non – agricultural income. Rates of tax for individuals. Income of other persons to be included in Income of Individual.

Note: Distribution of marks for theory and problems shall be 40 % and 60 % respectively.

Text Book

1. Gaur and Narang, (2014), Income Tax Law and Practice, Kalyani Publishers, Ludhiana.

REFERENCES

1. Mehrothra, (2014), Income Tax Law and Practice, Snow White publications, New Delhi.
2. Jayaprakash Reddy, (2014), Taxation, APH Publishing Corporation, New Delhi.
3. Dinkare Pagarae, (2014), Direct Tax, Sultan Chand and Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To impart the students' knowledge about the principles and practices in Auditing
2. To make the students to know about the Types of Audit and Vouching transaction
3. To apply the best auditing process as lifelong practice.
4. To communicate orally and in written form the auditing concept, techniques and practices in business.
5. To be familiar with the standards and laws pertaining to the auditing.
6. To give an understanding about the audit report

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the Concept of auditing,
2. Recall the audit techniques and practices.
3. Apply lifelong the key learning of best auditing process.
4. Communicate orally and in written form the auditing concept and techniques in business.
5. Familiar with the standards and laws pertaining to the auditing
6. Able to understand the audit report

Unit I

Introduction to Auditing: Definition – General objectives of auditing – Advantages and limitations of auditing – Auditing and investigation – Qualification of an auditor.

Unit II

Types of Audit: Continuous audit – final audit - Interim audit – Balance sheet audit – Merits and demerits – Audit procedure – Planning of audit – Audit programme – Audit note book – Audit working papers – Internal control – Internal check – Internal checks as regards cash, wages, sales etc – Position of external auditors to internal audit

Unit III

Vouching: Vouching of cash transactions – Trading transactions – Impersonal ledger –definition, nature and scope of internal auditing- Auditor position – Auditors duty regarding depreciation, reserves and provisions

Unit IV

Company Audit: Appointment and removal of auditor– Rights and duties of company auditors - Liabilities – Audit of share capital and share transfer.

Unit V

Audit report – contents and types. Auditors decision regarding the purchase and sale of asset. Audit of Computerized Accounts – Electronic Auditing.

TEXT BOOKS

1. B.N.Tandon, (2014), Principles of Auditing, S.Chand & Company, New Delhi.

REFERENCES

1. Saxena, R.G. Kuriakose, K.K. Venugopal. S, (2012), Auditing Theory and Practicals, Himalaya Publishing House, Mumbai.
2. Saxena. (2009), Principles and practices of Auditing. Himalaya Publishing House, Mumbai.
3. Kamal Gupta, (2010), Contemporary Auditing, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
4. M.S Ramasawamy, (2010), Principles and Practices of Auditing, Vikas Publishing House Pvt Ltd, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand Tally, its features and its importance in supporting accounting activity.
2. To communicate orally and in written form the Features of Tally in capturing accounting procedures.
3. To gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.
4. To be familiar with the incorporation of GST standards into accounting and computerized accounting process.
5. To learn how to use Tally for preparing final accounts
6. To use tally for inventory control and ratio analysis

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the knowledge of Tally, its features and its importance.
2. Communicate orally and in written form the Features of Tally in capturing accounting procedures.
3. Gain lifelong knowledge of Tally features and integration of accounting and computer for effective decision making.
4. Familiarize on the incorporation of GST standards into accounting and computerised accounting process.
5. Able to make use of Tally in preparing final accounts
6. Apply tally for inventory control and ratio analysis

PRACTICAL LIST

1. Create a new company in integrate accounts mode and account with inventory mode
2. Create a primary and sub groups using single or multiple ledger mode
3. Create minimum 10 ledgers using single or multiple ledger, and alter and delete any 2 ledger
4. Enter the following voucher
 - Payment vouchers
 - Receipt
 - Purchase
 - Sales
 - Credit note
 - Debit note
 - Journals
 - Memo

➤ Optional

5. Create stock, stock groups and enter the vouchers
6. Prepare inventory statements using (calculate inventory using all methods)
 - FIFO
 - LIFO

Simple Average Method

7 .Weighted Average MethodPrepare the following ratio analysis

- Financial ratio
- Operating ratio
- Investment ratio

8.Prepare the following

- Cash flow statement
- Fund flow statement

1. Preparation of reports for the following

- a. Trial Balance
- b. Profit & loss a/c
- c. Balance sheet
- d. Bank reconciliation statement
- e. Back up and restore the company information

TEXT BOOKS

- 1.Nellai Kannan, (2010), Tally, Nels Publishing Company, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of micro and macroeconomic factors and its application in business.
2. To communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.
3. To apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.
4. To understand demand supply functions
5. To gain knowledge on production function especially the long run and short run cost of production
6. To understand the various forms a competition prevails in market

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of micro and macroeconomic factors and its application in business.
2. Communicate orally and in written form Concept of micro and macroeconomic factors and its application in business.
3. Apply the micro and macroeconomic factors that is applied for the lifelong decision related to individual and business.
4. Familiarize the concept of demand and supply
5. Apply the concept of production function for fulfilling the managerial responsibilities
6. Understand the market structure

UNIT-I

Managerial Economics – Meaning and Definition – Nature and Scope – Economic Theory – Divisions – Goals of a firm.

UNIT-II

Demand Analysis – Meaning, Determinants of Demand – Law of Demand, Elasticity of Demand – Price, Income and Cross Demand – Demand Estimation and Demand Forecasting – Demand Distinctions. Supply Functions.

UNIT-III

Production Function – Meaning and Definition – Elasticity of Substitution and Production – Type of cost of Production – Long run and Short run cost.

UNIT-IV

Price Theory – Perfect Competition, Monopoly, Monopolistic competition, Monopsony, Duopoly, Duopsony and Oligopoly.

UNIT-V

Selects aspects of Indian Economy-population: Its size, Rate of growth and Its Implication for growth – Poverty: Absolute and Relative Poverty and min Programs for Poverty alleviation – Unemployment: Types , Causes and incidence of unemployment- infrastructure: Energy, Transportation , Communication , Health and Education – Inflation – Budget and Fiscal deficits – Balance of Payments – External Debts.

TEXT BOOKS

- 1.Sundaram K.P and Sundaram E. (2008). Business Economics. Sultan Chand & Sons, New Delhi.

REFERENCES

1. H.L.Ahuja. (2006), Business Economics, S.Chand & Company Ltd, New Delhi.
2. P.N.Reddy and H.R.Appanaiah, (2005), Principles of Business Economics, S.Chand & Company Ltd., New Delhi.
3. Paul R. Ferguson and Glenys J. Ferguson and R.Rothschild, (2010), Managerial Economics, Macmillan Press Ltd, Hong Kong.
4. S.K.Agarwala, (2009), Principles of Economics, Excel Books, NewDelhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of management, Behaviour as individual, group and organization.
2. To communicate orally and in written form Concept of management, Behaviour as individual, group and organization.
3. To apply the Concept of management, Behaviour as individual, group and organization life long.
4. To be familiar with various managerial theories
5. To demonstrate the concept of planning
6. To acquire knowledge about the business ethics

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of management, Behaviour as individual, group and organization.
2. Communicate orally and in written form Concept of management, Behaviour as individual, group and organization.
3. Apply the Concept of management, Behaviour as individual, group and organization lifelong.
4. Apply managerial theories in business
5. Understand the concept of planning
6. Gained insight about the business ethics

UNIT I

Nature and Scope of Management: Meaning – Definition - Management is a Science or Art – Development of Management Scientific Management – Functions - Social responsibilities and Ethics

UNIT II

Planning: Meaning and Characteristics of Planning – Steps in Planning – Objectives - Types of Planning - Policies, Procedures and Methods.

UNIT III

Organizing: Meaning – Definition - Functions of Organization – Types of Organizational Structure - Process of Decision making – Type of Decisions – Problems. – Span of control –Delegation - Decentralization and Centralization.

UNIT IV

Staffing: Line and Staff relationship – Co-ordination – Features. Motivation – Maslow's theory – Leadership – Qualities - Techniques.

UNIT V

Controlling: Meaning and Importance of Control – Control process – Controlling Techniques – Preventive control – Budgetary and Non-budgetary control - Business Ethics – Ethics and Morals – Nature of Ethics – Need for Business Ethics.

TEXT BOOKS

1. Dinkar Pagare, (2015), Principles of Management, S.Chand & Co Ltd., New Delhi.

REFERENCES

1. T.Ramasamy, (2014), Principles of Management, Himalaya Publishing house, Mumbai.
2. Koontz and Harold, (2014), Management Essentials, Tata Mc Graw Hill Publishers Pvt. Ltd. New Delhi.
3. S.P.Arora. (2009). Office Organization and Management,. Vikas Publishing House Pvt. Ltd. New Delhi.
4. Dr.Saxen,(2009), Business Administration and Management, Sahitya Bhavan Publications, New Delhi.

COURSE OBJECTIVES:**To make the students**

- 1 To know the basic concepts of MIS
- 2 To enable the students to learn the management information system and their applications in organization.
- 3 To know about various Input and output devices.
- 4 To create awareness among students in telecommunication revolution
- 5 To be able to understand the MIS support for specific business functions
- 6 To demonstrate the basic concepts of ERP

COURSE OUTCOMES:**Learners should be able to**

1. Understand the basic concepts of management information system
- 2 Apply management information system and their applications in organization.
- 3 Understand the usage of various input, output and storage devices.
- 4 Understand telecommunication revolution and IT Act 2000.
- 5 Gain knowledge about the MIS support for specific business functions
- 6 Apply the basic concepts of ERP

UNIT I

Introduction to Information Systems - Definition - Features - Steps in Implementation of MIS - Need for Information - Information System for Decision making- MIS as Competitive Advantages – MIS Structures.

UNIT II

MIS - Strategic Information System - MIS Support for Planning - Organizing - controlling - MIS for Specific Functions – Personnel – Finance - Marketing Inventory Production Data Base Management System Models - Hierarchical - Network - Relational - Modular.

UNIT III

Computer Hardware - Description of Electronic Computers – CPU Operations - Classification of Computers - Main - Mini – Workstations - Micro Computers - Super Computers - Personal Computers. Computer Software - Types of Software - Data Representation in Computers - Introduction to Client-Server.

UNIT IV

Input Devices - Mouse - Touch Screens - MICR - OCR - Keyboard - Pen Based Input - Digital Scanners - Voice Input Devices - Sensors. Output Devices - Impact Printers - Non-Impact Printers - Video Display Terminals - Plotters - Voice Output Devices. Secondary Storage Devices - Magnetic Disk, Floppy, Magnetic Tape, Optical Disk Storage - DROM

UNIT V

Telecommunication Revolution - Introduction to Email- Internet - Intranet – Teleconferencing - www Architecture - Introduction to E-Commerce - Models B_B, B_C, and EDI, EDI Applications in Business - Electronic Payment Cash - Smart Cards - Credit Cards - Fundamentals of ERP- Information Technology Act, 2000.

TEXT BOOKS

1. James O Brien, (2014), Management Information System, Tata Mc Grew Hill, New Delhi

REFERENCES

1. Kenneth Laudon and Jane Laudon , (2011), Management Information System- A contemporary perspective, Pearson Prentice Hall of India, New Delhi
2. Gordon B Davis, (2012), Management Information System, Tata Mc Grew Hill, New Delhi.
3. Sudalaimuthu S, (2014), Computer applications in business, Himalaya Publishing House Pvt.Ltd, Mumbai.

COURSE OBJECTIVES**To make the students**

1. To impact knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To impart the students with discipline and time management

COURSE OUTCOMES:**Learners should be able to**

1. Impact knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Improve the writing skill
6. Impart the students with discipline and time management

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives:**To make the students**

1. To train the students in understanding the concepts of communication.
2. To be familiar with the four basic skills of English.
3. To train students in developing their written communication.
4. To train students in developing their presentation skills.
5. To acquire the skill of making grammatically correct sentences.
6. To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:**Learners should be able to**

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

1. Juneja. P. Om and Aarati Mujumdar, “Business Communication -Techniques and Methods”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCES

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To understand the accounting process for Share capital and debenture and its application
2. To prepare final accounts for corporate
3. To understand the accounting standard and its application in inter-holding companies
4. To solve problems relating to Holding Company Accounts,
5. To understand the process related to Liquidation of Companies.
6. To familiarize the concepts of acquisition in business

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend and apply the accounting process related corporate accounting
2. Prepare final accounts for corporate entity.
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.
4. Understand the accounting for Holding Companies.
5. Enhance the problem-solving skills and analytical skills in the accounting context.
6. Apply the concept of Acquisition

Unit I

Company Accounts – Preparation of Financial Statements – Profit and Loss Account – Balance Sheet – Managerial Remuneration Sec 350.

Unit II

Profit or Loss Prior to Incorporation – Acquisition of Business – Ascertainment of Capital Reserve and Revenue Profit.

Unit III

Underwriting – Meaning – Types – Computation of Underwriting Commission – Computation of Underwriters' Net Liability.

Unit IV

Liquidation of Companies – Statement of Affairs – Preparation of Liquidators Final Statement.

Unit V

AS16: Borrowing costs – AS19: Leases – AS20: Earning per share – AS26: Intangible Assets – AS 29: Provisions, Contingent liabilities and Contingent assets.

Note: Distribution of marks for theory and problems shall be 20% and 80 % respectively.

TEXT BOOKS

1. Shukla M.C, Grewal T.S (2010) Advanced Accounts, S.Chand & Co Ltd, New Delhi.

REFERENCES

1. Maheswari S.N.,Maheswari, (2006), Advanced Accounting, Vikas Publishing House Pvt Ltd,. New Delhi.
2. Gupta R.L and Radha swamy, (2010), Advanced Accountancy, S.Chand & Co, New Delhi.
3. Jain S.P.,Narang K.L, (2010), Advanced Accountancy, Kalyani Publishers, Ludhiana.
4. Dr.M.A.Arulanandam, Dr. K.S. Raman,(2003), Advanced Accountancy, Part-I, Himalaya Publications, New Delhi.
5. Reddy and Murthy, (2004), Financial Accounting, Margham Publications, Chennai.

COURSE OBJECTIVES:**To make the students**

1. To understand the different deductions available under the income tax.
2. To understand the Assessment of Individuals and HUF.
3. To recognize the Partnership Firms and Association of Persons
4. To obtain the importance tax planning, collection and recovery of tax.
5. To gain the exposure on practical aspects of tax planning as an important managerial decision-making process.
6. To know about the various tax administration and tax authorities in India

COURSE OUTCOMES:**Learners should be able to**

1. Distinguish between deductible and nondeductible expenses
2. Gain knowledge on Individuals and HUF.
3. Apply the tax code provisions and tax for non-residence.
4. Comprehend and apply the practical aspects of tax planning
5. Exposure to real life situations involving taxation and to equip them with techniques for taking tax-sensitive decisions.
6. Gain knowledge about the tax administration and tax authorities in India

Unit I

Deductions: Deductions allowable from Gross Total Income in respect of certain payment and receipts (Sec 80).

Unit II

Individuals And HUF: Assessment of Individuals - Assessment of Hindu Undivided Family – Co-operative societies, Trust and political party.

Unit III

Partnership Firms and Association of Persons: Assessment of Partnership firms and Association of Persons – Taxation for non-residence.

Unit IV

Collection and Recovery of Tax: Advance Payment of Tax – Tax Deducted at Source – Penalties for offences under Income Tax Act – Double Taxation avoidances agreement.

Unit V

Tax Administration: Authorities under the Income Tax Act and Assessment procedure under Income Tax Act- Filing of Return of Income.

Note: Distribution of marks for theory and problems shall be 40% and 60 % respectively.

TEXT BOOKS

- 1.Gaur and Narang, (2014), Income Tax Law and Practice, Kalyani Publishers, Ludhiana.

REFERENCES

- 1.Mehrothra, (2014), Income Tax Law and Practice, Snow White publications, New Delhi.
- 2.Jayaprakash Reddy, (2012), Taxation, APH Publishing Corporation, New Delhi.
- 3.Dinkare Pagarae, (2014), Direct Tax, Sultan Chand and Sons, New Delhi.

CORE - COMPANY LAW AND SECRETERIAL PRACTISE

15PAU403

6 - - 5

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of laws related to constitution of company, finance structure, management team.
2. To comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. To analyze few real time cases relevant to company laws
4. To communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. To be familiar with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. To have an in-depth knowledge about the company directors

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of laws related to constitution of company, finance structure, management team.
2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. Analyze few real time cases relevant to company laws
4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. Understand the responsibilities of company directors

Unit I

Companies Act 1956 Vs Companies Act 2013 - Formation of Companies – Promotion – Meaning – Promoters – Functions – Duties of Promoters – Incorporation – Meaning – Certificate of Incorporation – Memorandum of Association – Meaning – Purpose – Alteration of Memorandum – Doctrine of Ultra vires – Articles of Association - Meaning – Forms – Contents – Alteration of Articles.

Unit II

Directors – Qualification and Disqualification of Directors – Appointment of Directors – Removal of Directors – Director’s remuneration – Powers of Directors – Duties of Directors – Liabilities of Directors.

Unit III

Company Meetings – Kinds - Board of Directors Meeting –Annual General Meeting – Extra Ordinary General Meeting - Duties of a Company Secretary to all the Company Meetings – Drafting of Correspondence – Relating to the Meetings – Notices – Agenda – Chairman’s Speech – Writing of Minutes.

Unit IV

Key Managerial Personnel (KMP) - Company Secretary – Meaning - Definition – Types – Positions – Qualities – Qualifications – Appointment and Dismissal – Power – Rights – Duties – Liabilities of a Company Secretary – Role of a Company Secretary

Unit V

Accounts of Companies – Audit and Auditors’ – Prevention of Oppression and Mismanagement – Winding up – Official Liquidators – National Company Law Tribunal.

TEXT BOOKS

1. M.C.Shukla and S.S.Gulshan, (2010), Principles of Company Law, S.Chand & Co. New Delhi.

REFERENCES

1. N.D.Kapoor, (2010), Elements of Company Law, Sultan Chand & Sons, New Delhi.
2. M.C.Kuchhal, (2008), Secretarial Practice, Vikas Publications, New Delhi.
3. Avtar Singh, (2014), Introduction to Company Law, Eastern book Company, New Delhi.

ALLIED - BUSINESS ORGANIZATION AND OFFICE MANAGEMENT

15PAU404A

6 - - 5

COURSE OBJECTIVES :

To make the students

1. To understand the concept, functions and form of business organization.
2. To know the different finance sources of business and location of the business.
3. To impart the importance of human behavior and personality to resolve conflict and managing change.
4. To understand the leadership and motivation theories and realise the practical implication in the individual performance and organization behavior.
5. To realise the importance of groups and teamwork and managing of conflict between the members of the organization.
6. To demonstrate the importance and functions of stock exchange in India

COURSE OUTCOMES:

Learners should be able to

1. Understand the concepts of business and form of business organization.
2. Execute the managerial functions of planning, organizing and controlling in a variety of circumstances.
3. Assess the impact of the personality traits and their perception in day to day performance.
4. Exhibit the leadership skills whenever required and work in groups and teams by motivating and resolving conflict arising in groups and adapting to change.
5. Understand the Office machines and equipments.
6. In depth knowledge about the functioning of stock exchange in India

Unit I

Nature and scope of Business, Forms of Business Organisation –SoleTrader, Partnership firms, Companies and Co-operative Societies –Public Enterprise.

Unit II

Location of Business – Factors influencing location, localization of industries- Size of forms, Sources of Finance – Shares, Debentures, Public Deposits, Bank Credit and Trade Credit – Relative Merits and Demerits.

Unit III

Stock Exchange - Functions – Procedure of Trading – Functions of SEBI – DEMAT of shares- Trade Association-Chamber of Commerce.

Unit IV

Office – Its functions and significance – Office layout and office accommodation – Filing and Indexing

Unit V

Office machines and equipments – Data Processing Systems – EDP –Uses and Limitations – Office Furniture.

TEXT BOOKS

1. Y.K.Bhushan , (2013), Business Organisation and Management, Sultan Chand & sons, New Delhi.

REFERENCES

1. Shukla, (2010), Business Organisation and Management ,S.Chand & Company Ltd., New Delhi.
2. R.K.Chopra, (2009), Office Management, Himalaya Publishing House, Mumbai.
3. J.C.Deneyer, (2008), Office Management, Himalaya Publishing House, Mumbai.
4. P.K. Saxena, (2009), Management in Organisation, Global Business Publication, New Delhi.

COURSE OBJECTIVES :**To make the students**

1. To make the concept, process and importance of Business ethics.
2. To gain knowledge on media of communication.
3. To improve the ethical behaviour of business, barriers of communication, and communication through letters.
4. To give the basics of communication reports, tenders and various correspondence of a company.
5. To understand minutes and agenda
6. To impart the students with enhanced communication skills

COURSE OUTCOMES:**Learners should be able to**

1. Make the concept, process and importance of Business ethics.
2. Gain knowledge on media of communication.
3. Improve the ethical behaviour of business, barriers of communication, and communication through letters.
4. Give the basics of communication reports, tenders and various correspondence of a company.
5. Prepare minutes and agenda
6. Enhanced the communication skills of students

Unit I

Genesis of Ethics – Concept of Ethics – Elements of Business Ethics – Features of Business Ethics – Advantages of Business Ethics – Scope of Ethics in Business – Why Business Should behave Ethically – Reasons for Unethical Business Practices – Measures to Improve Ethical Behavior of Business – Ethical Principles in Business – Indian Perspective

Unit II

Essential and Importance of Business Communication. Methods of Communication – Types – Barriers of Communication

Unit III

Communication through letters – Layout of letters business enquiries – Offers and Quotations – Orders – Execution of Orders – Cancellation of Orders – Claims – Adjustments and settlement of accounts – Letters of complaints – Collection letters –Status enquiries – Bank correspondence – Tenders – Letter to the editor.

Unit IV

Correspondence of company secretary with share holders and directors – Agenda – Minutes – Preparation.

Unit V

Communication through reports: Essentials – Importance – Contents - Reports by individuals – Boards Report – Committees – Annual report – Application for appointment – Reference and Appointment Orders.

TEXT BOOKS

1. Rajendra Pal Korahill, (2012), Essentials of Business Communication, Sultan Chand & Sons, New Delhi.

REFERENCES

1. Ramesh, MS, & C. C Pattanshetti, (2011), Business Communication, R.Chand&Co, New Delhi.
2. Rodriquez M V, (2007), Effective Business Communication Concept, Vikas Publishing Company.
3. Velasquez Manuel, (2009), Business Ethics, PHI Learning Ltd., New Delhi.
4. Urmirala Rai, (2003), Business Communication, PHI Learning Ltd., New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of marketing, and 4Ps of Marketing
2. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. To apply the marketing concepts and skills lifelong.
4. To give an in depth knowledge about the consumer buying behavior
5. To understand the product policy, product life cycle, product strategies and new product development
6. To have an in depth knowledge about Pricing

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of marketing, and 4Ps of Marketing
2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. Apply the marketing concepts and skills lifelong.
4. Understand the consumer buying behavior
5. Apply the concepts of product life cycle, product strategies and new product development
6. Gain the knowledge about various pricing strategies

UNIT I

Marketing: Meaning – Definition - Concept – Marketing Management – Meaning - Importance – Functions of Marketing – Marketing Environment - Factors affecting the Marketing Functions.

UNIT II

Consumer Behaviour and CRM: Buyer Behaviour – Buying Motives – Market Segmentation – Meaning – Definition – Bases – Marketing Strategy – Market Structure – Customer Relationship Management – Meaning – Importance.

UNIT III

Product: Product – Marketing Characteristics – Consumer Goods – Industrial Goods – Production Policy – Product Life Cycle (PLC) – Product Mix – Modification and Elimination –Developing New Products – Strategies.

UNIT IV

Pricing: Pricing Policies – Objectives - Factor Influencing Pricing Decision –Pricing Strategy - Physical Distribution – Management of Physical Distribution – Marketing Risk – Storage and Warehousing

UNIT V

Promotion: Advertisement – Personal Selling and Sales Promotion – Importance – Channels of Distribution – Meaning – Types - Functions of Middlemen – Elimination of Middlemen.

TEXT BOOKS

1. Philip Kotler. (2012), Marketing Management, Prentice Hall of India Pvt. Ltd, New Delhi.

REFERENCES

1. R.L.Varshney and B.Bhattacharya, (2007), International Marketing Management. Sultan Chand & Sons, New Delhi.
2. C.B.Mamoria and Satish Mamoria, (2013), Marketing Management, Kitab Mahal, Patna.
3. Philip Kotler and Gary Armstrong, (2011), Principles of Marketing, Prentice Hall of India Pvt. Ltd. New Delhi.
4. Rajan Nair. (2005), Marketing Management, Sultan Chand & Sons, New Delhi.

COURSE OBJECTIVES**To make the students**

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To Reinforce competencies in soft skills which are crucial in a social setting
4. To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. To enhance the writing skill of students
6. To acquire the knowledge of importance of discipline and time management

COURSE OUTCOMES:**Learners should be able to**

1. Impart knowledge on both Aptitude and Soft skills to the students
2. Demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Reinforcing competencies in soft skills which are crucial in a social setting
4. Achieve the analytical and reasoning competencies and to improve their communication and presentation skills
5. Improved writing skill
6. Enhanced discipline and time management

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

COURSE OBJECTIVES:**To make the students**

1. To understand the concepts on Amalgamation of companies and financial statement of insurance companies.
2. To gain knowledge in the Accounting practices in electricity companies and banking companies.
3. To understand the accounting standard and its application in inter-holding companies
4. To solve problems relating to Holding Company Accounts, Liquidation of Companies and various other Accounts
5. To understand and apply accounting process for Banking industry.
6. To have a knowledge about the life insurance and General Insurance

COURSE OUTCOMES:**Learners should be able to**

1. To enable the students to understand the concepts on Amalgamation of companies and financial statement of insurance companies.
2. The make the students gain knowledge in the Accounting practices in electricity companies and banking companies.
3. Understand the accounting standard and apply the same for corporate entity and amalgamation.
4. Understand the difference of banking balance sheet and non-banking balance sheet
5. Enhance the problem-solving skills and analytical skills in the accounting context.
6. Understand the Life insurance and General Insurance

Unit I

Amalgamation and Reconstruction – Meaning, Objectives, Types- Internal reconstruction – external reconstruction accounting treatment for amalgamation in the nature of merger – amalgamation in nature of purchase

Unit II

Financial statement of insurance companies – introduction to insurance business – types of insurance – life insurance – general insurance – fire insurance – marine insurance – preparation of valuation balance sheet, determination of surplus to policy holder.

Unit III

Financial statement of banking companies. Meaning of banking – types of banks – books of accounts, returns – forms of financial statement – capital adequacy norms – income recognition – classification of assets and their provision – rebate on bills discounted preparation of profit and loss a/c and balance sheet.

Unit IV

Financial statement of Electricity Company – formats of financial statement – specific transactions of Electricity Company – disposal of surplus – reasonable rate of return – implementation of accelerate power development and reform program [AADRP] – objectives – funding pattern etc.

Unit V

Accounting Standards. AS 4 : Contingencies and events occurring after the balance sheet date. AS 5: net profit or loss for the period, prior period items and changes in accounting policies – AS 11: the effects of changes in foreign exchange rates. AS12: accounting for government grants.

Note: Distribution of marks for theory and problems shall be 20 % and 80 % respectively.

TEXT BOOKS

1. Shukla M.C, Grewal T.S, Gupta S.C (2009), Advanced Accounts, Sultan Chand & Sons, New Delhi.

REFERENCES

1. Maheswari S.N (2010), Advanced Accounting, Vikas Publishings House, New Delhi.
2. Jain S.P. & Narang, (2010) Advanced Accountancy, Kalyani Publishers, Ludhiana.
3. Agarwal B.D (2009) Financial Accounting Advanced, Pitambar Publishing Company, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the cost concepts, types of costing methods and book keeping for cost accounting
2. To learn the tools and techniques to calculate cost and solve the problems.
3. To select the best methods of costing and apply critically based on the situation
4. To communicate orally and in written form the cost accounting concepts, methods and book keeping procedure for cost accounting.
5. To gain a lifelong learning for applying the cost concepts in analyzing the business problems.
6. To understand the computation of stock levels

COURSE OUTCOMES:**Learners should be able to**

1. Understand the cost concepts, types of costing methods and book keeping for cost accounting
2. Apply tools and techniques to calculate cost and solve the problems.
3. Select the best methods of costing by critically analyzing and apply the same to appropriate situation
4. Communicate orally and in written the cost concepts
5. Gain the lifelong learning of cost concepts and apply in the business environment.
6. Acquire knowledge about the need and importance of maintaining the stock level in business

Unit I

Meaning of Cost – Costing – Cost Accounting and Cost Accountancy – Cost Units – Cost Centre – Classification of Costs – Methods of Costing – Techniques – Cost Sheet Preparation-Advantages and Disadvantages of Cost Sheet, Installation of New Costing Techniques.

Unit II

Material Control – Procurement Procedure – Issue of Inventories under Various Methods – computation of stock levels – EOQ – Perpetual Inventory System – Labour Costing. – Time Rate, Piece Rate System, Methods of Payment by Result – Determination of Labour Turn over Under Various Methods

Unit III

Overhead Costing – Methods of Allocation – Determination of Overhead Rates – Functional Analysis – Factory, Administration, Selling and Distribution Over Heads Book Keeping – Non Integrate Accounts – Integrate Accounts.

Unit IV

Job costing – Batch Costing – Application of Job Costing – Reconciliation of Cost and Financial Accounts– Operating Costing.

Unit V

Contract Costing – Progress Payment – Retention Money – Escalation Claim – Contract Account – Process Account – Normal Loss – Abnormal Loss – Equivalent Units – Inter Process Profit – Joint Product – By Product.

Note Distribution of marks for theory and problems shall be 20% and 80% respectively.

TEXT BOOKS

1. Jain and Narang. (2006), Cost Accounting, Kalyani Publisher, Ludhiana.

REFERENCES

1. Iyengar S.P, (2009), Cost Accounting, Sultan Chand & Co., New Delhi.
2. Shukla .M.C. and T.S.Grewal, Gupta, (2010), Cost Accounting, Sultan Chand & Sons, New Delhi.
3. Thukaram Rao M.E, (2009), Cost Accounting, New Age international Pvt, New Delhi.
4. Das Gupta M.E, (2010), Studies in Cost Accounting, Premier Book Company, New Delhi.
5. Pillai and Bagavathi R.S.N, (2010), Cost Accounting, S.Chand & Co., New Delhi.

COURSE OBJECTIVES:**To make the students**

- 1.Explain need of Research, introduction to business research
- 2.Analyze various types of research and the sampling techniques
- 3.Analyze collections of data and to draft the questionnaire
- 4.Describe Knowledge on the application of various statistical tools
- 5.Experiment preparation of reports
- 6.To understand the scaling techniques

COURSE OUTCOMES:**Learners should be able to**

- 1.Describe the Basics, types and the stages of the research process and enables to apply and adapt them with relevance to specific research context
- 2.Apply an advanced understanding of business research design options, methodologies, sampling technique in a research.
- 3.Analyze the collected data using appropriate statistical tools for interpretation of the data.
- 4.Apply various statistical tools in a research.
- 5.Understand and prepare and present research findings in the report.
- 6.Gain an in depth knowledge about the scaling techniques

Unit I

Business Research : Meaning – Scope and Significance – Utility of Business Research – Qualities of Good Researcher – Types of Research – Research Process – Identification, Selection and formulation of research problems – Hypothesis – Research Design

Unit II

Sampling: Methods and techniques – Sample size – Sampling error – Field work and Data Collection. Tools of Data Collection – Interview Schedule – Questionnaire – Observation, Interview and Mailed Questionnaire – Pilot Study and final collection of data

Unit III

Measurement and Scaling Techniques: Processing and analysis of data – Editing and Coding – Transcription and Tabulation – Statistical tools used in Research – Interpretations and Report Writing – Types and contents and style of reports – Steps in drafting reports

Unit IV

Measures of Central Tendency –Mean, Median and Mode - Standard deviation – Correlation – Regression Models

Unit V

Test of Significance: ‘t’ Test – large sample and ‘f’ test, test of significance for attributes – Analysis of Variance – Business Forecasting – Exponential Smoothing – Chi-square test

Note: The question paper shall cover 60% theory and 40% problem

TEXT BOOKS

1. Kothari C.R., (2009) Research Methodology, Wishwa Prakashan Publications, New Delhi.

REFERENCES

1. Dr. P. Ravilochanan (2009), Research Methodology, Margham Publications, Chennai.
2. S.P. Gupta (2009), Statistical Methods, Sultan Chand and Sons, New Delhi.
3. Rao K.V. (2012) Research methods for management and commerce, Sterling Publishers pvt., Ltd.,
4. D. Amarchand (2007), Research Methods in Commerce, Emerald, Chennai.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. To learn and compute the Taxation under the constitution.
3. To know how to register CST and apply the CST provisions.
4. To communicate orally and in written form the indirect taxations concepts and provisions.
5. To be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. To demonstrate custom duties in India

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. Learn and compute the Taxation under the constitution.
3. Know how to register CST and apply the CST provisions.
4. Communicate orally and in written form the indirect taxations concepts and provisions.
5. Be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. To have an understanding of custom duties

Unit I

Indirect Taxes: Definition and Special features – difference between direct and indirect tax -Contribution to government revenues - Taxation under the constitution - Advantages and Disadvantages of Indirect Taxes.

Unit II

Levy and collection of Excise duty - Kinds of Excise Duty - Basic conditions for constituting excise goods - Excisability and Intermediate Products- Packing, Labeling and branding of goods- Valuation of excisable goods - Registration in Central Excise –Procedure for Registration.

Unit III

VAT: Terms and Definitions – VAT System in Tamil Nadu – Registration of Dealers – Input and Output Tax – Exempted Sales and Zero Rated Sales – Penalties – Filing of Return – Service Tax – Features.

Unit IV

Customs Duty - Different Types of Customs Duties - Abatement of duty in Damaged or Deteriorated Goods - Remission of duty on goods lost, destroyed or abandoned goods – Customs Tariff Act 1985 - Customs Duty Drawback.

Unit V

Central Sales Tax Act 1956 –various definition under CST ACT - Objectives of the CST – Levy and Collection of CST – Sales and Deemed Sales - Subsequent sales - Registration - Compulsory Registration – Voluntary Registration - Security from dealer-registration procedure - Declaration forms.

TEXT BOOKS

1. Dingare Pagare, (2014), Business Taxation, Sultan Chand & Sons, New Delhi.

REFERENCES

1. V.S.Datey, (2015), Indirect Taxes Law and Practices, Taxmann Publications (P) Ltd., New Delhi.
2. Balachandran, (2006), Indirect Taxation, Sultan Chand &Co., New Delhi.
3. R.L.Gupta V.K.Gupta, (2012), Indirect Tax, Sultan Chand &Co., New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of laws related to constitution of company, finance structure, management team.
2. To comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. To analyse few real time cases relevant to company laws
4. To communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. To be familiar with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. To understand the various employers and employee laws in India

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of laws related to constitution of company, finance structure, management team.
2. Comprehend on the laws pertaining to the need of audit, accounts, dividend and winding up of the company.
3. Analyse few real time cases relevant to company laws
4. Communicate orally and in written form and analyse cases in a team and exhibit leadership skills.
5. Familiarize with the standards and laws pertaining to the corporate and utilize for lifelong practical application.
6. Gained understanding about various employers and employee laws prevailing in India

Unit – I

Factories Act 1948 – Provisions Relating to Health Safety. Welfare – Employment of Child, Young Men – Adult Workers – Women Workers.

Unit – II

Industrial Disputes Act 1947 – Provision Relating to Strike Lockout Retrenchment. Layoff – closure – Machinery to Solve Dispute.

Unit – III

Trade Unions Act 1926 – Definitions Registration - Rights and Privileges – Cancellations of Registration – Payment of Wages Act 1926 – Permissible Deductions – Time and Mode of Payment- Provident Fund – Payment of Gratuity Act 1972

Unit- IV

Payment of bonus act 1965-Meaning Of Gross Profit- Computation Of Available And Allocable Surplus – Eligibility For Bonus – Minimum & Maximum Bonus – Exemption – Applicability Of The Act – Employees State Insurance Act Of 1948 – Definition –Its Medical Board – Purpose For Which Funds Can Be Spent – Benefits.

Unit – V

The Minimum Wages Act 1948 – Employees Compensation Act 1923 – Employers Liability & Non-Liability. Partial - Permanent- Total Disablement – Accusation Diseases.

TEXT BOOKS

1. N.D.Kapoor, (2013), Industrial Law, Sultan Chand & Sons, New Delhi.

REFERENCES

1. Sumeet Malik, (2013), Labour and Industrial Law, Eastern Book Company, New Delhi.
2. Tusian P.C, (2012), Business and Industrial Law, Sultand Chand & Company, New Delhi.
3. Baswarajan, (2008), Mercantile Law & Industrial Law, Yamuna Publication, New Delhi.

Elective-I
FINANCIAL MANAGEMENT

Semester V
L T P C
5 - - 5

15PAU506A

COURSE OBJECTIVES:

To make the students

- 1.Explain importance and role of financial management
2. Describe theories and factors affecting capital structure
- 3.Evaluate Dividend policies and
- 4.Discuss financial decision making and sources of finance
- 5.Analysis financial information from a wide variety of sources and use this information to research and assess corporation
- 6.Demonstrate the importance of working capital management

COURSE OUTCOMES:

Learners should be able to

1. familiarize the basic concepts of financial management
- 2 Understand the different financing decision and estimate the value of different financial instruments (including stocks and bonds)
- 3 Decide the source of finance for an organisation and formulate the optimum Capital Structure
- 4 Estimate cash flows and make capital budgeting decisions under both certainty and uncertainty
- 5 Analyze the factors influencing the dividend decision and formulate the dividend policy of the firm.
- 6 Describe and assess how companies manage the components of working capital to minimize the cost of carrying current assets and the cost of short-term borrowing.

UNIT I

Finance Functions: Meaning - Definition and Scope of Finance Functions - Objectives of Financial Management - Profit Maximization and Wealth Maximization. Sources of Finance - Short term - Bank Sources – Long term - Shares - Debentures, Preferred Stock - Debt.

UNIT II

Financing Decision: Cost of Capital - Cost of Specific Sources of Capital - Equity - Preferred Stock - Debt – Retained Earnings - Weighted Average Cost of Capital. Leverage - Operating Leverage - Financial Leverage.

UNIT III

Capital Structure: Meaning - Definition - Factors Influencing Capital Structure – Optimal Capital Structure - Dividend and Dividend policy – Meaning - Classification - Sources Available for Dividends - Determinants of Dividend Policy.

UNIT IV

Working Capital Management: Concepts - importance -Determinants of Working Capital. Cash Management - Motives for Holding Cash - Objectives and Strategies of Cash Management. Receivables Management - Objectives - Cost of Credit Extension, Benefits - Credit Policies - Credit Terms - Collection Policies – Inventory Management – Techniques.

UNIT V

Capital Budgeting: Meaning – Objectives - Methods of Evaluation of Capital Budgeting – Traditional Methods – Pay Back Period Method – Rate of Return - Discounted Cash flow Methods – Net Present Value Method - Internal Rate of Return – Profitability Index Method.

Note : Distribution of marks for theory and problems shall be 60% and 40% respectively.

TEXT BOOKS

1. S.N.Maheswari, (2014), Financial Management, Sultan Chand & Sons. New Delhi.

REFERENCES

1. P.V.Kulkarni, (2011), Financial Management, Himalaya Publishing house, Mumbai.
2. Khan and Jain, (2007), Financial Management, Tata Mc Graw Hill, Publishers Pvt. Ltd. New Delhi.
3. I.M. Pandey, (2009), Financial Management, Vikas Publications, New Delhi.

FUNDAMENTALS OF INSURANCE**L T P C****15PAU506B****5 - - 5****COURSE OBJECTIVES:****To make the students**

1. To Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.
2. To comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.
3. To communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.
4. To apply the learning of the insurance procedures, products, services and operations lifelong.
5. To comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.
6. To have an in-depth knowledge about the Risk

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of insurance, insurance products and services and the regulatory environment guiding the insurance function.
2. Comprehend on the risk mitigation concepts and usage of insurance products to mitigate risk and insurance contract in Indian market.
3. Communicate orally and in written form the understanding of insurance operations, functions, risk associated with and law pertaining to insurance functioning in India.
4. Apply the learning of the insurance procedures, products, services and operations lifelong.
5. Comprehend on the insurance industry, its regulatory body, insurance laws that supports the mitigation of risk in India.
6. Understand the concept of Risk and Uncertainty

UNIT I

Risk and Uncertainty - Definition - Classification of risk - Sources of Risk - External and Internal Insurance – Meaning - Nature - Significance - Essential Requirements and Principles of Risk Insurance – Reinsurance - Privatization of Insurance Business in India - Insurance Regulatory Development Authority – Recent Developments in the Insurance Sector.

UNIT II

Life Insurance - Law Relating to Life Insurance - General Principles of Life Insurance Contract - Proposal and Policy - Assignment and Nomination - Title and claims - Concept of trust in life policy - LIC - Role and Functions.

UNIT III

General Insurance - Law relating to general insurance - Different types of general insurance - General Insurance Vs Life Insurance - Nature of Fire Insurance - various types of Fire Policy subrogation - Double Insurance - Contribution - Proximate cause - Claims of Recovery - Accident and Motor Insurance - Nature, Disclosure, Terms and Conditions Claims And Recovery - Third Party Insurance - Compulsory Motor Vehicle Insurance - Accident Insurance.

UNIT IV

Deposit and Credit Insurance – Nature - Terms and Conditions - claim - Recovery etc., Public Liability Insurance - Emergency Risk Insurance Structure and Power, function of General Insurance Corporation of India - Deposit Insurance and Credit Guarantee Corporation.

UNIT V

Marine Insurance - Law relating to Marine Insurance - Scope and Nature - Types of Policy - Insurable Interest - Disclosure and Representation - Insured Perils - Proximity Cause - Voyage – Warranties - Measurement – Subrogation – Contribution - Under Insurance.

TEXT BOOKS

1. M.N.Mishra, (2012), Insurance Principles and Practices, S.Chand & Co., New Delhi.

REFERENCES

1. N.D.Kapoor, (2010), Elements of Business Law, Sulthan Chand & Sons, New Delhi
2. Murthy, (2012), Principles and Practices of Insurance, Margham Publications, Mumbai.
3. Senthil Jyotsna and Bhatia Nishwa, (2008), Elements of Banking and Insurance, Phi India Pvt., Ltd., New Delhi.
4. P.Periyasamy, (2010), Principles and Practices of Insurance, Himalaya Publishing house, New Delhi.

Elective I
RETAIL BUSINESS MANAGEMENT

Semester V
L T P C
5 - - 5

15PAU506C

COURSE OBJECTIVES:

To make the students

1. To make the students understand the features of retailing
2. To enhance the students knowledge in the theories of retail development
3. To enlighten the students' knowledge in global retail markets.
4. To provide the strategies, ethics in retailing and trends in international retailing.
5. To give an insight about the competition commission in India
6. To learn about the importance of retail location, site selection and merchandise management in retailing

COURSE OUTCOMES:

Learners should be able to

1. Make the students understand the features of retailing
2. Enhance the students knowledge in the theories of retail development
3. Enlighten the students knowledge in global retail markets.
4. Provides the strategies, ethics in retailing and trends in international retailing.
5. Acquire understanding about the competition commission in India
6. Insight about the importance of retail location, site selection and merchandise management

Unit I

Retail - Meaning – Functions and Special Characteristics of Retailer - Types of Retailers – Franchising – The Evolution of retail in India – Retailing as a Career– Consumer Behaviour in Retail Context

Unit II

Retail Strategies – Retail Location – Site Selection – Merchandise Management – Managing Service and Quality – Strategic planning - Global retail markets: Strategic planning process for global retailing - Factors affecting the Success of a Global Retailing Strategy .

Unit III

Organization Structure and Human Resource Management in Retail – Retail Store Operations – Financial Aspects of Retail – Retail Marketing and Communication.

Unit IV

Servicing the Retail Customer – Retail Store Design and Visual Merchandising – Retail Management Information Systems – Supply Chain Management.

Unit V

IT Applications in Retail – Data Base Marketing – Electronic Retailing – International Retailing Trends – Ethics in Retailing – Competition Commission of India.

TEXT BOOKS

1. Swapna Pradhan, (2014), Retailing Management, Second Edition, The Mc Graw- Hill companies, New Delhi.

REFERENCES

1. Burman barry and Joel Evan, (2006), Retail Management, Macmillan, New Delhi.
2. Geroge H. Lucas, Robert P. Bush, Larry G. Gresham, (2004), Retailing, All India Publishers, New Delhi.
3. Gibson Vedamani, (2009), Retail Management, Second Edition, Jaico Publishers, Mumbai.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of auditing.
2. To learn the audit techniques and its practices.
3. To apply the best auditing process as lifelong practice,
4. To communicate orally and in written form the auditing concept, techniques and practices in business.
5. To be familiar with the standards and laws pertaining to the auditing
6. To understand the rights and duties of a company auditor

COURSE OUTCOMES:**Learners should be able to**

1. To Understand the Concept of auditing.
2. To learn the audit techniques and its practices.
3. To apply the best auditing process as lifelong practice,
4. To communicate orally and in written form the auditing concept, techniques and practices in business.
5. To be familiar with the standards and laws pertaining to the auditing
6. Acquiring knowledge about the rights and duties of an auditor

Unit I

Introduction to Auditing: Definition – General objectives of auditing – Advantages and limitations of auditing – Auditing and investigation – Qualification of an auditor.

Unit II

Types of Audit: Continuous audit – final audit - Interim audit – Balance sheet audit – Merits and demerits – Audit procedure – Planning of audit – Audit programme – Audit note book – Audit working papers – Internal control – Internal check – Internal checks as regards cash, wages, sales etc – Position of external auditors to internal audit

Unit III

Vouching: Vouching of cash transactions – Trading transactions – Impersonal ledger –definition, nature and scope of internal auditing- Auditor position – Auditors duty regarding depreciation, reserves and provisions

Unit IV

Company Audit: Appointment and removal of auditor– Rights and duties of company auditors - Liabilities – Audit of share capital and share transfer.

Unit V

Audit report: Contents and types. Auditors decision regarding the purchase and sale of asset. Audit of Computerized Accounts – Electronic Auditing.

TEXT BOOKS

1. B.N.Tandon, (2014), Principles of Auditing, S.Chand & Company, New Delhi.

REFERENCES

1. Saxena, R.G. Kuriakose, K.K. Venugopal. S (2012), Auditing Theory and Practicals, Himalaya Publishing House, Mumbai.
2. Saxena. (2009), Principles and practices of Auditing. Himalaya Publishing House, Mumbai.
3. Kamal Gupta, (2010), Contemporary Auditing, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
4. M.S Ramasawamy, (2010), Principles and Practices of Auditing , Vikas Publishing House Pvt Ltd, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. To analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To Work in team and exhibit leadership skills
7. To utilize the IT applications for analysis and preparation of report.

COURSE OUTCOMES:**Learners should be able to**

1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills
7. Utilise the IT applications for analysis and preparation of report.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. To comprehend on the contemporary issues relevant to accounting concepts.
3. To analyse the alternatives using appropriate tools and techniques.
4. To solve the problems and take decisions based on the result.
5. To communicate orally and in written form the concepts and solutions.
6. To have an knowledge about the ratio analysis

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. Comprehend on the contemporary issues relevant to accounting concepts.
3. Analyse the alternatives using appropriate tools and techniques.
4. Solve the problems and take decisions based on the result.
5. Communicate orally and in written form the concepts and solutions.
6. Apply ratio analysis to take important business decisions

Unit I

Introduction: Meaning, Nature and Scope and Functions of Management Accounting- Comparison of Management accounting, Cost accounting and Financial accounting-Role of management accounting in decision making.

Unit II

Preparation of Financial Statement by applying Ratio Analysis – Turnover Ratio – Profitability Ratios – Solvency Ratios – Fund Flow Statement and Cash Flow Statement with AS 3.

Unit III

Introduction to Marginal Costing – Marginal Costing- Comparison with Absorption Costing-Cost-Volume-Profit Analysis – BEP - Application of Marginal Costing - Break Even Analysis and profit volume graph.

Unit IV

Budget and Budgetary control – The Budget Manual – Preparation and Monitoring Procedures – Budget Variance – Flexible Budget – Preparation of Functional Budget for Operating and Non-Operating Functions – Cash Budget – Master Budget – Principal Budget Factors.

Unit V

Introduction to Standard Costing – Various Types of Standards – Comparison of Material, Labour and Overheads Variance.

Note: Distribution of marks for theory and problems shall be 20 % and 80 %

TEXT BOOKS

1. Jain and Narang,. (2007), Cost and Management Accounting, Kalyani Publishers, Ludhiana.

REFERENCES

1. Man Mohan and Goyal, (2010), Management Accounting, Sahitya bhavan, New Delhi.
2. Battacharya, S.K. John Dearden.,(2005), Accounting for management, Vikas Publishing House Pvt. Ltd., New Delhi.
3. Srinivasan. N.P. (2008), Management and Financial Accounting, Sterling Publishers Pvt Ltd., New Delhi.
4. Khan M.Y. and Jain. P.K. (2008), Management and Cost Accounting, Tata McGraw-Hill Publishing Company Ltd., New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. To learn and compute the Service tax under the constitution.
3. To know how to register CST and apply the CST provisions.
4. To communicate orally and in written form the indirect taxations concepts and provisions.
5. To be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. To understand small dealers and composition scheme

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. Learn and compute the Service tax under the constitution.
3. Know how to register CST and apply the CST provisions.
4. Communicate orally and in written form the indirect taxations concepts and provisions.
5. Be familiar with the standards and laws pertaining to the CST and customs and utilize for lifelong practical application.
6. Gain understanding about the small dealers and composition scheme

UNIT I

Service Tax – Concepts and general principles. Charge of service tax and taxable services.

UNIT II

Valuation of taxable services. Payment of Service Tax and Filing of Returns.

UNIT III

VAT – Concepts and General Principles Calculation of VAT Liability including Input Tax Credits

UNIT IV

Small dealers and Composition Scheme

UNIT V

VAT Procedures

TEXT BOOKS

1. Dr. G.K. Pallai, (2010), VAT, Jaico Publishing House, New Delhi.

REFERENCES

1. R.Radhakrishnan ,(2008), Indirect Taxation, Kalyani Publishers, Ludhiana.
2. V. Balachandran, (2005), Indirect Taxation, Sultan chand &sons, New Delhi.
3. Prof.N.S. Govindan, (2006), Indirect Taxes Made easy, Kalyani Publishers, Ludhiana.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of investing and mechanics for formulating investment decisions.
2. To communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. To apply the investing concepts and skills lifelong.
4. To acquire knowledge about the capital market and stock exchange in India
5. To apply Fundamental analysis, Forecasting techniques an Industry analysis
6. To demonstrate Markowitz theory, Portfolio construction and portfolio revision

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of investing and mechanics for formulating investment decisions.
2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. Apply the investing concepts and skills lifelong.
4. Gained understanding about the capital market and stock exchange in India
5. Apply Fundamental analysis, Forecasting techniques and Industry analysis
6. Acquiring knowledge about the Portfolio construction and Portfolio revision

Unit I

Nature, meaning and scope of investment – Importance of investment – Factors influencing investment - investment media – features of an Investment programme – Investment process –Alternative forms of Investment- Mutual Funds. Risk – Systematic risk – Unsystematic risk.

Unit II

Capital market and stock exchange in India – Structure of capital market – New issue market– stock exchanges in India – Mechanics of trading – Legal control of stock exchanges – SEBI and its role, guidance – NSE – OTCEI – Recent trends – Stock market operation – security market indicators.

Unit III

Fundamental Analysis: Economic analysis – Economic Forecasting – Forecasting Techniques. Industrial analysis – Industry classification – Economy and industry analysis – Industry life cycle.

Unit IV

Company analysis – Measuring earnings – Forecasting earnings – Technical analysis – Charting methods – Market indicators – Trend – Moving average - Fundamental Vs Technical analysis.

Unit V

Portfolio Analysis: Markowitz Theory – Optimum Portfolio – Portfolio Construction – Performance evaluation – Portfolio revision.

Note: The question paper shall be covered of 100% theory.

TEXT BOOKS

1. Preethi Singh. (2015), Investment Management. Himalaya Publications, Mumbai.

REFERENCES

1. Dr.Avadhani. (2014). Investment Management. Himalaya Publications, Mumbai.
2. Jack Clark Francis. (2001). Investments Analysis and Management. Mc Graw Hill International Edition, Singapore.
3. R.M.Srivatsava. (2010), Management of Indian Financial Institution, Himalaya Publishing House, Mumbai.
4. V.K. Bhalla. (2010), Investment Management. Sultan Chand & Sons, New Delhi.

Elective II
HUMAN RESOURCE MANAGEMENT

Semester VI
L T P C
5 - - 5

15PAU603B

COURSE OBJECTIVES:

To make the students

1. Describe nature and scope of Human Resources management
2. Evaluate human resource planning, recruitment process and selection methods in the organization
3. Discuss need for motivating employees in an organisation.
4. Assess labour relations, industrial disputes and settlement in the organization
5. To know the concept of industrial relations.
6. To describe the performance appraisal, Job evaluation, promotion and punishment

COURSE OUTCOMES:

Learners should be able to

1. Understand the HR environment in India and human resource functions within organizations
2. Plan human resources requirement and formulate HR policy of the organisation with regard to recruitment, selection, training and career planning.
3. Appraise the employee's performance and formulate compensation policy which helps to make organizational excellence.
4. Understand the importance of career planning, job evaluation and factors influencing compensation levels.
5. Analyse the ethical issues in HR management
6. Understand the performance appraisal, Job evaluation, Promotion and Punishment

UNIT - I

Personnel Management - meaning, nature, scope and objective – Functions of Personnel Department - The Role of Personnel manager - Organisation of personnel department - Personnel Policies and Procedures.

UNIT - II

Manpower planning - Job description - Job analysis - Role analysis - Job specification - Recruitment and Selection - Training and Development.

UNIT - III

Performance appraisal - Job evaluation and merit rating - Promotion - Transfer and demotion - Human relations - approaches to good human relations - Punishment.

UNIT - IV

Wages and Salary administration - Incentive system - Labour welfare and Social Security - Safety, health and Security - retirement benefits to employees.

UNIT – V

Industrial relations - Trade unionism - Grievance handling – collective bargaining and worker's participation in management.

TEXT BOOKS

1. C.B.Memoria. (2014), Personnel Management and Industrial Relations. Himalaya Publishing House, Mumbai

REFERENCES

1. N.G.Nair, Latha Nair. (2004). Personnel Management and Industrial Relations S.Chand & Company Ltd, NewDelhi.
2. N.D.Kapoor. (2007). Elements of Industrial Law. Sultan Chand & Sons, NewDelhi.
3. Tripathy. (2013). Personnel Management and Industrial Relations. Sultan Chand & Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
2. To communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. To apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice
4. To have an knowledge about various institutional service provided to entrepreneurs
5. To acquire understanding about the start-up process and project identification, project selection, and project formulation
6. To learn about the incentives and subsidies

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.
2. Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. Gain an insight about the institutional services provided to entrepreneurs
5. Describe start-up process, project identification, project selection and project formulation
6. Have a deep knowledge about the incentives and subsidies

Unit I

Concept of Entrepreneurship : Definition Nature and characteristics of entrepreneurship – function and type of entrepreneurship phases of EDP. Development of women entrepreneur & rural entrepreneur – including self employment of women council scheme.

Unit II

The start-up process, Project identification – selection of the product – project formulation evaluation – feasibility analysis, Project Report.

Unit III

Institutional service to entrepreneur – DIC, SIDO, NSIC, SISI, SSIC, SIDCO – ITCOT, IIC, KUIC and commercial bank.

Unit IV

Institutional finance to entrepreneurs: IFCI, SFC, IDBI, ICICI, TIIC, SIDCS, LIC and GIC, UTI, SIPCOT – SIDBI commercial bank venture capital.

Unit V

Incentives and subsidies – Subsidised services – subsidy for market. Transport – seed capital assistance - Taxation benefit to SSI role of entrepreneur in export promotion and import substitution – MSMED Act.

TEXT BOOKS

1. Vasant Desai. (2013). Dynamics of Entrepreneurial Development and Management.
Himalaya Publishing House, Mumbai

REFERENCES

1. Poornima M, (2012), Entrepreneurship Development Small Business Enterprises,
Pearson Education, Chanantimath.
2. S.S. Khanka, (2012), Entrepreneurial Development, Sultan Chand & Sons, New Delhi.
3. C.B. Gupta and N. P. Srinivasan, (2007), Entrepreneurial Development, Sulthan Chand &
Sons, New Delhi.
4. P.Saravanavel, (2001), Entrepreneurial Development , Ess Pee Kay Publishing House, Madras.

PROJECT**L T P C****15PAU691****- - 15 5****COURSE OBJECTIVES:****To make the students**

1. To identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/ International business etc.
3. To analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To Work in team and exhibit leadership skills
7. To utilise the IT applications for analysis and preparation of report.

COURSE OUTCOMES:**Learners should be able to**

1. Identify an issue to be analysed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyse the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills
7. Utilise the IT applications for analysis and preparation of report.

ADDITIONAL PAPER**SELF STUDY PAPER**

CODE	SUBJECTS	INS*	MARKS			EXAM/ HRS	CREDIT
			CIA	ES E	Total		
SEMESTER – V							
15PAU507	MICRO FINANCE	-	-	100	100	3	04
SEMESTER – VI							
15PAU604	SUPPLY CHAIN MANAGEMENT	-	-	100	100	3	04
	TOTAL	-	-	100	200	-	08

COURSE OBJECTIVES

To make the students

- 1 To make the students acquire conceptual knowledge of the micro financing system in India.
- 2 To enhance the students to gain knowledge in commercial micro finance
- 3 To describe the credit lending models and emerging practices in micro finance
- 4 To demonstrate the pricing of microfinance products
- 5 To have an understanding of micro finance models
- 6 To demonstrate the market analysis, Technological analysis, Socio-economic analysis, Environmental analysis.

COURSE OUTCOMES

Learners should be able to

- 1 Understand the conceptual knowledge of the micro financing system in India
- 2 Gain knowledge in commercial micro finance
- 3 Gain insight about the credit lending models
- 4 Acquire knowledge about the pricing of microfinance products
- 5 Understand about micro finance models and emerging practices in micro finance
- 6 Acquire knowledge about the market analysis, technological analysis, socio-economic analysis and environmental analysis

Unit I: Overview of Microfinance : Indian Rural financial system, introduction to Microfinance, Microfinance concepts, products, (Savings, Credit, Insurance, Pension, Equity, Leasing, Hire-purchase service, Microfinance in kind, Micro remittances, Micro-Securitization, franchising etc.,) Microfinance models (Generic models viz, SHG, Grameen, and Co-operative, variants SHG NABARD mode, SIDBI model, SGSY model, Grameen Bangladesh model, NMDFC model, credit unions, etc. unbranded primitive models) Emerging practices of Microfinance in India state wise cases, Emerging Global Microfinance practices. Need of Microfinance.

Unit II: Microfinance, Development, Income generating activities and Micro enterprise:

Market (demand) analysis, financial analysis including sources. Technological analysis, Socio-economic analysis, Environmental analysis. Logical framework Implementation & Monitoring.

Unit III: Credit Delivery Methodology : Credit Lending Models : Associations; Bank Guarantees Community Banking, Cooperatives, Credit Unions, Grameen Model, SHG, Individual, Intermediaries, Could be individual lenders, NGOs, micro credit programmers, and Commercial banks.

Unit IV: Pricing of Microfinance products: Purpose base, Activity base, Economic class base Open bidding, etc., Pricing saving products, Amount of savings base, Attendance at periodical meeting Adding to corpus. Gender issues in Microfinance and Conflict resolution in Microfinance - Client impact studies measuring impact of Microfinance and Micro enterprises.

Unit V: Commercial Microfinance: MFIs – Social and performance metrics, fund structure, value-added services. The Rise of Commercial Microfinance: - Transforming NGOs. Structure of Microfinance Industry and Constraints on MFI Growth. The partnership model – MFT as the servicer.

TEXT BOOKS

1. Beatriz Armendariz and Jonathan Morduch, (2010), The Economics of Microfinance, Prentice- Hall of India Pvt. Ltd. New Delhi.

REFERENCES

1. Joanna Ledgerwood, (2008), Microfinance Handbook, An institutional and financial perspective, The World Bank, Washington, D. C.
2. Malcolm Harper, (2003), Practical Microfinance, A training Guide for South Asia, Vistaar Publication, New Delhi.
3. Prahalad, (2006), The Market at the Bottom of the Pyramid, The Fortune at the Bottom of the Pyramid, Wharton School Publishing.

SELF STUDY PAPER
SUPPLY CHAIN MANAGEMENT

Semester VI
LTPC

15PAU604

- - - 4

COURSE OBJECTIVES

To make the students

- 1 To create awareness among the students about the supply chain activities
- 2 To gain knowledge about the inventory management and supply contracts
- 3 To impart students knowledge on the dimension of customer value
- 4 To learn the push and pull strategies and demand strategies
- 5 To understand the retailer and supplier partnership, Distributor integration
- 6 To demonstrate procurement and outsourcing

COURSE OUTCOMES

Learners should be able to

1. Understand the supply chain activities
2. acquire insight about the inventory management and supply contracts
3. demonstrate dimensions of customer value
4. apply push and pull strategies and demand strategies
5. Gain knowledge about the retailer and partnership, Distributor integration
6. Understand procurement and outsourcing

UNIT I

Supply Chain Management – Global Optimisation – importance – key issues – Inventory management – economic lot size model. Supply contracts – centralized vs. decentralized system.

UNIT II

Supply chain Integrates- Push, Pull strategies – Demand driven strategies – Impact on grocery industry – retail industry – distribution strategies.

UNIT III

Strategic Alliances: Frame work for strategic alliances – 3PL – merits and demerits – retailer – supplier partnership – advantages and disadvantages of RSP – distributor Integration.

UNIT IV

Procurement and Outsourcing: Outsourcing – benefits and risks – framework for make/buy decision – e-procurement – frame work of e-procurement.

UNIT V

Dimension of customer Value – conformance of requirement – product selection – price and brand – value added services – strategic pricing – smart pricing – customer value measures.

TEXT BOOKS

1. R.B. Handfield and E.L. Nochols, (2006), Introduction to Supply Chain Management, Prentice Hall, New Delhi.

REFERENCES

1. Simchi-Levi, David, Kamisnsky and Simchi-Levi, Edith. (2004), Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, Irwin/McGraw Hill, New Delhi.
2. Rushton, A., Oxley, J and Croucher, P (2000), Handbook of Logistics and Distribution Management, Kogan Page.
3. Sunil Chopra and Peter Meindel. (2006), Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, New Delhi.

B.Com (PA) (Hons)
SELF STUDY PAPER

CODE	SUBJECTS	INS*	MARKS			EXAM/ HRS	CREDIT
			CIA	ES E	Total		
SEMESTER –V							
15PAU508	STRATEGIC MANAGEMENT	-	-	100	100	3	04
SEMESTER –VI							
15PAU605	SERVICE MANAGEMENT	-	-	100	100	3	04
	TOTAL	-	-	100	200	-	08

COURSE OBJECTIVES:

To make the students

1. To Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.
2. To critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.
3. To communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.
4. To apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.
5. To demonstrate the strategic decision framework and strategy options
6. To study the Resource allocation, Planning and Controlling system, Evaluation Criteria, Quantitative and Qualitative factors, Feedback and Information

COURSE OUTCOMES:

Learners should be able to

1. Understand the strategic management concept, strategic process, strategic evaluation and formulation techniques.
2. Critically analyse and evaluate the internal and external environment using appropriate technique and formulate the strategy suitable for an organization.
3. Communicate orally and in written form the understanding of strategic management concept, strategic process, strategic evaluation and formulation techniques.
4. Apply the understanding of the strategic management concept, strategic process, strategic evaluation and formulation techniques in lifelong practice.
5. Apply the strategic decision framework and strategy options
6. Understand the Resource allocation ,Planning and Controlling system, Evaluation Criteria, Quantitative and Qualitative factors ,Feedback and Information

UNIT I

Introduction-concept of Strategy – Need – Dimensions - Strategic Planning - Process- Benefits – McKinsey's 7s Model – Strategic vision – Corporate Mission – Objectives – Goals – Social Responsibility – Business ethics – Linking Strategies with ethics – Social audit.

UNIT II

Environmental Analysis – Need – Scanning – Approaches – Forecasting – Techniques. Internal Analysis – Need – SWOT analysis – Value Chain – Functional Analysis – Grid approach – Criteria for evaluating internal capabilities.

UNIT III

Strategic Decision Framework – Developing alternatives – Strategy Options – Diversification strategies – Retrenchment Strategy – Factors influencing strategy – generic strategy – cultural context of strategy – comparing alternatives – BCG Model.

UNIT IV

Implementation – Role of Top Management – Process – Matching Structure of strategy – Resource allocation – Planning and Controlling system. Evaluation – Criteria – Quantitative and Qualitative factors – Feedback and Information – Industry attractiveness – Application of 9 Cell Matrix.

UNIT V

Core Competencies – Building Core Competencies – Building Strategic Supportive Corporate Culture Strategic Advantage – Managing Strategic Change – Strategic Change Process – Diagnosing Change Need.

TEXT BOOKS

1. P.K. Ghosh, (2013), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

REFERENCES

1. V.S. Ramaswamy and S.Namakumari, (2007), Strategic Planning – Formulation of Corporate Strategy, Macmillan Business Books, Prentice Hall, New Delhi.
2. John A Pearce, Richard B Robinson, (2006), Strategic Management, AITBS Educational Books.
3. Micheal E Porter, (2004), Competitive Strategy, Prentice Hall, New Delhi.

SELF STUDY PAPER
SERVICE MANAGEMENT

Semester VI
LTPC

15PAU605

- - - 4

COURSE OBJECTIVES

To make the students

- 1.To learn the concepts in service management
- 2.To enlighten the students' knowledge in financial services.
- 3.To have an in depth knowledge about the marketing mix, pricing, promotion, distribution, positioning and differentiation strategy
- 4.To acquire knowledge about the marketing of hospitality service
- 5.To understand the marketing of non-profit organization
- 6..To understand relationship marketing, elements of design and marketing plan

COURSE OUTCOMES

Learners should be able to

- 1 Understand the important concepts in service management
- 2 Gain knowledge in financial services
- 3 Describe marketing mix, pricing, promotions, distribution, positioning and differentiation strategy
- 4 Apply marketing in hospitality services
- 5 Learn marketing of non-profit organization
- 6 Describe Relationship marketing, elements of design and marketing plan

Unit I

Service Management – Meaning – Features of Services – Types & Importance – Relationship Marketing – Mission, Strategy, Elements of design & marketing plan.

Unit II

Marketing Mix Decisions – Unique Features of Developing Pricing, Promoting & Distribution of services – Positioning & Differentiation Strategy, Quality of Service Industries.

Unit III

Marketing of Hospitality – Prospective of Tourism, Hotel & Travel services – Airlines, Railway, Passenger & Goods Transport – Leisure services – Information Technology.

Unit IV

Marketing of Financial Services, Concepts – Features of Banking, Insurance, Lease, Mutual Fund, Factoring, Portfolio & Financial Intermediary services.

Unit V

Marketing of Non-Profit Organization: NGO'S – Services offered by trust/Societies – Educational Services – Miscellaneous service.

TEXT BOOKS

1. James A. Fitzsimmons,(2010), Service Management, Mc Graw Hill Co., New Delhi.

REFERENCES

1. S.M. Jha, (2014), Service Marketing, Himalaya Publishing House, New Delhi.
2. Ravishankar, (2002), Service Marketing, South Asia Publication, New Delhi.
3. Rober Johnson and Graham Clark, (2008), Service Operations Management- Improving service deliver, New Delhi.
4. Richard Metters, (2005), Successful Service Operations Management-,Delmar language learners, Mumbai.

KARPAGAM ACADEMY OF HIGHER EDUCATION,
(Deemed to be University)
(Established Under Section 3 of UGC Act 1956)
MASTER OF COMMERCE (Computer Applications)
M.Com.
(For the Students admitted during the year 2015 – 2017 Batch onwards)

Scheme of Examination

Course Code	Name of the Course	Objectives and Outcomes		Instruction Hours / Week			Credits	Maximum Marks		
		PEOs	Pos	L	T	P		CIA	ESE	Total
								40	60	100
Semester 1										
15CMP101	Corporate Finance	I,II	a,e,	5	-	-	4	40	60	100
15CMP102	Managerial Economics	IV	b,g,h,i	4	-	-	3	40	60	100
15CMP103	Operations Research	IV	b,g,h,i	4	1	-	4	40	60	100
15CMP104	Marketing Management	IV	b,g,h,i	4	-	-	4	40	60	100
15CMP105	Core: Advanced Corporate Accounting	I,II, IV	a,e,b,g,h ,i	6	-	-	5	40	60	100
15CMP111	Core Practical 1: Accounting Package - Tally	I,II, IV	a,e,b,g,h ,i	-	-	4	2	40	60	100
	Journal Paper Analysis & Presentation	III	c,d,f	2	-	-	-	0	0	0
				25	1	4	22	240	360	600
Semester II										
15CMP201	Applied Cost Accounting	IV	b,g,h,i	5	-	-	5	40	60	100
15CMP202	Core: Direct Taxation and Tax Planning	III	c,d,f	5	-	-	5	40	60	100
15CMP203	Core: Insurance and Risk Management	I,II	a,e,	5	-	-	4	40	60	100
15CMP204A	Organizational Behavior	I,II	a,e,	4	-	-	3	40	60	100
15CMP204B	Modern Management Practice	I,II	a,e,	4	-	-	3	40	60	100
15CMP204C	Consumer Behavior	IV	b,g,h,i	4	-	-	3	40	60	100
15CMP204D	Working Capital	I,II,	a,e,b,g,h	4	-	-	3	40	60	100

	Management	IV	,i							
15CMP204E	Advertisement and Sales Promotion	IV	b,g,h,i	4	-	-	3	40	60	100
15CMP205	Core: Business Environment	IV	b,g,h,i	5	-	-	4	40	60	100
15CMP206	Core: Financial Markets and Institutions	IV	b,g,h,i	-	-	4	2	40	60	100
	Journal Paper Analysis and Presentation	III	c,d,f	2	-	-	-			
15OEP201	Open Elective - Stock Market Investments	I, II, III	a,e,c,d,f	-	-	-	3	0	0	100
				26	0	4	26	240	360	600
Semester III										
15CMP301	Core: Management Accounting	IV	b,g,h,i	6	-	-	6	40	60	100
15CMP302	Business Research Methods and Techniques	III	c,d,f	5	-	-	4	40	60	100
15CMP303	Core: Indirect Taxation	III	c,d,f	5	-	-	5	40	60	100
15CMP304A	Investment Management	III		4	-	-	3	40	60	100
15CMP304B	International Financial Management	I,II	a,e,	4	-	-	3	40	60	100
15CMP304C	International Business	IV	b,g,h,i	4	-	-	3	40	60	100
15CMP304D	Strategic Management	IV	b,g,h,i	4	-	-	3	40	60	100
15CMP304E	Industrial Relations	I, II, III	a,e,c,d,f	4	-	-	3	40	60	100
15CMP305	Core: Human Resource Management	I,II	a,e,	-	-	4	2	40	60	100
15CMP311	Core Practical 4: SPSS	I, II, III	a,e,c,d,f	-	-	4	2	40	60	100
	Journal Paper Analysis and Presentation	III	a,e,c,d,f	2	-	-	-	-	-	-
				22	0	8	22	240	360	600
Semester IV										
15CMP401	Core: Financial Services	I, II, III	a,e,c,d,f	6	-	-	5	40	60	100
15CMP402	Core: Corporate Administration and Secretarial Practices	I, II, III	a,e,c,d,f	6	-	-	5	40	60	100
15CMP403	Core: Entrepreneurship	IV	b,g,h,i	6	-	-	5	40	60	100

	and Small Business Management									
15CMP491	Project and Viva – Voce	III	c,d,f	-	-	12	5	80	120	200
				18	-	12	20	200	300	500
							90	920	1380	2400

PROGRAMME OUTCOMES (PO)

- a) Postgraduates will develop an understanding of various commerce functions such as finance, accounting, financial analysis, project evaluation, cost accounting.
- b) Postgraduates will have exposure to solve complex commerce problems and analyze problems critically through research based or project based approach of learning.
- c) Postgraduates will excerpt information from various sources and apply mathematical, analytical, statistical and IT tools for financial and accounting analysis.
- d) Postgraduates will develop an ability to effectively communicate both orally and in written forms.
- e) Postgraduates will appreciate the importance of working independently and in a team in order to achieve common goals.
- f) Postgraduates will acquire critical and analytical thinking and will be able to apply the same in effective decision making.
- g) Postgraduates will acquire professional and intellectual integrity, professional code of conduct, ethics and values to contribute for sustainable development of society by becoming socially responsible citizen.

PROGRAMME SPECIFIC OUTCOMES (PSO)

- h) Postgraduates will apply the lifelong learning and exhibit high level of commitment to identify a timely opportunity and use business innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
- i) Postgraduates will acquire managerial positions or take up entrepreneurial ventures by applying the skills and knowledge gained.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- I. Postgraduates will gain advanced knowledge in the domain of commerce, management and finance
- II. Postgraduates will be able to apply the accounting, finance and management tools and techniques to implement systematic decision making process.
- III. Postgraduates will attain research insights, professional skills and competencies to enhance lifelong learning and excel in diverse career path.
- IV. Postgraduates will adapt to a rapidly changing global environment and become socially responsible and value driven citizens committed to sustainable growth.

Program Educational Objectives	Program Outcomes								
	a	b	c	d	e	f	g	h	i
Postgraduates will gain advanced knowledge in the domain of commerce, management and finance	✓				✓				
Postgraduates will be able to apply the accounting, finance and management tools and techniques to implement systematic decision making process.	✓				✓				
Postgraduates will attain research insights, professional skills and competencies to enhance lifelong learning and excel in diverse career path.			✓	✓		✓			
Postgraduates will adapt to a rapidly changing global environment and become socially responsible and value driven citizens committed to sustainable growth.		✓					✓	✓	✓

15CMP101	CORPORATE FINANCE	Semester – I			
		L	T	P	C
		5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To Explain the core concepts of corporate finance and its importance in managing a business
2. To understand the nature, importance, structure of corporate finance related areas.
3. To impart knowledge regarding source of finance for a business.
4. To develop a conceptual framework of finance function
5. To acquaint the participants with the tools, techniques
6. To know the process of financial management in the realm of financial decision making.

COURSE OUTCOMES:

Learners should be able to

1. Understand the role of a financial manager and their role in taking decisions professionally.
2. Demonstrate knowledge and compute value of money over time
3. Apply the concept to Evaluate the business proposal applying capital budgeting techniques
4. Compute the cost of capital and financial leverage to estimate the optimal capital structure
5. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.
6. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.

Unit – I

Scope and Functions of Finance – Role of Financial Manager – Goals of Financial Management – Functions of Controller and Treasurers in India

Unit – II

Cost of Capital – Significance – Concepts of Cost of Capital – Cost of Debt Capital, Preference Capital, Equity Capital and Retained Earnings – Weighted Average Cost of Capital

Unit – III

Capital Structure – Concept – Capital Structure Theories – Net Income Theory, Net Operating Income Theory – MM’s Proportion on Capital Structure – Determinants of Optimal Capital Structure – Financial and Operating Leverage

Unit – IV

Capital Budgeting Decisions – Investment Evaluation Criteria – Payback Method – ARR – NPV Method – IRR – Profitability Index – Risk Analysis in Capital Budgeting – Nature of Risk – Conventional and Statistical Technique to handle risk

Unit –V

Management of Working Capital – Determinants of Working Capital – Management of Accounts Receivable, Inventory and Cash – Financing of Working Capital – Dividend Theories – Walter’s Model – Gordon’s Model – MM’s Hypothesis – Dividend Policy – Determinants of Dividend Policy.

Note: Theory :60 Marks and Problems : 40 Marks

TEXT BOOK

I.M. Pandey (2014) Financial Management, Vikas Publishing House Pvt. Ltd., New Delhi

REFERENCES

1. **Prasana Chandra** (2012) Financial Management – Theory and Practice, Tata Mc Graw Hill Publishing Company Ltd., New Delhi
2. **Khan M.Y and P.K. Jain** (2014) Financial Management, Tata Mc Graw Hill Publishing Company Ltd., New Delhi

15CMP102	MANAGERIAL ECONOMICS	Semester – I			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To obtain fundamental knowledge on economic concepts and tools that have direct managerial applications.
2. To illustrate the application of economic theory and methodology as an alternative in managerial decisions.
3. To gain a rigorous understanding of competitive markets as well as alternative market structures.
4. To obtain familiarity on the macro level business components like money, banking, monetary policy, fiscal policy, trade, business cycles and balance of payment and understand the forces determining macroeconomic variables such as inflation, unemployment, interest rates, and the exchange rate.
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills
6. To enable students to obtain managerial problem solving skills.

COURSE OUTCOMES:

Learners should be able to

1. Apply the economic way of thinking to individual decisions and business decisions
2. Measure the responsiveness of consumers' demand to changes in the price of a goods or service, and understand how prices get determined in markets,
3. Understand the different costs of production and how they affect short and long run decisions and derive the equilibrium conditions for cost minimization and profit maximization
4. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run
5. Critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.
6. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.

Unit - I

Nature, Objectives and Scope of Managerial Economics – Role and Responsibilities of Managerial Economist – Circular Flow of Economic Activity – Nature of the Firm – Economic Profit – Profits in the Market System

Unit – II

Demand Theory and Analysis – Supply Theory and Analysis

Unit – III

Production Theory – Cost Theory – Cost Concept – Cost Output Relationship – Break Even Analysis

Unit – IV

Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly, Duopoly, Bilateral Monopoly – Monopsony.

Unit – V

Pricing Decision – Pricing of Goods and Services – Pricing and Employment of Inputs – Pricing in Public Sector – Risk and Decision Making – Input – Output Analysis

TEXT BOOK

1. **Varshney and Maheswari** (2014) Managerial Economics, Sultan Chand and Sons, New Delhi

REFERENCES

1. **Heynes, Mole and Paul** (2007) Managerial Economics, Tata Mc Graw Hill Publications, New Delhi
2. **Joel Dean** (2011) – Managerial Economics, Mangal Deep Publications, Jaipur
3. **Sumitra Pal** (2011) Managerial Economics, Mac Millan

15CMP103	OPERATIONS RESEARCH	Semester – I			
		L	T	P	C
		4	1	-	4

COURSE OBJECTIVES:

Course Objectives

This course enables the students

1. To provide essential knowledge on Linear programming
2. To offer practical exposure to transportation and assignment problems
3. To gain the knowledge on Assignment and Queuing Theory Problems
4. To train students on Inventory Control
5. To helps to facilitates the learning of network analysis
6. To enhance learner knowledge in optimal use of performance measures of queues, optimal use of Inventory and Network scheduling with various applications in mathematics

Course Outcomes

On successful completion of this course, the students will be able to

1. Students may gather relevant knowledge for minimizing Operation Cost
2. Students are equipped to cut total cost and able to minimize time required for completing assigned task
3. Students could learn to maintain optimal level of inventory
4. Understand various mathematical applications in industries.
5. Decision making for real time environment.
6. course concentrates on Linear programming, transportation model, Queuing theory and Inventory

Unit – I

Introduction to Operations Research – Application in Management Decision Making – Linear Programming: Formulation of LPP – Graphical Solution to LPP – Simplex Method (using slack variables only)

Unit - II

Transportation Model: Introduction – Mathematical Formulation –Finding Initial Basic Feasible Solutions – Optimum Solution for Nondegeneracy and Degeneracy Model - Unbalanced Transportation Problems and Maximization case in Transportation Problem- Traveling Sales Man Problem.

Unit- III

The Assignment problem - Mathematical Formulation of the Problem – Hungarian Method –Unbalanced Assignment Problem- Maximization Case in Assignment Problem - Travelling Salesman Problem. Queuing Theory : Introduction – Characteristics of Queuing System. Problems in $(M/M/1):(\infty/\text{FIFO})$ and $(M/M/1):(N/\text{FIFO})$ models

Unit - IV

Inventory Control: Introduction – Costs involved in Inventory – Deterministic EOQ Models – Purchasing Model without and with Shortage, Manufacturing Model without and with Shortage -Price Break

Unit - V

PERT and CPM: Network Representation – Calculation of Earliest expected time, latest allowable occurrence time. CPM - Various Floats for Activities – Critical Path- PERT –Time Estimates in PERT- Probability of Meeting scheduled date of Completion of Projects

TEXT BOOK

1. **Kanthi Swarup, Gupta P.K., Man Mohan.,** (2006) Operations Research, Sultan Chand and Sons, New Delhi.

REFERENCES

1. **Sharma J.K.,** (2008), Operations Research Theory Applications, Macmillan India Ltd, New Delhi.
2. **Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K.,** (2005), Resource Management Techniques, A. R. Publications, Nagapatinam.

3. **Shanthi Sophia Bharathi D.**,(1999),Operations Research/ Resource management techniques, Charulatha Publications.
4. **Hamdy A.Taha.**, Operations Research, (2007), Pearson education, Prentice Hall.
5. **Vittal** – Operations Research – Margham Publications

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of marketing, and 4Ps of Marketing
2. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. To apply the marketing concepts and skills lifelong.
4. To understand the recent trends in marketing strategies of a companies.
5. To understand the consumer behavior and to adopt the decision according to the consumer.
6. To know the promotion strategies followed by a company.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of marketing, and 4Ps of Marketing
2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. Apply the marketing concepts and skills lifelong.
4. Apply the marketing strategies of a company's effectively.
5. To be familiar in behavior of consumer in related to market and to take decision effectively.
6. To implement the correct promotion strategies.

Unit-I

Definition of Marketing and Marketing Management – Object and Importance of Marketing – Evolution of Concept of Marketing – Recent Development in Marketing Concept – Marketing Functions – Approaches to the Study of Marketing – Market Segmentation – Basis – Criteria – Benefits.

Unit-II

Product Policy: Product Planning and Development – Product Life Cycle – Product Line and Product Mix Strategies. Branding: Features – Types – Functions. Packaging: Features – Types – Advantages – Brand Name and Trademark.

Unit-III

Pricing: Definition - Objectives of Pricing Decisions - Factors influencing Pricing Decisions – Methods of Setting Prices – Cost – Demand and Competition – Pricing Policies and Strategies.

Unit-IV

Sales Promotion: Meaning and Definition – Objectives and Importance of Sales Promotion – Personal Selling – Steps in Personal Selling - Advertising – Meaning – Objectives – Functions and Importance – Kinds of Media – Direct Marketing – Multi-level Marketing. Distribution Channels: Types of Channels – Factors affecting Choice of Distribution.

Unit-V

Marketing of Services – E-Marketing – Marketing Ethics – Consumerism – Meaning – Evolution – Types of Exploitation – Consumer Rights – Laws Protecting the Consumer Interest – Consumer Protection Acts – Consumer Courts - Retail Marketing – Methods – Problems – Retail Marketing in India – Customer Relationship Management

TEXT BOOK

1. **R.S.N. Pillai & Bagavathi** (2012), Modern Marketing Principles and Practices, S. Chand & Co Pvt., Ltd, New Delhi.

REFERENCES

1. **CB Gupta and Dr. Rajan Nair** (2014), Marketing Management, Sultan Chand & Sons, New Delhi.
2. **Philip Kotler** (2014), Principles of Marketing, Prentice Hall of India, New Delhi.

15CMP105	ADVANCED CORPORATE ACCOUNTING	Semester – I			
		L	T	P	C
		6	-	-	5

COURSE OBJECTIVES:

To make the students

1. To understand the Redemption of Preference shares, Mergers& Acquisitions, Internal Reconstruction, Liquidation of shares, recent Development in Accounting.
2. To Post the journal, ledger Prepare the balance sheet for corporate Accounting.
3. To comprehend on recent developments and accounting standards
4. To enable the students to have working knowledge in corporate and special accounts.
5. To enable the students to have working knowledge in corporate and special accounts.
6. To provide knowledge on the importance of Human Resources Accounting

COURSE OUTCOMES :

Learners should be able to

1. Understand the Redemption of Preference shares, Mergers & Acquisitions, Internal Reconstruction, Liquidation of shares, recent Development in Accounting.
2. Post the journal, ledger Prepare the balance sheet for corporate Accounting.
3. Comprehend on recent developments and accounting standards
4. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of accounting.
5. course includes preparation of final accounts, Amalgamation, Absorption and Reconstruction, Holding Company, Insurance and Banking Company Accounts, Inflation and Human Resource Accounting
6. Provide knowledge on the importance of Human Resources Accounting

Unit – I

Preparation of Company Final Accounts – Treatment and Provisions for Income Tax – Divisible Profit – Bonus Shares – Calculation of Managerial Remuneration

Unit –II

Amalgamation, Absorption and Reconstruction of Companies (Advanced Problems in Amalgamation, Absorption and Reconstruction of Companies including adjustment regarding elimination of Unrealized Profit, Inter Company Owings and Inter-Company Holdings)

Unit – III

Holding Company Accounts – Capital Profit – Revenue Profit – Minority Interest – Cost of Control – Preparation of Consolidated Balance Sheet

Unit – IV

Insurance Company Accounts – Life and General Insurance Accounts – Preparation of Revenue Accounts and Balance Sheet (Under the New Format) - Banking Company Accounts – Rebate on Bills Discounted – Classification of Advances and Investments – Preparation of Profit and Loss Account and Balance Sheet (Under the New Format)

Unit – V

Inflation Accounting – Human Resource Accounting –International Accounting Standards (Theory Only) – International Financial Reporting Standards.

Note: Theory 20%; Problems 80%

TEXT BOOK

1. **S.P. Jain and Narang** (2010) Advanced Corporate Accounting, Kalyani Publishers, New Delhi

REFERENCES

1. **R.L. Gupta** (1998) Corporate Accounts, Sultan Chand and Company, New Delhi
2. **Singhal A.K.** (2010), Corporate Accounting, Vayu Education of India, New Delhi

Semester – I			
L	T	P	C
-	-	4	2

15CMP111 PRACTICAL:1 ACCOUNTING PACKAGE - TALLY

COURSE OBJECTIVES:

To make the students

1. To understand the accounts heads, vouching, inventory valuations, available in the accounting software
2. To classify the items under items heads
3. To Generate the financial Reports evaluate the output.
4. To communicate the outputs in written form identifying the objective and outcome of each exercise.
5. To apply the utilization of computerized system as a lifelong learning.
6. To develop practical skills for maintain the book of accounts.

COURSE OUTCOMES:

Learners should be able to

1. Familiarize on the account's heads, vouching, inventory valuations available in the accounting software
2. Classify the items under items heads
3. Generate the financial Reports, evaluate the output.
4. Communicate the outputs in written form identifying the objective and outcome of each exercise.
5. To apply the utilization of computerized system as a lifelong learning.
6. Course covers Company Creation, Ledger, Voucher, Trading and Profit and Loss Account, Balance Sheet, Inventory Valuation and Ratio Analysis

Creating a Company

1. Create a Company with all relevant details including VAT options

Creating Ledger

2. Create the ledgers under appropriate predefined groups

Cash a/c	Computer sales a/c
Buildings a/c	Machinery a/c
Furniture a/c	Commission received a/c
Printer purchase a/c	Commission paid a/c
Rent received a/c	Salary a/c
Rent paid a/c	Indian bank a/c
Wages a/c	Sales returns a/c
Capital a/c	Depreciation a/c
Purchase returns a/c	John & Co. a/c (purchased goods from this company)
Ram agency a/c (sold goods to this company)	

Create vouchers**3. Create vouchers and view Profit and loss a/c and Balance sheet for the following:**

Hindustan Ltd. started the business on 01-04-2011

- 1 Apr. Contributed capital by cash Rs 2, 00,000
- 1 Apr. Cash deposited in Indian bank Rs 50,000
- 2 Apr. Credit purchases from Krishna traders Rs. 20000 invoice no 12
- 3 Apr. Credit purchases from PRAVIN traders Rs 20,000 invoice no 12
- 4 Apr. Credit purchase from KRISHNA traders Rs 20000 invoice no 14
- 5 Apr. Credit purchase from PRAVIN traders Rs 20,000 invoice no 44
- 6 Apr. Returned goods to KRISHNA traders Rs 5000 invoice no 12
- 7 Apr. Returned goods to PRAVIN traders Rs 5000 invoice no 44
- 8 Apr. Credit sales to RAVI & Co Rs 50,000 inv no 1
- 9 Apr. Credit sales to KUMAR & Co Rs 50,000 inv no 2
- 10 Apr. Cash sales Rs 20,000 inv no 3
- 11 Apr. Credit sales to RAVI & Co Rs 50,000 inv no 2
- 12 Apr. Credit sales to RAVI & Co Rs 50000 inv no 5
- 14 Apr. Goods returned by RAVI & Co Rs 5000 inv no 1
- 14 Apr. Goods returned by KUMAR & Co Rs 5000 inv no 1
- 15 Apr. Payment made by cheque to Krishna Traders Rs 30,000 ch no 505580
- 16 Apr. Payment made by cheque to Pravin Traders Rs 30,000 ch no 505592
- 17 Apr. Received cheque from: Ravi & Co and Kumar & Co 75,000 each.

Payments made by cash

- 3 Apr. Paid to petty cash by cash Rs.1000
- 4 Apr. Furniture purchased Rs.20000
- 5 Apr. Salaries paid Rs. 10000
- 6 Apr. Rent Rs.4000
- 7 Apr. Electricity charges Rs.3000
- 8 Apr. Telephone charges Rs.3500
- 9 Apr. Cash purchases Rs.5000

Payments made by petty cash

- 10 Apr. Conveyance Rs.150
- 11 Apr. Postage Rs.100
- 12 Apr. Stationeries Rs.200
- 14 Apr. Staff welfare Rs.100
- 14 Apr. Stationeries purchased from Sriram & Co 1500 on credit
- 15 Apr. Depreciation on furniture 10%

4. Emerald & Co., started a business of home appliances from 1-4-2011

01-04 received cash for capital 5, 00,000
 07-04 credit purchases from LG Limited invoice no 123
 Oven 100nos at Rs 800,Mixes 100nos at Rs 1000,DVD player 100nos at Rs 1500,
 Fridge 100nos at Rs 2000
 10-04 Credit Sales to AMN invoice no 1:
 Oven 70nos at Rs 1000,Mixes 70nos at Rs 1500,DVD player 70nos at Rs 2000
 Fridge 70nos at Rs 2500+TNGST 4% ON TOTAL SALES
 10-04 Cash Sales invoice no 2:
 Oven 10nos at Rs 1000,Mixes 10nos at Rs 1500,DVD player 10nos at Rs 2000,
 Fridge 10nos at Rs 2500+TNGST 4% ON TOTAL SALES CASH discount 5%
 15-4 Paid cheque to LG limitedRs 2,00,000
 15-4 Received cheque from AMN&coRs 3,00,000

5.Payment made by cash

Paid to petty cash Rs 2000, Furniture Rs 15000, Salaries Rs 10000
 Wages Rs 7000, Carriage inward Rs 1500.
 25-04 Payment made by petty cash
 Conveyance Rs 200, Postage Rs 150, Stationeries Rs 150, Staff Welfare Rs 200
 30-04 Journal depreciate 10% on furniture:

Prepare Trading Profit and Loss Account and Balance sheet.

6. From the Balances of Ms. Kavitha, Prepare Trading A/C, Profit And Loss A/C and Balance Sheet for The Year Ending

Stock - 9,300	Misc. income - 200
Repairs - 310	Purchases - 15,450
Machinery - 12,670	Purchase return - 440
Furniture - 1430	Sales return - 120
Office expenses - 750	Sundry creditors -
Trading expenses -	12,370
310	Advertisement - 500
Land & Building -	Cash in hand - 160
15,400	Cash at bank - 5,870
Bank charges - 50	Sales - 20,560
Capital - 24,500	Sundry expenses -
Loan - 5,000	150
Closing stock - 7,580	Insurance - 500
	Traveling expenses -
	200

INVENTORY VALUATION

7. From the Information given below create unit of measurement, stock groups and stock items

Find the stock summary:

Stock groups: 1. Magazine 2. Baby drinks 3. Cool drinks 4.dailynews paper 5. Hot drinks
6.Stationeries 7. Vegetables

Stock items:

Item	Qty	Rate	Units
Boost	25	80	nos
Sports star	20	15	nos
Potato	260	30	kgs
Star dust	20	25	nos
The Hindu	50	3.25	nos
Tomato	150	15	kgs
Fanta	10	25	lit
Dinamalar	40	2.50	nos
Coco	55	120	nos
Horlicks	60	70	nos
India today	10	10	nos
Lactogin	10	100	nos

MAINTAIN BILLWISE DETAILS**8. Create bill wise details from the following**

1. Ravi commenced business with a capital of Rs 2,00,000
2. Purchased goods from Kumar & Co Rs.15, 000 Paid in three installments within 5 days gap
3. Purchased goods for cash Rs.8000
4. Sold goods to Ratna & co Rs. 20,000 amount to be paid in two installment
5. Sold goods for cash for Rs .5000
6. Received cash from Ratna & co Rs. 75000
7. Paid to Kumar & co Rs. 7500
8. Sold goods for cash Rs.5000

CONSOLIDATION OF ACCOUNTS**9. Bharath Agencies, A Wholesaler Gives The Following Information:**

Opening balances:

Capital: 20, 00,000 cash at bank: 10, 00,000

Cash in hand: 5, 00,000 furniture: 5, 00,000

Bharath agencies are dealing in stationeries. The selling prices are as follows;

Pen Rs 35 per dozen, pencil Rs. 30 per dozen, Ink pens Rs 140 per dozen

The following transactions take on a particular date:

- 1.purchased 100 dozens of pens from Ravana bros. @ Rs.25 per dozen for cash
- 2.purchased 200 dozens of pencils from Gughan bros.@ Rs.21.50 per dozen for credit less discount of Rs 100
- 3.sold 10 dozens of pens to Dharma bros. For cash
- 4.sold 10 dozens of pens to Bema bros for credit
- 5.sold 50 dozens of pencils to Arjuna bros.
- 6.purchased from Ravana bros 50 dozens of ink pens @ Rs.120 and by cheque.

Prepare following statements using Ex-accounting packages:

Stores ledger, Trading account, Income statement, Balance sheet, Account summary
Ignore dates

FOREIGN GAINS/LOSS

10. Calculate

01.01.2005 Purchased goods from U.K supplier 1000 £

02.01.2005 Sold goods to U.S buyer 1500

03.01.2005 Cash received from U.S buyer 1500

(Selling rate rs.46/\$)

04.02.2005 Paid cash to U.K supplier 1000

(Selling rate Rs 53/ £)

Dollar \$:

Std rate - 1\$ - 43 Rs

Sales rate - 1\$ - 44 Rs

Buying rate - 1\$ - 42 Rs

Pound £:

Std rate - 1 £ - 51 Rs

Sales rate - 1 £ - 50 Rs

Buying rate - 1 £ - 52 Rs

11. MEMO VOUCHER

An advance amount paid Rs 1500 given to sales executive for traveling. The actual expenses for traveling expenses for the sales is Rs 500

12. CHEQUE PRINTING

Print a cheque:

Company name on cheque: Wipro India Ltd.: name of the bank Indusind bank.

Width 168, height 76, starting location 116, distance from top 23.

13. RATIO ANALYSIS

Enter the following details comment upon the short-term solvency position of the company:

Working capital Rs 20560492

Cash 14500

Bank 18500

Debtors 518260

Creditors 429337

Sales 515252

Purchases 433310

Stock 125982

Net profit ...?

14. INTEREST CALCULATIONS

Cash deposited in Scotia bank Rs 1,00,000

Sold goods to Ganesh Rs 25,000

31-12- cash deposited at Scotia bank Rs 50,000

Sold goods to Ganesh 50,000

Interest parameters rate 14% per 365 days year

15. Calculate Interest

Cash deposited in SBI 1, 00,000 Rs

1-12 purchased goods from suppliers Rs 20,000

Deposited in SBI Rs.50, 000

Purchased goods from suppliers Rs 40,000

Interest parameters rate 16% per 365 days year

16. Display the interest calculations for the period 1-4-2011 to 31-12-2011

Opening balance

Ram & Co Rs 25,000

Krishna traders Rs 20,000

Interest parameters rate 12% per 365 days year

Interest parameters rate 12% and 16% for sundry creditors per 365 days year

Purchased goods from Krishna for 25,000(credit period 45 days)

Sold goods to Ram for Rs. 50,000(credit period 30 days)

Paid to Krishna the amount plus interest

Received from Ram plus interest

17. Create stock items, stock groups, sales categories, godowns, units of measure.

Stock	Category	Group	Godown	Unit of measure	Std cost	Sell Price	Op. Qty	Total Value
Inter	Processor	Celeron	Mumbai	Nos.	15000	20000	2	30000

<u>Celeron</u>								
<u>Intel Premium III</u>	<u>Processor</u>		<u>Chennai</u>	<u>Nos</u>	<u>20000</u>	<u>25000</u>	<u>3</u>	<u>60000</u>
<u>Tally Silver</u>	<u>Accounting</u>	<u>Tally</u>	<u>Chennai</u>	<u>Nos</u>	<u>20000</u>	<u>22500</u>	<u>5</u>	<u>100000</u>
<u>Tally gold</u>	<u>Accounting</u>	<u>Tally</u>	<u>Chennai</u>	<u>Nos</u>	<u>42000</u>	<u>45000</u>	<u>5</u>	<u>210000</u>
								<u>400000</u>

18. Using the above exercise create various vouchers including VAT calculation for the following

Date Transactions	Transcation
<u>09/4/2006</u>	Intel Pentium III (3 Nos) @ 25,000 delivered to Vijay & CO, from Madras Go down.
<u>10/4/2006</u>	10 Nos of Intel Celeron @ 15000 per unit received from Jayaram and Co, and sent to Madras Go down.
<u>12/4/2006</u>	2Nos of Intel Premium III received from Vijay & CO, as it was not in a working position.
<u>14/4/2006</u>	2Nos of Intel Celeron returned to Jayaram & Co from Madras Go down.
<u>14/4/2006</u>	Physical Stock verification shows Shortage of 1 No Intel Pentium III.

19. Create the following Inventory vouchers with data from any cost accounting book.

- Purchase order
- sales order
- Rejection out
- Rejection in
- Stock journal
- Delivery note
- Receipt note
- Physical stock

20. In addition to the above mentioned lab exercises work out a problem from any advanced accountancy book with a minimum of 20 transactions and generate the tally reports in full.

		Semester – II			
		L	T	P	C
15CMP201	APPLIED COST ACCOUNTING	5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To Explain the core concepts of costing, costing types and its importance in managing a business
2. To develop a conceptual framework of costing and to acquaint the participants with the tools, techniques
3. To know the process of cost reduction and control in the realm of decision making.
4. To familiarizes students with the various concepts and elements of cost
5. To Create cost consciousness among the students
6. To provide the students knowledge about use of costing data for Planning, Control and decision making

COURSEOUTCOMES:

Learners should be able to

1. Explain the core concepts of costing, costing types and its importance in managing a business
2. Develop a conceptual framework of costing and to acquaint the participants with the tools, techniques and process cost reduction and control in the realm of decision making
3. Compute using different costing methods.
4. Demonstrate capabilities of teamwork, problem-solving and critical thinking
5. Communication skills related to finance decisions.
6. course include Material Cost, Labour Cost, Overheads, Process Costing, Activity Based Costing and Target Costing

Objectives

Unit – I

Cost Accounting – Meaning and Objectives – Importance – Limitations – Limitations of Financial Accounting – Differences between Cost Accounting and Financial Accounting, Cost Accounting and Management Accounting – Methods of Costing – Elements of Cost – Preparation of Cost Sheet – Tender – Quotations – Reconciliation of Cost and Financial Accounting

Unit – II

Material Control – Objectives – Levels of Inventory – EOQ – Methods of Inventory Control – Methods of Valuing Material Issues – Control over Wages – Scrap and Spoilage - Labour - Labour Cost Control – Importance – Systems of Wage Payment – Incentives – Idle Time – Control Over Idle Time – Labour Turnover

Unit – III

Overheads – Classification of Overheads – Allocation, Apportionment and Absorption of Overheads – Methods of Absorption of Overheads

Unit – IV

Process Costing – Features – General Principles – Comparison between Job Costing and Process Costing – Process Losses – Normal Loss – Abnormal Loss – Abnormal Gains – Inter Process Profit – Equivalent Production – Procedure for Evaluation – Joint Product and by Product

Unit-V

Activity Based Costing: Meaning and Methodology of Activity Based Costing (ABC Analysis)-Merits, Demerits and Suitability of Activity Based Costing- Implementation of Activity Based Costing- Draw Back of Conventional Costing - Target costing: Meaning-Characteristics-Principles-Implementation of Target Costing- Installation of Target Costing-Target Costing Vs. Traditional Costing- Life Cycle Costing-Meaning-Definition-Applications of LCC -Importance-Process of LCC

TEXT BOOK

1. **S.P. Jain and K.L. Narang** (2012) Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi

REFERENCES

2. **S.P.Iyyangar** (2005) Cost Accounting Principles and Practices, Sultan Chand and Sons, New Delhi

3. **R.S.N. Pillai and Bhagavathi** (2010) Cost Accounting, Sultan Chand and Sons, New Delhi
4. **S.N. Maheswari** (2013) Cost Accounting, Sultan Chand and Sons, New Delhi

		Semester – II			
		L	T	P	C
15CMP202	DIRECT TAXATION AND TAX PLANNING	5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of assessment, assessee, Income heads and the Income Tax laws.
2. To help students to understand different heads of income
3. To learn the tools and techniques to compute the tax for the various income heads.
4. To select the best ways to compute the income tax based on the income heads for various assessee and to gain a lifelong learning for applying the IT calculation for various income heads based on each case of assessee.
5. To communicate orally and in written form the income tax concepts and computations.
6. To be familiar with the laws pertaining to the Income Tax and apply it lifelong.

COURSE OUTCOMES:

Learners should be able to

1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.
2. Compute Income Tax Returns.
3. Provide the students knowledge about Tax planning
4. Formulate the Income Tax calculations by critically analyzing the assessee's situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee
5. Communicate orally and in written the Income tax computation under various income heads and deductions.
6. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.

Unit- I

Income Tax Act 1961- Scope of income - Total Income and residential status - income which do not form part of the total income – Income from Salaries.

Unit - II

Income from House Property – Profits and gains of business or profession – Income From business- Income from Profession.

Unit - III

Capital Gains – Capital Gain –Short Term and Long Term Gain - Income from other sources – Aggregation of income- set off and carry forward of losses.

Unit - IV

Deduction out of Gross Total Income - Computation of Total Income- Assessment of Individual.

Unit - V

Tax Planning – Advance payment of tax –Tax Deducted at Source - ETDS Software - Returns to be submitted by various assesses-Different Types of Tax Planning – Tax Software – e-filing Procedure e-filing of income tax return.

Note: The question paper shall cover 40% theory and 60% problems

TEXT BOOK

1. **Gaur and Narang** (2013) Income Tax Law and Practice, Kalyani Publishers, Ludhiana

REFERENCES

1. **Mehrothra (2007)** Income Tax Law and Practice, Snow White publications, New Delhi
2. **Jayaprakash Reddy** (2014) Taxation, APH Publishing Corporation, New Delhi

		Semester – II			
		L	T	P	C
15CMP203	INSURANCE AND RISK MANAGEMENT	5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. To comprehend on the reforms in Indian insurance industry.
3. To understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. To create awareness among students on various insurance policies and the procedures followed on availing policies
5. To communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
6. To create awareness among students on various insurance policies and the procedures followed on availing policies

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. Comprehend on the reforms in Indian insurance industry.
3. Understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. Communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. course consists of types of risks, risk management, Life and General Insurance
6. Create awareness among students on various insurance policies and the procedures followed on availing policies

Objective

Unit – I

Introduction to Risk Management : The Concept of Risk – Risk Vs Uncertainty – Types of Risks: Market Risk, Credit Risk, Operational Risk, Interest Risk, Business Risk, Systematic Risk – Classifying Pure Risks – Methods of Handling Pure Risks – Risk Management Process – Risk Financing Techniques – Risk Management Objectives – Risk Management Information System (RMIS) – Risk Control

Unit - II

Risk Management by Individuals: Factors affecting individual demands for insurance – Risk Management by Corporations – Corporate Risk Management Process – Types of Risk Managing Firms

Unit – III

Growth and Development of Indian Insurance Industry – Regulations of Insurance Business and the Emerging Scenario – Introduction to Life and General Insurance – Life Insurance: Features of Life Insurance – Essentials of Life Insurance Contract – Kinds of Insurance Policies – Premium Determination – Life Policy Conditions

Unit – IV

Fire Insurance – Fire Insurance Contracts – Fire Insurance Coverage – Policies for Stocks – Rate Fixation in Fire Insurance – Settlement of Claims – Marine Insurance: Marine Insurance Contract – Types of Marine Insurance – Marine Cargo Losses and Frauds – Settlement of Claims

Unit – V

Miscellaneous Insurance: Motor Insurance – Employer's Liability Insurance – Personal Accident and Sickness Insurance – Aviation Insurance – Burglary Insurance – Fidelity Guarantee Insurance – Engineering Insurance – Cattle Insurance – Crop Insurance

TEXT BOOK

1. **Dr. P.K. Gupta** (2015) Insurance and Risk Management, Himalaya Publishing House

REFERENCES

1. **Mishra** (2012), Insurance Principles and Practice, S. Chand & Sons
2. **Periasamy** (2011), Insurance Principles and Practice, Himalaya Publishing House, New Delhi

15CMP204A	ORGANIZATIONAL BEHAVIOUR	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To understand the basic concepts of organizational behavior.
2. To analyze the individual behavior traits required for performing as individual or group.
3. To obtain the knowledge and skills of perceiving, motivating using different learning styles.
4. To understand how to perform in group and team and how to manage the power, politics and conflict.
5. To recognize the importance of organizational culture and organizational change.
6. The course comprise of Organizational behavior, Personality, Attitude, Stress and Organizational Conflict

COURSE OUTCOMES:

Learners should be able to:

1. Analyze behavior issues in the context of the organizational behavior theories and concepts.
2. Assess the behavior of the individuals and groups in organization by applying personality, motivation and learning theories.
3. Manage team and resolve conflict arising between the members.
4. Explain how organizational changes held in the company
5. and culture affect working relationships within organizations.
6. Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.

Unit – I

Organizational Behaviour – Nature – Disciplines contributing to Organizational Behavior – Role of Organizational Behavior – Foundations of Organizational Behavior – Implications of Hawthorne Experiments

Unit – II

Individual Difference – Nature – Causes – Models of Man – Perception – Perceptual Process – Perceptual Selectivity – Distortion in Perception – Personality – Determinants of Personality

Unit – III

Attitude – Concepts – Theories of Attitude Formation – Factors in Attitude Formations – Attitude Change. Stress – Causes of Stress – Effects of Stress – Stress Coping Strategies – Individual and Organizational

Unit – IV

Group Dynamics – Concepts and Features of Group – Types of Groups – Formal and Informal Groups – Causes of Informal Organizations – Types of Industrial Organization – Effects of Informal Organization – Group Cohesiveness

Unit – V

Organizational Conflicts – Functional and Dysfunctional Aspects of Conflicts – Role Conflicts – Interpersonal Conflict – Conflict Management

TEXT BOOK

1. **Aswathappa K** (2012) Organizational Behaviour, Himalaya Publishing House, Mumbai

REFERENCES

1. **Steven MC Shane** (2014), Organizational Behaviour, Tata Mc Graw Hill Publishing, New Delhi
2. **Stephen Robbins** (2013), Organizational Behaviour, Prentice Hall of India learning Pvt. Ltd., New Delhi

15CMP204B	MODERN MANAGEMENT PRACTICE	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To Understand the concept of management
2. To understand on the concept of Strategic Management.
3. To understand on the concept of Organizational Structures
4. To identify the concept of Leadership and Quality of Work Life
5. To understand the concept of Team Management
6. To understand the concept of Team Conflict

COURSE OUTCOMES:

Learners should be able to

1. Understand the concept of management
2. Understand on the concept of Strategic Management.
3. Understand on the concept of Organizational Structures
4. Identify the concept of Leadership and Quality of Work Life
5. Understand the concept of Team Management
6. Understand the concept of Team Conflict

Unit – I

Fundamentals of Management - Characteristics of Well managed companies – Managerial Process –Managerial Skills and roles –Managing the Internal and External Environment –Strategies of the Environment Management –Managing for Competitive Advantage –Cost –Quality –Speed –Innovations –Globalization –Challenges of a Manager in the 21st Century

Unit – II

Strategic Management - SWOT Analysis –BCG matrix –Classification of Strategies -Managerial Decision Making –Group Decision Making –Corporate Social Responsibility –Strategies -Indian experiences in CSR

Unit – III

Organizational Structures - Kinds of Organizational Structures - Hybrid and Matrix Structures - Span of Control - Delegation of Authority - Centralized and Decentralized Structures - Organizing for Optimal Size - Strategies of Responsive Organization - Customer Relationship Management - TQM - 6 Sigma.

Unit – IV

Leadership - Transactional and Transformational Leaders - Traditional and Contemporary Perspective on Leadership - Situational Theories - Developing Leadership Skills - Motivating for Performance - Reinforcements for Performance - Expectancy Theory - Job Enrichment - Empowerment - Establishing Equity and Quality of Work Life.

Unit – V

Management Teams - Managing High Performance Teams - Team Development - Cohesiveness - Managing Conflicts in Team - Managing Technology and Innovations in Competitive Environment - Managing Change - Shaping the future.

TEXT BOOK

1. **Bateman Thomas S,&. Snell Scott A**, (2008), Competing in the New Era, 8th Edition, Tata McGraw Hill Publishing Company Ltd.,

REFERENCES

1. **Certo Sameul C, Certo S. Travis**, (2011), Modern Management: Concepts and Skills; 11th Edition, PHI Pvt. Ltd.,
2. **Pyzdek Thomas** (2014), Six Sigma Project Planner, Tata McGraw Hill Education Pvt. Ltd.,

15CMP204C	CONSUMER BEHAVIOUR	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To understand the consumer behavior concepts, dimensions used in consumer behaviour research.
2. To recognize the Internal Influencing factors that affect the Consumer Behaviour
3. To identify the external Influencing factors that affect the Consumer Behaviour
4. To conceptualize on the consumer decision making process.
5. To know the application consumer behaviour concepts to access the changing behavior of the customers.
6. To appreciate the personal and environmental factors that influence consumer decisions. To understand the strategic implications of consumer influences, and marketing decisions

COURSEOUTCOMES:

Learners should be able to

1. Understand the importance of Culture, Subculture, Social Class, Reference Groups
2. Understand the importance of Family Influences in Consumer Behaviour.
3. Explore, analyze and compare the core theories of consumer behaviour and its application in both consumer and organizational markets
4. Appraise models of Consumer Behaviour and determine their relevance to particular marketing situations
5. Critique the theoretical perspectives associated with consumer decision making, including recognizing cognitive biases and heuristics
6. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to investment decisions.

Unit – I

Definition, Scope, and Application of Consumer Behavior-Evolution of Consumer Behavior as a field of study and its relationship with Marketing; Behavioral Dimension-Interdisciplinary Nature of Consumer Behavior studies

Unit – II

Consumer Decision Making Process - Buying Motives - Buying Roles, Consumer Decision Making Process, Levels of Consumer Decision Making, Perspectives-Models

Unit – III

Psychological Influence on Consumer Decision Making – Consumers Needs & Motivation, Emotions and Mood, Consumer Involvement; Consumer Learning, Personality, Self-concept and Self-image; Consumer Perception, Risk and Imagery; Consumer Attitude: Belief, Attitude and Intention, Formation-Change-Consumer Communication.

Unit – IV

Sociological Influences – Consumer Groups - Consumer Reference Groups, Family and Life cycle, Social Class and Mobility, Lifestyle Analysis - Culture; Sub-Culture, Cross Culture - Interpersonal Communication and influence, Opinion Leadership.

Unit – V

Diffusion of Motivation - Consumer Orientation - Diffusion Process, Adoption Process, Consumer Innovators, Multiplicative Innovation Adoption (MIA) Model.

TEXT BOOKS

1. **Schiffman, Leon.G, Kanuk Leslie Lazar, and Kumar Ramesh. S.,**(2010), Consumer Behavior; Pearson Education, 10th Edition

2. **Gupta S.L & Pal Sumitra** (2013), Consumer Behaviour: An Indian Perspective Text and Cases; Sultan Chand, 2nd Edition

REFERENCES

1. **Peter Paul J., and Olson Jerry C.**, (2010), Consumer Behavior and Marketing Strategy, Irwin/McGraw Hill Higher Education
2. **Solomon,M.R.**, (2014), Consumer Behavior: Buying, Having, and Being, PHI Learning, 9th Edition
3. **Loudon, David, Bitta Albert Della** (2001), Consumer Behavior: Concepts and Applications; Tata McGraw Hill Education Private Limited, 4th Edition

15CMP204D	WORKING CAPITAL MANAGEMENT	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of financial management, objective of financial management,
2. To know the major four decisions taken by finance manager and its impact and enrich the lifelong learning.
3. To analyze the alternatives using appropriate tools and techniques.
4. To solve the problems and take decisions based on the result.
5. To communicate orally and in written form the concepts and solutions.
6. To analyse cases in a team and exhibit leadership skills.

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of financial management, objective of financial management, the major four decisionstakenbyfinancemanageranditsimpactandenrichthelifelong learning.
2. Working Capital Management, Cash Management, Inventory Management, Receivables Management and Modes of financing Current Asset
3. Analyze the alternatives using appropriate tools and techniques.
4. Solve the problems and take decisions based on the result.
5. Communicate orally and in written form the concepts and solutions.
6. Analyze cases in a team and exhibit leadership skills.

Unit - I

Working Capital Policy Overall Considerations - Importance of Working Capital Management - Concept of Working Capital - Risk and Return Trade off Financing Working Capital - Sources and Uses of Working Capital - Factor influencing Working Capital Requirements Issues in Working Capital Policy - Size of Working Capital Forecasting and Management of Working Capital.

Unit - II

Cash Management: Importance - Factors influencing Cash Balance
Determining minimum Cash Balance - Cash Budgeting - Cash Control Monitoring
Collections and Disbursement - Cash Management Models.

Unit - III

Inventory Management - Need for inventories and importance of its Management
- Techniques for Managing Inventory - Different Models Recorder - Point - Pricing of
Raw Materials and Valuation of Stock - Monitoring and Control of Inventories

Unit - IV

Receivables Management Credit Policy - Credits evaluation credit granting
decisions - Control receivables - Collection policy

Unit - V

Financing Current Assets: Trade Credit - Short - term Bank Finance -
Commercial paper - Public Deposits - Committees on Working Capital Regulation of
Bank credit - Recommendation

TEXT BOOK

1. **Agarwal Gaurav** (2011) Working Capital Management, Vayu Education of India, New Delhi

REFERENCES

1. **Gitmen L.J** (1987), Basic Managerial Finance Harper & Raw
2. **Weston J.F and Copeland T.E** (1995) Managerial Finance, Dryden P. New York
3. **I.M Pandey** (2014) Financial Management, Vikas Pub, New Delhi
4. **Bhalla V.K.** (2013) Working Capital Management, S.Chand Publishing New Delhi

15CMP204E	ADVERTISEMENT AND SALES PROMOTION	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To acquire knowledge in advertising, advertising designing, advertising agency and sales promotion.
2. To understand the concepts and practical implications of advertising,
3. to know the advertising designing, advertising agency and sales promotion.
4. To design advertisement and broadcast the same in an appropriate media
5. To give the students the basic knowledge of advertising and sales promotion.
6. To introduce the students to latest methods and tools of advertising and sales promotion.

COURSEOUTCOMES:

Learners should be able to

1. Acquire knowledge in advertising, advertising designing, advertising agency and sales promotion.
2. The course consists of Advertising, Advertising Process, Advertising Media, Sales Promotions and Salesmanship
3. Select the appropriate approach for setting the advertising a=objective
4. Evaluate the media alternative suitable for an advertisement.
5. Understand the concept of advertising budget, ethics for advertisement and its application.
6. Understand advertising, advertising designing, advertising agency and sales promotion and communicate ideas, explain procedures and interpret results and solutions in written and oral forms to different audiences.

Objectives

Unit - I

Advertising - Features, Purpose, Scope and Function - Classifications - Social and Economic Aspects & Ethical Issues in Advertising - Need for Advertising

Unit – II

Advertising Process - Advertising Strategy - Psychology of Target Audience - Effectiveness of Advertising - Buying Behavior - Audience Perception -Setting Advertising Objectives, Advertisement Planning and Organization -Advertisement Copy.

Unit - III

Advertising Media - Role of Media - Print Media - Radio and Television - Online Advertising - Media research - Media Selection - Advertising Budget - Evaluation of Effectiveness of Advertising - Areas of Assessment - Media testing

Unit – IV

Sales Promotions - Scope - Functions and Importance - Sales Promotional Methods - Fundamental of Successful Selling - Retail Marketing

Unit – V

Salesmanship - Salesmen Recruitment and Training - Personnel Selling - Skills for Good Salesmanship - Training of Sales Personnel - Motivating and Evaluating Sales Personnel - Sales Records - Rewarding Good Salesmanship

TEXT BOOK

1. **Mahendra Mohan**, (2008) Advertising Management, Tata McGrew Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. **Philip Kotler, Kevin Lane Keller, Abraham Koshy, Mithileshwar Jha** (2013), 'Marketing Management', Pearson Education, New Delhi.
2. **Rathore (1998)**, 'Advertising Management', Himalaya Publishing House, New Delhi.
3. **Francis Cherunilam** (2010) Advertisement and Salesmanship, Himalaya Publishing House
4. **Varma and Agarwal** (2000), Salesmanship and Publicity, King Books, New Delhi

15CMP205	BUSINESS ENVIRONMENT	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To understand the basic concepts of environmental forces for business decisions
2. To learn the political and government influence on business activities
3. To analyses the social factors affecting the business structure
4. To critically evaluate the economic and global factors influencing the business environment.
5. To expose the students to the environmental aspects of business
6. To expose the students to the Social Environment: Social Responsibilities of Business

COURSEOUTCOMES:

Learners should be able to

1. Understand the basic concepts of environmental forces for business decisions
2. Learn the political and government influence on business activities
3. Analyze the social factors affecting the business structure
4. Critically evaluate the economic and global factors influencing the business
5. The course incorporates Economic, Political, Technological and Social Environments
6. Know the concept of Social Responsibilities of Business

Unit-I

Introduction to Business Environment – Objectives – Types of Environment – Nature and Scope – Relationship between Economic and Non-Economic Environment – Elements of Business Environment

Unit-II

Economic Environment: Industrial Policy 1991 – Liberalization – Privatization and Globalization – Pros and Cons of Globalization – Forms of Privatization

Unit-III

Political Environment: Government and Business Relationship – Different Roles of Government in Indian Economy – Objectives of State Intervention – Indian Constitution – The Preamble Fundamental Rights.

Unit-IV

Technological Environment: Features – Impact of Technology on Society and Economy – Restraints on Technological Growth – Technology Policy.

Unit-V

Social Environment: Social Responsibilities of Business – Business and Society - Women and Business Opportunities – Child Labour – Corporate Governance. – Green Marketing – Global Warming

TEXT BOOKS

1. **Francis Cherunilum** (2014) Business Environment: Text and Cases, Himalaya Publishing House, Mumbai.
2. **K. Ashwathappa** (2011) Essentials of Business Environment, Himalaya Publishing House, Mumbai.

REFERENCES

1. **Ashish Bhalla** (2011) Business Environment, Vayu Education of India, New Delhi
2. **Gopal Namita** (2010) Business Environment, Tata Mc Graw Hill Education Pvt. Ltd., New Delhi

15CMP206	FINANCIAL MARKETS AND INSTITUTIONS	Semester – II			
		L	T	P	C
		5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To comprehend on the concept financial markets, instruments and financial institution and its role in economic development
2. To understand the regulatory bodies governing the functioning of financial markets and financial institution
3. To analyze the structure of financial markets and its functions
4. To provide knowledge on Financial System of India and
5. To provide knowledge on Financial System of India and to familiarize the structure of financial markets
6. To familiarize the structure of financial markets

COURSE OUTCOMES:

Learners should be able to

1. Comprehend on the concept financial markets, instruments and financial institution and its role in economic development
2. Understand the regulatory bodies governing the functioning of financial markets and financial institution
3. Obtain the capacity to do lifelong learning on financial markets, instruments, financial institution and its applications.
4. To communicate orally and in written format about the financial markets and institutions
5. The course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions
6. Course includes Money Market, Money Market Instruments, Capital Market, Depository System and various types of Financial Institutions

Unit – I

Financial Concept: Financial Assets, Intermediaries, Financial Markets, Financial Rate of Return, Financial Instruments. Financial Markets Classification – Development of Financial System in India, Legislative Support – Weakness of Indian Financial System

Unit - II

Money Market – Definition – Money Market Vs Capital Market- Objectives – Importance of Money Market – Composition of Money Market – Participants – Commercial Bill Market – Types of Bills – Importance of Bill Market –Discount Market

– Acceptance Market – Bill Market Scheme – Treasury Bill Market – Types of Treasury Bills – Importance – Commercial Paper – Certificate of Deposit – REPO – Structure of Indian Money Market – Recent Developments in Money Markets.

Unit – III

Capital Market – Meaning – Stock Exchange – Distinction between New Issue Market and Stock Exchange – Relationship between New Issues Market and Stock Exchange – Functions of New Issue Market – Instruments of Issues – Players in the New Issue Market – Book Building – Follow on Public Offer – Recent Trends – Reasons for Poor Performance – Suggestions

Unit - IV

Depository System : Definition and Meaning – Objectives – Interacting Institutions – Depository Process – Trading in a Depository System – Depository System in India – Depository Participants – Benefits – NSDL – Central Depository Services (India) Ltd. – Drawbacks – Remedial Measures - Derivatives

Unit - V

RBI – Commercial Banks – Public and Private – Co-operative Banks - LIC – IDBI – IFCI – ICICI – NHB – SFCs – DIC – TIIC. SEBI – Objectives – Functions of SEBI - Guidelines for Investor Protection

TEXT BOOK

Gordon and Natarajan (2010) Financial Markets and Institutions, Himalaya Publishing House, New Delhi

REFERENCES

1. **Gupta N.K. and Monika Chopra** (2011) Financial Markets and Institutions, ANE Books Ltd., New Delhi
2. **S. Gurussamy** (2009) Financial Markets and Institutions, Tata Mc Graw Hill Publishing, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To comprehend on the concept financial markets, instruments and financial institution
2. To understand role of stock market on economic development
3. To understand the regulatory bodies governing the functioning of financial markets and financial institution
4. To analyze the structure of financial markets and its functions
5. To enable the students from students other than Commerce
6. To understand the concepts, tools and techniques of investment in stock market

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the concept financial markets, instruments and financial institution
2. Understand role of stock market on economic development
3. Understand the regulatory bodies governing the functioning of financial markets and financial institution
4. Analyze the structure of financial markets and its functions
5. Enable the students from students other than Commerce
6. Understand the concepts, tools and techniques of investment in stock market

Unit – I

Investment: Basics of Investment – Investment, Speculation and Gambling – Investment Environment – Investment Categories – SEBI Functions

Unit – II

Stock Market: Markets for Securities and their functions – Primary Markets – Secondary Markets – Processes of Buying and Selling Securities – Types of Securities – Security Market Indicators.

Unit – III

Risk – Return Framework: Security Returns – Measurement of Returns – Concept of Risk – Systematic Risk – and Unsystematic Risk

Unit -IV

Fundamental Analysis: Basics of Economic Analysis and Industry Analysis – Company Analysis – Non Financial Parameters – Financial Parameters – Analysis of Financial Statements.

Unit-V

Technical Analysis: The Dow Theory – Technical indicators of the Overall Market – Indicators for Individual Stocks – Charting Techniques.

TEXT BOOKS

1. **Avadhani V.A.** (2014), Securities Analysis and Portfolio management, Himalaya Publishing House, Delhi
2. **Preethi Singh**, (2014), Investment Management, Himalaya Publishing, Delhi,

REFERENCES

1. **Bhalla V.K.**, (2009), Investment Management, S. Chand & Co, New Delhi
2. **Gopalakrishnan** (2005) Investment Management, Kalyani Publications
3. **Dhanesh Kumar** (2010) Investment Management and Security Analysis, Mac Millan Publication, New Delhi

15CMP221	INSTITUTIONAL TRAINING	Semester – II			
		L	T	P	C
		-	-	-	3

15CMP301	MANAGEMENT ACCOUNTING	Semester – III			
		L	T	P	C
		6	-	-	5

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. To comprehend on the contemporary issues relevant to accounting concepts.
3. To analyse the alternatives using appropriate tools and techniques.
4. To solve the problems and take decisions based on the result.
5. To communicate orally and in written form the concepts and solutions.
6. To provide the students knowledge about budgetary control.

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. Comprehend on the contemporary issues relevant to accounting concepts.
3. Analyse the alternatives using appropriate tools and techniques.
4. Solve the problems and take decisions based on the result.
5. Communicate orally and in written form the concepts and solutions.
6. Gain knowledge about budgetary control.

Unit – I

Management Accounting – Meaning – Definition – Objectives and Scope – Relationship between Management Accounting and Financial Accounting – Management Accounting and Cost Accounting

Unit – II

Financial Statement Analysis – Types of Financial Statement Analysis - Ratio Analysis – Meaning – Uses – Limitations – Classification of Ratios – Computation of Ratios from Financial Statements

Unit – III

Fund Flow Analysis – Cash Flow Analysis – Working Capital Statements – Funds from Operations

Unit – IV

Budgetary Control – Flexible Budget – Sales Budget – Cash Budget – Production Budget – Purchase Budget

Unit – V

Marginal Costing – Break Even Analysis – Applications of Marginal Costing Techniques – Determination of Sales Mix – Key factor – Make or Buy Decision (Simple Problems Only)

Note: Theory -20% Problems - 80%

TEXT BOOK

1. **S.N. Maheswari** (2007) Management Accounting, Kalyani Publishers, New Delhi

REFERENCES

1. **Sharma Shashi K. Gupta** (2003) Management Accounting, Kalyani Publishers, New Delhi
2. **P.K. Khan and Jain** (2009) Management Accounting, Tata Mc Graw Hill, New Delhi

15CMP302	BUSINESS RESEARCH METHODS AND TECHNIQUES	Semester – III			
		L	T	P	C
		5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To understand the basic framework of research and research process and its important in business decision.
2. To develop an understanding of various research designs and sampling techniques and its application.
3. To identify appropriate sources of information and methods of data collection for solving a business issue.
4. To understand the selection of appropriate tools to analyse the quantitative and qualitative data.
5. To understand the ethical norms for research and select the best type of research report and be familiar with the content to be included in the report.
6. To gain the sampling techniques along with hypothesis testing.

COURSE OUTCOMES :

Learners should be able to

1. Assess the best suitable research type and formulate the research objective for the business problem.
2. Formulate the suitable research designs and select appropriate sampling techniques for the research.
3. Select the appropriate data collection method for solving the business issue and decide the appropriate measurement scale for designing the instrument for data collection.
4. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.
5. Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills and design a suitable research report based on the ethical norms of research.
6. The course comprise of Types of Research, Research Design, Sampling, Data Collection, Scaling Techniques, Hypothesis Testing and Statistics

Unit-I

Introduction to Research: Meaning – Purpose – Types of Research – Significance
– Qualities of a good research – Steps in Research - Identification, Selection and Formulation

of Research Problem. Research Design: Components of Research Design – Methods of Research Design.

Unit-II

Sampling Design: Census and Sample Survey – Characteristics of a Good Sample Plan – Steps in Sampling – Types of Sampling – Advantages and Limitations of Sampling. Data Collection: Primary Data - Meaning – Significance – Methods of Collecting Data: Observation – Interview Schedule – Questionnaire. Secondary Data – Meaning - Sources of Secondary Data – Precautions while using Secondary Data.

Unit-III

Scaling Techniques: Meaning of Scale–Measurement of Scale – Important Scaling Techniques - Processing of Data - Editing – Purpose – Analysis and Interpretation of Data: Meaning – Need for Interpretation – Techniques of Interpretation.- Report Writing: Types of Research Reports – Layout of the Report – Steps in Writing the Report – Contents of Research Reports

Unit-IV

Hypothesis: Characteristics of a good Hypothesis – Formulation of Hypothesis – Procedure for Testing of Hypothesis – T test, F test and Chi Square Test, Analysis of Variance - Business Forecasting – Exponential Smoothing

Unit-V

Descriptive Statistics - Measures of Central Tendency: - Mean, Median and Mode - Standard deviation – Karl Pearson Correlation – Spearman Rank Correlation - Regression Models – Inferential Statistics – Multivariate Analysis - Factor Analysis – Kruskal Wallis Test

Note:

The question paper shall cover 80% theory and 20% problems

TEXT BOOK

1. **C. R. Kothari**, (2014) Research Methodology – Methods and Techniques, New Age International (P) Limited, Publishers, New Delhi

REFERENCES

2. **Anil Kumar Gupta** (2011) Research Methodology: Methods and Techniques, Vayu Education of India, New Delhi
3. **O.R. Krishnaswami and M. Ranganatham** (2014) Methodology of Research in Social Sciences, Himalaya Publishing House Pvt. Ltd., Mumbai.
4. **S.P. Gupta** (2014), Practical Statistics, S. Chand and Co., New Delhi.
5. **Dr.A. Vinayagamoorthy** (2013), Business Research Methods, Vaishali Publications
6. **Saravanavel** (2008) Research Methodology, Kitab Mahal
7. **Rao** (2013) Research Methodology in Commerce and Management, Streling Publishers

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of indirect taxes emphasizing VAT and customs law.
2. To learn and compute the VAT liabilities.
3. To know how to register VAT and apply the VAT provisions.
4. To communicate orally and in written form the indirect taxations concepts and provisions.
5. To be familiar with the standards and laws pertaining to the VAT and customs and utilize for lifelong practical application.
6. To understand the statutory compliance under indirect taxes.

COURSE OUTCOMES:**Learners should be able to**

1. Comprehend on the Concept of indirect taxes emphasizing VAT and customs law.
2. Comprehend and compute VAT liabilities.
3. Know the procedure to register VAT and apply VAT provisions to business situations.
4. Communicate orally and in written form the indirect taxations concepts and provisions.
5. Familiar with the standards and laws pertaining VAT and customs and utilize for lifelong practical application.
6. The course covers Indirect Tax, Central Excise, Customs Laws, Service Tax and Central Sales Tax and VAT

Unit-I

Indirect Taxes- Features of Indirect Tax- Indirect Tax Laws-Administration and Relevant Procedures - Advantages and Disadvantages of Indirect Taxes

Unit-II

Central Excise - The Central Excise Law – Goods- Excisable goods, Manufacture and Manufacturer- Classification- Valuation-Related Person-Captive Consumption- Powers of Officers-Tariff Commission and other Tariff Authorities.

Unit-III

Customs Laws -Basic Concepts of Customs Law - Types of Custom Duties.- Anti- Dumping Duty, Safeguard Duty- Valuation -Customs Procedures- Import and Export Procedures-Baggage- Exemptions – Warehousing- Demurrage - Project Imports and Re- Imports- Penalties and Offences- Export Promotion Schemes- Duty Drawback.

Unit-IV

Service Tax - Introduction, Nature of Service Tax-Service Provider and Service Receiver- Registration procedure- Records to be Maintained - Classification of Taxable Services - Valuation of Taxable Services- Exemptions and Abatements - Payment of Service Tax- Return - Export and Import of Services- Other aspects of Service Tax- Taxable Services.

Unit-V

Central Sales Tax Act & VAT Act- Introduction, Definition of Sale under CST – VAT- Salient Features of State VAT Acts- Treatment of Stock & Branch Transfer under State VAT Acts - Filing & Return under State VAT Act.

TEXT BOOK

1. **V.S.Datey(2015)-** , Indirect Taxes, Taxmann Publications (P) Ltd., New Delhi.

REFERENCES

1. **V.Balachandran** (2006) Indirect Taxation, Sultan Chand & Sons, New Delhi
2. **J.K.Mittal** (2015) Law Practice and Procedures of Service Tax, Jain Book Agency, New Delhi

3. **P.RadhaKrishnan** (2009) Indirect Taxation, Kalyani Publishers, New Delhi .
4. **Sethurajan** (2005) Indirect Taxation including Wealth Tax, Speed Publications

COURSE OBJECTIVES:**To make the students**

1. To understand of investment concepts and investment avenues available.
2. To calculate the intrinsic value of securities and understand risk-return relationship.
3. To know about the fundamental analysis and technical analysis and its application.
4. To comprehend the investment theory and its relevance in the current context.
5. To recognize different performance measures and evaluate the performance of the portfolio.
6. To enlighten the students on the various methods of Portfolio management adopted in practice.

COURSE OUTCOMES:**Learners should be able to**

1. Choose the appropriate investment avenues based on the individual risk return profile.
2. Calculate the intrinsic value and evaluate the performance based on risk-return.
3. Select the security based on the fundamental and technical analytical tools.
4. Evaluate the performance of the portfolio using the different measures.
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to investment decisions.
6. consists of Concepts of Investment, Types of Risk, Stock Market, Fundamental and Technical Analysis and Portfolio Analysis

Unit- I

Introduction of Investment: Concepts of Investment – Common Forms of Investment - Types of Securities – Government Securities – Government Securities Market — India Money Market and Capital Market Institutions- Risk and Return – Systematic and Unsystematic Risk.

Unit - II

Stock Markets: Concepts – Bull- Bear-PE Ratio-Different Stock Market Ratio - SEBI - Structure – Functioning – NSE and BSE – Functions – Listing of Securities –

New Issue Market- Mechanics of Trading in Stock Exchange – Evaluation of Securities, Equity , Preference, Debt, Hybrid Securities, - OTCEI .

Unit - III

Fundamental Analysis - Economic analysis and Industry analysis: Asset Pricing Theories (APT)s s- Option Pricing Theory – Economic Analysis –Economic Forecasting – Stock Investment Decision - Techniques Company Analysis – Industry Analysis

Unit - IV

Technical Analysis–Charting Methods – Market Indicators – Trend Analysis - Trend Reversal – Patterns Moving Average – Exponential Moving Average – Oscillators –RSI - Fundamental Analysis Vs. Technical Analysis.

Unit - V

Portfolio Analysis: Methods of Portfolio Construction – Selection of Portfolio Management- Practical Aspects – Performance Evaluation - Portfolio Revision – Problems.

Note: This Paper consisting of 80% Theory and 20% Problem.

TEXT BOOK

1. **Preeti Singh** (2014) Investment Management – Himalaya Publishing House, Bangalore

REFERENCES

1. **Prasanna Chandra** (2012) Investment Analysis and Portfolio management , TMH, 2nd Edition.
2. **Fisher Donald** (2000) Security Analysis & Portfolio Management, Prentice Hall of India, New Delhi
3. **V A Avadhani** (2011) Securities Analysis & Portfolio Mgmt., Himalaya Publishing House, Bangalore
4. **Kevin S** (2005) Portfolio Management, Prentice Hall of India Pvt., Ltd., New Delhi

	Semester – III			
	L	T	P	C
15CMP304B INTERNATIONAL FINANCIAL MANAGEMENT	4	-	-	3

Course Objectives

To make the students

1. To make the students understand principles of financial management
2. To enable the students to take investment decisions.
3. To help the students to make financial decisions.
4. To provide the students with the basic knowledge of Dividend decisions.
5. To impart knowledge of working capital and cash management.
6. To provide knowledge on Foreign exchange and its significance in a developing economy

Course Outcomes

Learners should be able to

1. Students will be familiarized with basic concepts of financial management.
2. Students will know the technicalities of making investment decisions.
3. Students will be capable of making financing decisions.
4. Students will be familiarized with concepts of dividend decisions.
5. Students will be capable of making working capitalization and cash management.
6. course includes Balance of Payment, International Monetary System, Foreign Exchange Market, Foreign Exchange Risk and International Financial Market Instruments

Unit - I

IFM- Nature and Scope, IFM and Domestic Financial Management- Balance of payments - Significance- Preparation of BOP Statement - Link between BOP and the Economy.

Unit - II

International Monetary System - Gold Standard - IMF and World Bank Exchange Rate Mechanism - Factors influencing Exchange Rate - Purchasing Power Parity and Interest Rate Parity Theorems.

Unit - III

Foreign Exchange Market Transactions Spot, Forward, Futures, Options and Swaps - Arbitrage and Speculation in Foreign Exchange Market.- Exchange Arithmetic, Spread, Premium and Discount. – Currency Derivatives and Swaps

Unit - IV

Foreign Exchange Exposure - Managing Transaction, Translation and Operating Exposure - Techniques for covering the Foreign Exchange Risk - Internal and External Techniques of Risk.

Unit -V

International Financial Market Instruments - International Equities - ADR and GDR - Foreign Bond and Euro-bond - Short-term and Medium-term instruments.

TEXT BOOK

1. **V.Sharan** (2012) International Financial Management, 4th Edition, Prentice Hall of India

REFERENCES

1. **Bhalla V,K.** (2007) International Financial Management, Anmal Publications Pvt. Ltd., New Delhi
2. **Apte** (2011) International Financial Management, Tata Mc Graw Hill Public Co., Ltd., New Delhi

15CMP304C	INTERNATIONAL BUSINESS	Semester – III			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of International business, environment context, International Economic Institutions, Agreements and multinational Corporation.
2. To communicate orally and in written form the understanding of International business, environment context, International Economic Institutions, Agreements and multinational Corporation.
3. To apply the understanding of International business, environment context, International Economic Institutions, Agreements and multinational Corporation. in lifelong practice.
4. To Understand the Concept of International Financial Environment And *International Accounting Practices*:
5. To communicate orally and in written form the understanding of Multinational Corporations And Their Involvement In International Business:
6. To apply the understanding of International business Emerging Developments and Other Issues: Growing concern for ecology; Counter trade; IT and international business

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of International business, environment context, International Economic Institutions, Agreements and multinational Corporation.
2. Communicate orally and in written form the understanding of International business, environment context, International Economic Institutions, Agreements and multinational Corporation.
3. Apply the understanding of International business, environment context, International Economic Institutions, Agreements and multinational Corporation. in lifelong practice.
4. Understand the Concept of International Financial Environment And *International Accounting Practices*:
5. Communicate orally and in written form the understanding of Multinational Corporations And Their Involvement In International Business:
6. Apply the understanding of International business Emerging Developments and Other Issues: Growing concern for ecology; Counter trade; IT and international business

UNIT I INTRODUCTION TO INTERNATIONAL BUSINESS:

Importance nature and scope of International business; modes of entry into International Business internationalization process and managerial implications.

Meaning of Culture, Country Culture, and Culture in an International Business Organization

UNIT II ENVIRONMENTAL CONTEXT OF INTERNATIONAL BUSINESS:

Framework for analyzing international business environment – Domestic, foreign and global environments and their impact on international business decisions.

Global Trading Environment: World trade in goods and services – Major trends and developments; World trade and protectionism – Tariff and non-tariff barriers; Counter trade.

UNIT III INTERNATIONAL FINANCIAL ENVIRONMENT AND *INTERNATIONAL ACCOUNTING PRACTICES*:

Foreign investments-Pattern, Structure and effects; Movements in foreign exchange and interest rates and then impact on trade and investment flows.

Introduction, International Accounting Standards, Accounting for International Business, International Regulatory Bodies, International Financial Reporting Standards

UNIT IV INTERNATIONAL ECONOMIC INSTITUTIONS AND AGREEMENTS:

WTO, IMF, World Bank UNCTAD, Agreement on Textiles and Clothing (ATC), GSP, GSTP and other International agreements; International commodity trading and agreements.

Regional Economic Groupings in Practice: Regionalism vs. multilateralism, Structure and functioning of EC and NAFTA; Regional economic cooperation.

UNIT V MULTINATIONAL CORPORATIONS AND THEIR INVOLVEMENT IN INTERNATIONAL BUSINESS:

Issues in foreign investments, technology transfer, pricing and regulations; International collaborative arrangements and strategic alliances.

Emerging Developments and Other Issues: Growing concern for ecology; Counter trade; IT and international business.

SUGGESTED READINGS:

1. K. Aswathappa (2011), International Business, 6th edition, McGraw Hill, New Delhi.
2. Francis Cherunilam, (2013), International Trade and Export Management. Himalaya Publications, Mumbai.
3. Charles W. L. Hill, G. Tomas M. Hult, Rohit Mehtani (2012), International Business: Competing in the Global Marketplace, McGraw Hill, New Delhi.
4. Gupta C.B.(2014), International Business, S.Chand, New Delhi.
5. Varma Sumati (2013), Fundamentals of International Business, 4th edition, Pearson Education, New Delhi.

15CMP305	HUMAN RESOURCE MANAGEMENT	Semester – III			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To acquire knowledge in human resource management, HR audit, and HR analytics.
2. To gain knowledge of HR planning, Selection, Recruitment, job analysis and its interrelations.
3. To understand the concepts and practical implications of performance management, Training methods and career planning.
4. To know about compensation and reward management and its practice in industry.
5. To be familiar with Employee relations and its application for the development of Human resources.
6. To understand the Job analysis and Design

COURSE OUTCOMES:

Learners should be able to

1. Assess the job analysis for a profile and understand its linkage with HR planning
2. Evaluate the training needs and draft a training programme.
3. Understand the compensation and reward system applicable to the industry based and understand its linkage with performance management
4. Understand and apply the appropriate employee relations measures.
5. Understand the HR functions and latest developments in the field of HR and effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to different audiences.
6. consists of Job Analysis, Job Evaluation, Orientation, Performance Appraisal, Rewards, Punishment, Industrial Relations, Collective Bargaining and Grievances Handling

Unit -I

Evolution of HRM: Role of Human Resource in Management - Human Resource Philosophy- Organization of HR Departments- Line and Staff functions- HR Planning –

factors affecting HR Planning. Changing Environments of HRM- Strategic Human Resource Management- Using HRM to attain Competitive Advantage- Trends in HRM- Qualities and Role of HR Managers.

Unit - II

Job analysis and Design: Job evaluation- Computerized Job Evaluation. Recruitment and Selection Process: Employment Planning and Forecasting- Building Employee Commitment: Promotion from within- Sources. Developing and Using Application Forms. IT and Recruiting on the Internet - Employee Testing and Selection process.

Unit - III

Orientation and Training: Orienting the employees, The Training Process, Need Analyses, Training Techniques, Special Purpose Training, Training via the Internet. Performance Appraisal- Traditional and Modern Techniques of Performance Appraisal- 360° Feedback

Unit - IV

Establishing pay plans: Basics of Compensation- Factors determining Pay Rate- Current Trends in Compensation - Pricing Managerial and Professional Jobs- Pay for Performance and Financial Incentives - Benefits and Services-Promotion – Rewards and Punishment.

Unit - V

Auditing and HR functions: Future of HRM function – International HRM. Industrial Relation and Collective Bargaining - Discipline Administration- Grievances

Handling - Managing Dismissals and Separation-Trade Union activities and Workers Participation in Management

TEXT BOOK

1. **V.S.P.Rao** (2010) Human Resource Management Text and Cases. New Delhi: Excel Books.

REFERENCES

1. **Milkovich, Boudreau.** (1997) Human Resource Management, New Delhi: Irwin Book Team.
2. **Beardwell, Holden** (2003) Human Resource Management, . New Delhi: Macmillan India.

	Semester – III			
	L	T	P	C
15CMP306 LOGISTIC AND SUPPLY CHAIN MANAGEMENT	-	-	-	3

COURSE OBJECTIVES:

To make the students

1. To understand the concept and functions of logistics management.
2. To learn the basics of supply chain management and supply chain relationship
3. To communicate the knowledge on logistics information system
4. To critically evaluate the design of operational mechanism of warehouse and logistics administration
5. To Introduce the concept and impact of Logistics and Supply Chain Management, with a competitive strategy overview.
6. Expose the various dimensions of Financial Supply Chain Management with the perspective of e-finance and its legal aspects

COURSEOUTCOMES:

Learners should be able to

1. Understand the concept and functions of logistics management.
2. Learn the basics of supply chain management and supply chain relationship
3. Communicate the knowledge on logistics information system
4. Critically evaluate the design of operational mechanism of warehouse and logistics administration
5. Introduce the concept and impact of Logistics and Supply Chain Management, with a competitive strategy overview.
6. Expose the various dimensions of Financial Supply Chain Management with the perspective of e-finance and its legal aspects

Unit – I

Introduction to Logistics- Fundamentals of Logistics-Definition and Activities- Aims and Importance-Progress in Logistics and Current trends-Organization and achieving integration

Unit-II

Planning the Supply Chain - Logistics Strategy-Implementing the Strategy-
Locating Facilities-Planning Resources-Controlling Material Flow

Unit-III

Measuring and Improving Performance of Supply Chain - Procurement-Inventory
Management -Warehousing and Material Handling Transport-Global Logistics

Unit-IV

Supply Chain Management - Basic Concepts of Supply Chain Management-
Planning and Sourcing-Making and Delivering Returns-IT and Supply Chain
Management

Unit - V

Financial Supply Chain-Elements of Financial Supply Chain Management-The
Evolution of e-Financial Supply Chain-E-Financial Supply Chain' (Banks Perspective)-
Legal Aspects of e-Financial Supply Chain

TEXT BOOK

1. **Agarwal** (2003), Logistics and Supply Chain Management, Mac Millan India
Pvt., Ltd., New Delhi

REFERENCES

1. **Donald Waters** (2009), Supply Chain Management : An: Introduction to
Logistics, Palgrave Macmillan
2. **Christopher Martin** (2005), Logistics and Supply Chain Management: Creating
Value Adding Networks, 2nd Edition, FT Prentice Hall

COURSE OBJECTIVES:**To make the students**

1. To understand the Importance of SPSS and the features for entering the data according to the variable type.
2. To understand and apply the descriptive analytical tools
3. To know the univariate tools and its application
4. To comprehend the application of Bivariate analysis
5. To understand and compute the multivariate analysis using the package
6. To understand the correlation analysis

COURSEOUTCOMES:**Learners should be able to**

1. Create datasheet and enter the data
2. Compute descriptive statistics using the package and graphically represent the data.
3. Perform univariate and bivariate analysis in the software package.
4. Perform multivariate analysis in the software package.
5. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.

Workout the following statistics:

1. Descriptive Statistics
2. Chi-square
3. Independent Sample 't' Test
4. Paired 't' Test
5. Analysis of Variance (ANOVA)
6. Karl Pearson Correlation
7. Spearman Rank Correlation
8. Regression
9. Factor Analysis
10. Kolmogorov and Smirnov test
11. Mann Whitney U Test

12. Wilcoxon Test
13. Friedman Rank Test
14. Kruskal Wallis H-Test
15. Garrett Ranking

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept financial services its impact on economy
2. To categorise financial services as fund based and fees based services
3. To understand the application of the fee and fund based services in economic development.
4. To communicate orally and in written form the understanding of financial services concepts and application.
5. To expose the students to the contemporary theory and practice of Indian Financial Services Sector
6. To familiarize the students with various types of Financial Services and their role in Social Change.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept financial services its impact on economy
2. Categorise financial services as fund based and fees based services
3. Understand the application of the fee and fund based services in economic development.
4. Communicate orally and in written form the understanding of financial services concepts and application.
5. comprise of Financial Instruments, Merchant Banking, Hire Purchase, Leasing, Venture Capital, Factoring, Mutual Funds and Credit Rating
6. Know the various types of Financial Services and their role in Social Change.

Unit – I

Financial Services – Meaning – Classification – Scope – Fund Based Activities – Non Fund Based Activities – Modern Activities – Sources of Revenue – Causes for Financial Innovation – New Financial Products and Services – Innovative Financial Instruments – Challenges facing the Financial Service Sector. Merchant Banking – Definition – Origin – Merchant Banking in India- Merchant Banks and Commercial Banks – Services of Merchant Banks- Qualities required of Merchant Bankers – Problems – Scope of Merchant Banking in India

Unit – II

Hire Purchase – Meaning – Features – Legal Position – Hire Purchase and Credit Sale – Hire Purchase and Instalment Sale – Hire Purchase and Leasing – Origin and Development – Banks and Hire Purchase Business – Bank Credit for Hire Purchase. Leasing – Definition – Steps in Leasing Transactions – Types of Lease – Advantages and Disadvantage of Lease – Problems of Leasing

Unit – III

Venture Capital – Concept – Meaning – Features – Scope of Venture Capital – Importance – Method of Venture Financing – Suggestion for the Growth of Venture Capital – Factoring – Meaning – Functions – Types – Factoring Vs Discounting – Benefits of Factoring

Unit – IV

Mutual Funds – Types – Importance – Selection of a Fund – Securitization – Stages of Securitization – Benefits – Derivatives – Kinds – Forward, Future, Options and Swaps.

Unit – V

Credit Rating – Definition and Meaning – Functions of Credit Rating – Origin – Credit Rating in India – Benefits of Credit Rating – Credit Rating Agencies in India: CRISIL, ICRA, CARE- Limitations of Rating – Future of Credit Rating in India

TEXT BOOK

1. **E Gordon and K. Natarajan** (2014) Financial Markets and Services, Himalaya Publishing House, Mumbai

REFERENCES

1. **Khan M.Y.** (2013), Financial Services, Tata McGraw Hill Company Ltd, New Delhi.
2. **Dharmaraj** (2010) Financial Services, S. Chand & Sons Ltd., New Delhi
3. **Tripathy Nalini Prava** (2007) Financial Services, Prentice Hall of India, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. To comprehend on the reforms in Indian insurance industry.
3. To understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. To communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. To enable the students to understand the procedures in Company Law.
6. To enable them to acquire skills needed for socially relevant and good corporate governance

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. Comprehend on the reforms in Indian insurance industry.
3. Understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. Communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. Enable the students to understand the procedures in Company Law.
6. Enable them to acquire skills needed for socially relevant and good corporate governance

Unit – I

Company Administration – Hierarchy – Share Holders – Membership – Termination – Rights and Duties – Board of Directors – Qualification – Appointment – Powers – Duties – Other Managerial Personnel

Unit – II

Company Secretary – Meaning – Types – Qualities – Appointment – Dismissal – Power – Rights – Duties and Liabilities – Role of a Secretary in the Administration of a Company

Unit – III

Meeting – Law Governing Meetings – Requisites of a Valid Meeting – Chairman of a Meeting – Appointment – Duties – Powers – Notice – Agenda – Minutes – Quorum – Motion – Resolution – Methods of Voting

Unit – IV

Kinds of Company Meetings – Board of Directors Meeting – Share holder Meeting – Statutory Meeting – Annual General Meeting – Extraordinary General Meeting – Duties of a Company Secretary relating to the Meetings

Unit – V

Drafting of Correspondence relating to the Meetings – Drafting of Notices – Agenda and Minutes of the Meetings of Shareholders and Directors – Drafting of Chairman’s Speech – Annual Report and Auditors Report

TEXT BOOK

1. **Kuchhal, M.C.**, (2008) Secretarial Practice, Vikas Publishing House Pvt. Ltd., New Delhi

REFERENCES

1. **N.D. Kapoor** (2015) Elements of Company Law, Sultan Chand and Sons, New Delhi
2. **Ashok K. Bagrial** (2007) Company Law, Vikas Publishing House Pvt. Ltd., New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
2. To communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. To apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. To initiate the required skills for entrepreneurial development.
5. To help students understand the process of establishing and developing an enterprise
6. To make the students Small Business as seed bed of Entrepreneurship

COURSE OUTCOMES:**Learners should be able to**

1. Assess the best suitable research type and formulate the research objective for the business problem.
2. Formulate the suitable research designs and select appropriate sampling techniques for the research.
3. Select the appropriate data collection method for solving the business issue and decide the appropriate measurement scale for designing the instrument for data collection.
4. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.
5. Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills and design a suitable research report based on the ethical norms of research.
6. The course comprise of Types of Research, Research Design, Sampling, Data Collection, Scaling Techniques, Hypothesis Testing and Statistics

Unit – I

Small Business Enterprise - Small Business framework - Concept and Definition- Nature and Characteristics - Relationship between Small and Large Business - Scope and Types of Small Business - Rationale and Objectives - Small Business as seed bed of Entrepreneurship

Unit –II

Entrepreneurship - Entrepreneur and Entrepreneurship Concept - Distinction between Entrepreneur and Manager - Entrepreneurial Competency - Functions - Types (including women and rural).

Unit – III

Establishing a Small Enterprise - Learning the important steps for starting a Business - Project Identification and Selecting the Product - Generation and Screening the Project Ideas - Market Analysis - Technical Analysis, Financial Analysis (up to cost of production) Project Formulation - Assessment of Project Feasibility - Preparation of Project Report - Dealing with basic startup problems.

Unit –IV

Growth Strategy - Growth strategy for Small Business - Need for Growth - Types of Growth Strategy - Expansion - Diversification-Sub contracting.

Unit-V

Institutional Support - Sources of Finance - Financial Support to Small Business- Various Incentives and Subsidies - Central and State Government Schemes

TEXT BOOKS

1. **Khanka S. S**, (2012), Entrepreneurial Development, Sultan Chand Publications
2. **Shapiro Alan C**, (2009), Multinational Financial Management, Prentice Hall of India, 4th Ed.,

REFERENCES

1. **Gupta C.B, & Srinivasan N.P**,(2014), Entrepreneurial Development, Sultan Chand & Sons
2. **Suresh Jayasree**, (2010), Entrepreneurial Development, Margham Publications

COURSE OBJECTIVES:**To make the students**

1. To understand the international marketing environment.
2. To enlighten learners about overseas market research, sources of marketing information and the guidelines to identify foreign markets.
3. To guide global product planning, standardization and adaptation
4. To Understand the Concept of marketing, and 4Ps of Marketing
5. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
6. To apply the marketing concepts and skills lifelong.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the international marketing environment.
2. Enlight learners about overseas market research, sources of marketing information and the guidelines to identify foreign markets.
3. Guide global product planning, standardization and adaptation
4. Understand the Concept of marketing, and 4Ps of Marketing
5. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
6. Apply the marketing concepts and skills lifelong.

Unit – I

Introduction to International and Global Marketing- The Marketing Concept- The Three Principles of Marketing-Global Marketing-Importance of Global Marketing-Management Orientations-Driving and Restraining forces affecting Global Integration and Global Marketing

Unit - II

Global Marketing Environment- Economic, Socio-cultural, and Political Environments-Global Market Segmentation – Global Product Positioning – Product Adoption – International Product Life Cycle – International Marketing Strategies – Product Policy, Pricing Policy and Place Policy

Unit - III

Entry and Expansion strategies: Marketing and Sourcing-Decision criteria for International Business-Entry and Expansion Model-Exporting-Additional International Alternatives-Marketing Strategy Alternatives-Cooperative Strategies and Global Strategic Partnerships (GSP)-Nature of GSP- International Partnerships in Developing Countries-Competitive Analysis and Strategy- Industry Analysis: Forces influencing Competition-Strategic Positions-Competitive Innovation and Strategic Intent.

Unit – IV

Product and Channel Decisions - Product Decisions- Product Saturation levels in Global Markets- Product Design Considerations- Attitudes toward Country of Origin-Geographic Expansion: Strategic Alternatives- New products in Global marketing-Global marketing channels and Physical Distribution-Channel objectives and Constraints-Distribution Channels: Terminology and structure-International channel Innovation-Channel strategy for New Market Entry-Physical Distribution and Logistics

Unit-V

Pricing and Promotion Decisions- Pricing Decisions-Basic Pricing Concepts-Environmental influences on Pricing Decisions-Global Pricing Objectives and Strategies-Gray market goods-Dumping-Transfer Pricing-Global Pricing: Three pricing alternatives-Global Advertising and Branding-Selecting an Advertising Agency-Advertising Appeals-Public relations and Publicity-Personal Selling-Sales Promotion-Direct Marketing-Trade shows and exhibitions-Sponsorship promotion.

TEXT BOOK

1. **Keegan J.Warren and Bhargava K. Naval** (2011), Global Marketing Management, Dorling Kindersley (India) Pvt. Ltd (Licensee of Pearson Education in South Asia), 7th Edition

REFERENCES

1. **Philip R. Cateora, John L. Graham and Prashant Salwan** (2010), International Marketing, Tata McGraw Hill Publishing Company Ltd, Special Indian 13th Edition,
2. **Rajagopal** (2010), International Marketing, Vikas Publishing House Pvt Ltd,
3. **Srinivasan** (2008) International Marketing, Prentice Hall of India, New Delhi
4. **Rajendra Nargundkar** (2008) International Marketing, Excel Books, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. To analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To Work in team and exhibit leadership skills

COURSE OUTCOMES:**Learners should be able to**

1. Identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills

The students should select a problem in Accounting, Finance, Marketing or any other areas related to commerce.

Report should contain

- Introduction
 - Introduction about the industry
 - Introduction about the Company
 - Review of literature – Minimum 10 papers from referred journal
 - Need for the Study
 - Objectives

- Research Methodology
 - Research Design
 - Sampling Design
 - Sources of Data Collection
 - Tools used for analysis
 - Limitation
- Data analysis and interpretation
- Findings and Suggestions
- Conclusion
- Bibliography (APA format)

KARPAGAM ACADEMY OF HIGHER EDUCATION
BACHELOR OF COMMERCE (COMPUTER APPLICATION)
B.Com (CA)

(For the Students admitted during the year 2015-2018 Batch Onwards)

Scheme of Examination

SEMESTER I

Course Code	NameOf the Course	Objectives and Outcomes		Instruction/ Hours/Week			Credits	Maximum Marks		
		PEOs	POS	L	T	P		CIA	ESE	TOTAL
Semester I								40	60	100
15LAU101	Language –I	c,d,h	I,III	5	-	-	05	40	60	100
15ENU101	English - I	a,f,i	IV	4	-	-	04	40	60	100
15CCU101	Core : Principles of Accountancy	a,f,i	IV	5	1	-	06	40	60	100
15CCU111	Core : Practical I- Ms Office	c,d,h	I,III	-	-	5	03	40	60	100
15CCU102	Allied : Business Mathematics	a,f,i	IV	5	1	-	04	40	60	100
15FCA101	Foundation course- A (Value Education)	c,d,h	I,III	2	-	-	01	100	-	100
15SSD101	Soft Skill Development -I	b,e,g	II	2	-	-	-	-	-	-
	TOTAL			23	2	5	23	300	300	600

SEMESTER II

SUB CODE	TITLE OF THE COURSE			L	T	P	C	CIA	ESE	TOTAL
15LAU201	Language –II	c,d,h	I,III	5	-	-	05	40	60	100
15ENU201	English - II	a,f,i	IV	4	-	-	04	40	60	100
15CCU201	Core: Financial Accounting	a,f,i	IV	5	1	-	06	40	60	100
15CCU211	Core: Practical II – Accounting Package-Tally	a,f,i	IV	-	-	5	03	40	60	100
15CCU202	Allied: Business Statistics	c,d,h	I,III	4	2	-	04	40	60	100

15FCB201	Foundation Course-B(Environmental Studies)	b,e,g	II	2	-	-	01	100	-	100
15SSD201	Soft Skill Development -I	c,d,h	I,III	2	-	-	01	100	-	100
	TOTAL			22	3	5	24	400	300	700

SEMESTER III

SUB CODE	TITLE OF THE COURSE			L	T	P	C	CIA	ESE	TOTAL
15ENU301	English - III	a, f, i	I V	4	-	-	04	40	60	100
15CCU301	Core : Corporate Accounting	a, f, i	I V	5	1	-	06	40	60	100
15CCU302	Core : Object Oriented Programming With C++	c, d, h	I, I II	5	-	-	05	40	60	100
15CCU303	Core : Principles of Marketing	b, e, g	II	4	-	-	04	40	60	100
15CCU304A	Business Economics	c, d, h	I, I II	5	-	-	05	40	60	100
15CCU304B	Business Environment	b, e, g	II							
15CCU304C	Company Law	a, f, i	I V							
15CCU311	Core : Practical III -OOPs With C++	a, f, i	I V	-	-	4	02	100	-	100
15SSD301	Soft Skill Development -II	c, d, h	I, I II	2	-	-	-	-	-	-
	TOTAL			25	1	4	26	300	300	600

SEMESTER IV

SUB CODE	TITLE OF THE COURSE			L	T	P	C	CIA	ESE	TOTAL
15ENU401	English IV	a, f, i	IV	4	-	-	04	40	60	100
15CCU401	Core: Cost Accounting	a, f, i	IV	4	1	-	05	40	60	100

15CCU402	Core : Database Management System	a,f,i	IV	5	-	-	05	40	60	100
15CCU403	Core : Financial Management	b,e,g	II	4	1	-	05	40	60	100
15CCU411	Core: Practical IV - Oracle- SQL	a,f,i	IV	-	-	4	02	40	60	100
15CCU404A	Indian Economy	a,f,i	IV	5	-	-	05	40	60	100
15CCU404B	Advertising and sales promotion	b,e,g	II							
15CCU404C	Business Ethics	c,d,h	I,III							
15SSD401	Soft Skill Development – II	c,d,h	I,III	2	-	-	01	100	-	100
	TOTAL			24	2	4	27	340	360	700

SEMESTER V

[illegible]

		i								
15OEU501	Open Elective	C, d,h	I,II I	-	-	-	0 3	-	100	100
	TOTAL			20	1	9	3 1	240	460	700

SEMESTER VI

SUB CODE	TITLE OF THE COURSE			L	T	P	C	CIA	ESE	TOTAL
15CCU601	Core : Internet and Web Design	a,f,i	IV	5	-	-	05	40	60	100
15CCU602A	Indirect Tax	c,d, h	I,III	5	-	-	05	40	60	100
15CCU602B	E- Commerce and Information Technology	b,e, g	II							
15CCU602C	Cyber Law	a,f,i	IV							
15CCU611	Core : Practical VI-Internet And Web Design	c,d, h	I,III	-	-	5	03	40	60	100
15CCU691	Project and Viva – Voce	b,e, g	II	-	-	15	06	80	120	200
15EAU601	NCC/NSS/Sports/Club activity etc	c,d, h	I,III	-	-	-	-	-	-	-
	TOTAL			10	-	20	19	200	300	500
	G. TOTAL			124	9	47	150	1780	2020	3800

PROGRAM OUTCOMES [PO]

- Graduates will have solid foundation in bookkeeping, accounting, computers and professional fundamentals required to record the business transactionability.
- Graduates will apply technological skills in accounting, taxation by creating and applying the appropriate software and software tools for business management.
- Graduates will obtain the ability to analyze and develop programs for system based applications which will help in solving complex business problems to make effective decisions.
- Graduates will exhibit critical thinking skills in understanding the real-time business issues and advocate solutions.
- Graduates will acquire and demonstrate the interpersonal and communication skills to convey and negotiate ideas for achieving the common goals.
- Graduates will attain and exhibit skills to work as team to take effective decisions

in achieving the common goals.

- g. Graduates will demonstrate the leadership skills to initiate, lead and deliver the best performance together with the team members.

PROGRAM SPECIFIC OUTCOMES (PSO)

- h. Graduates will apply a lifelong learning gained through knowledge and skills in continuous adaption of new technologies and the changes in environment factors pertaining to accounting, IT, and finance.
- i. Graduates will demonstrate legal, ethical compliance (including IT norms) and socially sustainable code of conduct in both personal and professional decision making process.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- I. Graduates will acquire knowledge in accounting, taxation, finance, management concepts and computer applications and apply it in business to become qualified professionals.
- II. Graduates will possess the professional skills, computer skills and competence in field related to accounting and commerce which will enable them to perform effectively in higher studies, KPO/BPO field of IT sector and entrepreneurial ventures.
- III. Graduates will continuously improve accounting and computer skills required to develop a lifelong learning through IT enabled research and practice.
- IV. Graduates will demonstrate high standard of ethical conduct in application of computer in accounting and finance and become socially responsible citizens contributing to the sustainable growth of profession and the community.

Program Educational Objectives	Program Outcomes								
	a	b	c	D	e	f	g	h	i
Graduates will acquire knowledge in accounting, taxation, finance, management concepts and computer applications and apply it in business to become qualified professionals.			√	√				√	
Graduates will possess the professional skills, computer skills and competence in field related to accounting and commerce which will enable them to perform effectively in higher studies, KPO/BPO field of IT sector and entrepreneurial ventures.	√					√			√
Graduates will continuously improve accounting and computer skills required to develop alifelong learning through IT enabled research and practice.			√	√				√	
Graduates will demonstrate high standard of ethical conduct in application of computer in accounting and finance and become socially responsible citizens contributing to the sustainable growth of profession and the community.		√			√		√		

(For I-UG Arts Degree Classes)

15LAU101

பாடத்திட்டப் பொதுநோக்கம்

1. கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
2. ஆய்வுநோக்கை மேம்படுத்துதல்.
3. இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
4. மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
5. வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
6. அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

15LAU101 : தமிழ் முதல் தாள்

L	T	P	C
5	-		5

அலகு I தற்கால இலக்கியம்

- 1.மனோன்மனியம் - சுந்தரம்பிள்ளை
- 2.பாரதியார் - பாரதியார் கவிதைகள்
- 3.பாரதிதாசன் - குன்றம் (அழகின் சிரிப்பு)
- 4.நாமக்கல் கவிஞர் - தமிழன் இதயம்
- 5.அப்துல் ரகுமான் - கூடுதுறக்கும் பறவைகள்
- 6.சிற்பி - ஒடு ஒடு சங்கிலி (ஒரு கிராமத்து நதி)
- 7.வைரமுத்து - மரங்களைப்பாடுவேன்
- 8.தாமரை - அவசரம் ஒரு அசுர ஊசி
(ஒருகதவும் கொஞ்சம் கள்ளிப்பாலும்)
- 9.புதியமாதவி - மகளே வந்துவிடு (ஹேராம்)

அலகு II பக்தி இலக்கியம்

1. சைவம் - பன்னிரு திருமுறைகளில் 12 பாடல்கள்
2. வைணவம் - ஆழ்வார் பாடல்கள் 12)

அலகு III உரைநடை

1. பழந்தமிழ்நாடு - டாக்டர். கு. கதிரேசன்
2. நொய்யல் நாகரிகம் - புலவர் செ. இராக
3. அறிவியல் தமிழாக்கம் இற்றைநிலை - வா.செ. குழந்தைசாமி
4. கணிப்பொறி - சுஜாதா
5. சுற்றுச்சூழல் மேலாண்மை - தமிழ்நாடு அரசு

அலகு IV பயிற்சி

இலக்கணம், கடிதங்கள் - அலுவலகநிலை, மொழிபெயர்ப்பு
நிகழ்ச்சித் தொகுப்புகள்
(பயிற்சி ஏடு - கல்லூரி வெளியீடு)

அலகு V இலக்கிய வரலாறு

- 1.தற்காலத் தமிழ்க் கவிதைகளின் வரலாறும், வளர்ச்சியும்
- 2.புதுக்கவிதைப் பிதாமகன்கள் குறித்த அறிமுகம்
- 3.பாரதியார், பாரதிதாசனின் தமிழ்த்தொண்டு
- 4.உரைநடையின் தோற்றமும் வளர்ச்சியும்

(For all under graduates students admitted from 2015 onwards)

Course Objectives:

1. To enable the learners to acquire English language skills at a faster pace.
2. To introduce different kinds of literary works
3. To familiarize different genres of Literature
4. To instruct moral values through literature.
5. To improvise their productive and receptive skills
6. To strengthen the basic knowledge about grammar.

Course Outcomes:

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

COURSE OBJECTIVES:

To make the students

1. To learn the basic concepts and conventions of accounting and basic accounting framework.
2. To learn to debit and credit side of accounting Principles.
3. To learn to Bank Reconciliation Statement.
4. To give insight into the business income and preparation of final accounts.
5. To learn accounting for hire purchase and installment system.
6. To learn the consignment feature and joint venture and Non -Profit Organization.

COURSE OUTCOMES:

Learners should be able to

1. Understand the bookkeeping and purpose and functions of accounting.
2. Know the accounting principles.
3. Know the Bank Reconciliation statement.
4. Understand the depreciation and preparation of final accounts.
5. Describe the accounting for hire-purchase and installment system.
6. Identify the consigner and consignee & joint venture.

UNIT I

Fundamentals of Book Keeping – Accounting Concepts and Conventions – Journal – Ledger – Subsidiary Books – Trial Balance - Rectification of Errors - Bank Reconciliation Statement.

UNIT II

Final Accounts: Final Accounts of a Sole Trader with Adjustment Entries.

UNIT III

Bills of Exchange – Accommodation Bills – Account Current and Average due date - Apportionment of Capital and Revenue Expenditure.

UNIT IV

Consignment and Joint Venture - Accounting entries in the books of Consignor and Consignee - Joint Venture Accounting.

UNIT V

Non-Profit Organization - Accounts of Non-Profit Organization – Receipts and Payments- Income and Expenditure Accounts and Balance Sheet.

Note: Distribution of marks for theory and problems shall be 20 % and 80 % respectively.

Text Book :

1. S.P.Jain, K.L.Narang - Advanced Accounting (Vol – I – 2013) , 18th Edition - Kalyani Publishers, Ludhiana.

Reference Books:

1. Gupta R.L. & Gupta V.K. 2010 Advanced Accountancy (Vol. I) 1 8th Edition, Sultan Chand and sons, New Delhi
2. T.S.Grewal & S.C.Gupta - 2011. Introduction to Accountancy .Sultan Chand and Sons, New Delhi.
3. R.L. Gupta & M. Radhaswamy - Advanced Accountancy - Vol. I Sultan Chand & Sons
4. Vinayagam N, Mani P.L. and Nagarajan K.L - Principles of Accountancy, Sultan Chand and Sons, New Delhi.
5. Maheswari S.N. Maheswari S.K. 10th edition, 2012 Advanced Accountancy. Vikash Publishing House Pvt. Ltd ,New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Identify the components of a computer, components in a CPU and its functions.
2. To Provide foundational or “computer literacy” curriculum that prepares students for life-long learning of computer concepts and skills.
3. To provide the applications Word, Excel, Access and PowerPoint.
4. To familiarize the students in preparation of documents and presentations with office automation tools.
5. To Create, edit, save, and print documents to include documents with lists and tables.
6. To Use the Spelling and Grammar Checker as well as Microsoft Help

COURSE OUTCOMES:**Learners should be able to**

1. Describe the usage of computers and why computers are essential components in business and society.
2. Utilize the Internet Web resources and evaluate on-line e-business system.
3. Solve common business problems using appropriate Information Technology applications and systems.
4. Identify categories of programs, system software and applications. Organize and work with files and folders.
5. Describe various types of networks network standards and communication software.
6. Perform the presentation skills.

I - MS WORD

1. Type Chairman’s speech/ Auditor’s report / Minutes/ Agenda and perform the following operations: Bold, Underline, Font Size, style, Background color, Text Book color, Line spacing, Spell Check, Alignment, Header & Footer, Inserting pages and page numbers, Find and Replace.
2. Prepare an invitation for the college function using Text Box boxes and clip parts.
3. Design an invoice and Account sales by using Drawing tool bar, Clip Art, Word Art, Symbols, Borders and Shading.
4. Prepare a Class Time Table and perform the following operations: Inserting the table, Data Entry, Alignment of Rows and Columns, Inserting and Deleting the Rows and Columns and Change of Table Format.
5. Prepare a Shareholders meeting letter for 10 members using mail merge operation.
6. Prepare Bio-Data by using Wizard/ Templates.

II - MS EXCEL

1. Prepare a mark list of your class (minimum of 5 subjects) and perform the following operations: Data Entry, Total, Average, Result and Ranking by using arithmetic and logical functions and sorting.
2. Prepare Final Accounts (Trading, Profit & Loss Account and Business Sheet) by using formula.
3. Draw the different type of charts (Line, Pie, Bar) to illustrate year-wise performance of sales, purchase, profit of a company by using chart wizard.
4. Prepare a statement of Bank customer's account showing simple and compound interest calculations for 10 different customers using mathematical and logical functions.
5. Prepare a Product Life Cycle which should contain the following stages: Introduction, Growth, Maturity, Saturation, Decline.

III - MS POWERPOINT

1. Design presentation slides for a product of your choice. The slides must include name, brand name, type of product, characteristics, special features, price, special offer etc. Add voice if possible to explain the features of the product. The presentation should work in manual mode.
2. Design Presentation slides for Organization details for 5 levels of hierarchy of a company by using organization chart.
3. Design slides for the headlines News of a popular TV Channel. The Presentation Should contain the following transactions: Top down, Bottom up, Zoom in and Zoom out. - The presentation should work in custom mode.
4. Design presentation slides about an organization and perform frame movement by interesting clip arts to illustrate running of an image automatically.
5. Design presentation slides for the Seminar/Lecture Presentation using animation effects and perform the following operations: Creation of different slides, changing background color, font color using word art.

IV - MS ACCESS

1. Prepare a payroll for employee database of an organization with the following Details: Employee id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other deductions if any. Perform queries for different categories.

2. Create mailing labels for student database which should include at least three Table must have at least two fields with the following details: Roll Number, Name, Course, Year, College Name, University, Address, Phone Number.
3. Gather price, quantity and other descriptions for five products and enter in the Access table and Create an invoice in form design view.
4. Create forms for the simple table ASSETS.
5. Create report for the PRODUCT database.

Reference Books

1. June Jamrich Parsons, 2010, “Practical Microsoft Office 2010”, Cengage Learning; 1 edition.
2. Dr. S.V. Srinivasa Vallabhan, 2011, Computer Application in Business, Sultan Chand & Sons.

COURSE OBJECTIVES :**To make the students**

1. To understand the concept of matrices.
2. To acquire the knowledge of differential calculus.
3. To provide college students with reinforcement of mathematical computations.
4. Challenge the student to understand how to process and interpret information to arrive at logical conclusions to common business math applications.
5. To Develop proficiency in the application to solve business math problems.
6. To Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems

COURSE OUTCOMES:**Learners should be able to**

1. Understand the important role math plays in all facets of the business world.
2. Utilize the concept of matrices, differential calculus to solve business problems.
3. Evaluate the relationship and association between variables to formulate the strategy in business.
4. Analyze problems in economics, business, and accounting to determine appropriate methods for solving them using business math concepts and applications.
5. Develop proficiency in the application to solve business math problems.
6. Apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems.

UNIT I

Matrix: Basic Concepts – Addition and Multiplication of matrices – Inverse of a Matrix – Rank of a matrix – Solution of Simultaneous Linear equations by matrix method.

UNIT II

Basic concept – Simple and Compound Interest – Effective Rate of Interest, Depreciation. Annuities – Present value of an immediate annuity, present value of an annuity due, Amount of an immediate annuity, Amount of an annuity due.

UNIT III

Limits of Algebraic Functions – Simple Differentiation of Algebraic Functions – Meaning of Derivatives – Evaluation of First and Second order derivatives – Maxima and Minima – Application to Business problems.

UNIT IV

Elementary Integral Calculus – Determining Indefinite and definite Integrals of simple functions – Integration by parts-Applications to business problems.

UNIT V

Linear Programming Problem Formulation – Solution by Graphical Method - Solution by Simplex Method(problems using slack variables only)

TEXT BOOKS

1. Navanitham.Pa., 2004. Business Mathematics and Statistics, Jai Publishers, Trichy.
(Unit I - IV)
- 2.Sundaresan.V., K.S.Ganapathy Subramanian.,K. Ganesan. Operations Research (Resource Management Techniques), 2005, A.R.Publications, Nagapattinam. (Unit V)

REFERENCES

1. Vital.P.R., 2000.Business Mathematics and Statistics, Margham Publications, Chennai.
2. Sundaresan.V, & S.D. Jeyaseelan ,1999, An Introduction to Business Mathematics, S.Chand & Company Ltd, New Delhi.
3. Eugene Don.,& Joel Lerner., 2004. Basic Business Mathematics, Tata Mc Graw-Hill, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To learn the basic concepts of value education.
2. To learn the role of values.
3. To learn the fostering culture of peace through education.
4. To identify and apply the practices for value development and clarification.
5. To educate students with the professional behaviors.
6. To make aware of moral and ethical dilemmas.

COURSE OUTCOMES**Learners should be able to**

1. Understand the core values that shape the ethical behavior.
2. Recognize the awareness on professional ethics with stress management.
3. Understand the basic perception of various moral issues in ethical theories.
4. Manipulate the various social issues.
5. Solve the several of global issues by ethical principles.
6. Promote socio cultural values to create well-being and identify the human excellence.

UNIT I: Human Values

Self-Discipline, Concern for others, Empathy, Kindness, Valuing Time, Self Esteem, Dignity, Caring and Sharing, Honesty, Cooperation and Commitment, Responsible Citizenship. Significance of Practicing Human Values in Daily Life.

UNIT II: Culture and Adolescent dilemma

Culture: Meaning and Definition. Characteristics and Functions, Features of Indian culture, Impact of Westernization and Globalization on Indian Culture. Peer Pressure: Meaning, Types and Overcoming Peer Pressure, Infatuation, Mobile Phone Usage: Advantages and Disadvantages, do's and don'ts, Influence of Media, Alcoholism, Smoking: Causes, Effects and Quitting, Substance Abuse, Suicidal Tendency (Introduction, Causes, Effects and Remedies).

UNIT III: Character Building

Self-introspection, Self-confidence, Courage, Team Work, Motivation, Adjustments, Accepting differences, Conflict resolution, Assertiveness, Critical thinking, Decision making.

UNIT IV: Health Education

Personal Hygiene, Fitness and health, Importance of Yoga and Meditation, Balanced Nutritional Diet. Sex Education: Healthy Life Style Choices, Sexually Transmitted Diseases, HIV/AIDS Awareness.

UNIT V: Social Emotional Skills

Human Duties, Ethics and Responsibilities Towards Self, Family and Community. Emotional Balance and Coping Skills, Positive Living Skills and Fundamentals of Transactional Analysis.

Reference Books:

1. Attekar A.S. 1961. Education in Ancient India, Indian Bank Shop, Banaras
2. Chand J. 2007. Value Education, 1st Edition, Anshah Publishing House, New Delhi.
3. Fischer J.M and R. mark. 1998. Responsibility and Control: A Theory of Moral Responsibility, Cambridge University Press, New York.
4. Gandhi M.K. Non-violence:Weapon of the Brave, Navjuvan Trust.
5. Gawander E. N. 2008. Value Oriented Education (Vision for better living), 1st Edition, Sarup & Sons, New Delhi.
6. Hariram J. 1990. Spiritual Values and Education, Prabhat Pranashan, New Delhi.
7. Rest J.R. and N. Dareia. 1994. Moral Development in the profession: Psychology and Applied Ethics, Lawrence Erlbaum Associates, New Delhi.
8. Singh M.S. 2007. Value Education, 1st Edition, Adhayayan Publishers and Distributions, New Delhi.
9. Narayana Roa 2005. Guidance and Counselling, Discovery publishing house, New Delhi.

15SSD101

SOFT SKILL DEVELOPMENT - I

Semester I			
L	T	P	C
2	-	-	-

பொதுநோக்கம்

1. கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
2. மேம்படுத்துதல்.
3. இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
4. மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
5. வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
6. அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பொதுநோக்கம்

1. பொதுநோக்கம், 'பொதுநோக்கம்' பொதுநோக்கம், பொதுநோக்கம் பொதுநோக்கம், 'பொதுநோக்கம்' பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம்.
2. பொதுநோக்கம், பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம், இலபொதுநோக்கம் பொதுநோக்கம்.
3. பொதுநோக்கம் பொதுநோக்கம், 'பொதுநோக்கம்' ; 'பொதுநோக்கம்' பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம்.
4. பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம், பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் .
5. பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் இலபொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம்.
6. பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம் பொதுநோக்கம்

15LAU201 : தமிழ் இரண்டாம் தாள்

அலகு I செய்யுள்

1.சங்கஇலக்கியம்

அகநானூறு, புறநானூறு, நற்றிணை, குறுந்தொகை, ஐங்குறுநூறு, பதிற்றுப்பத்து, பரிபாடல்

2. நீதி இலக்கியம்

திருக்குறள் (ஈகை, தெரிந்து செயல்வகை)
நாலடியார் (நல்லினம் சேர்தல்)

3.பக்தி இலக்கியம்

திருஞானசம்பந்தர் தேவாரம், திருவாசகம், பெரியாழ்வார் திருமொழி, நாச்சியார் திருமொழி

அலகு II சிறுகதை

காலனும் கிழவியும்	- புதுமைப்பித்தன்
அக்கினிப்பிரவேசம்	- ஜெயகாந்தன்
கண்ணகி	- இராஜம் கிருஷ்ணன்
பாதுகை	- பிரபஞ்சன்
உருமாற்றம்	- சு. வேணுகோபால்

அலகு III இலக்கணம்

அகம், புறம், திணை, துறை

அலகு IV. பயிற்சி

விண்ணப்பங்கள்- கட்டுரைகள்- கடிதங்கள்

அலகு V இலக்கிய வரலாறு

- 1.எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள் அறிமுகம்
2. பன்னிரு திருமுறை, நாலாயிரதிவ்யபிரபந்தம்
3. சைவ, வைணவ இலக்கியங்கள் தமிழுக்குச் செய்த தொண்டு
4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

(For all undergraduates students admitted from 2015 onwards)

Course Objectives:

1. To enable the learners to acquire English language skills through literature.
2. To familiarize them with English literature.
3. To acquire Grammar knowledge.
4. To help learners imbibe cultural values.
5. To acquire skill of making correct sentences.
6. To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2015. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course Objectives:**To make the students**

1. To learn the basic concepts of Depreciation and methods of depreciation.
2. To better knowledge in single entry system.
3. To learn to departmental accounts and foreign branches a/c.
4. To acquire the valuation of the goodwill.
5. To study the partnership accounting and goodwill.
6. To learn the dissolution of partnership and Rule in Garner vs Murray.

Course Outcomes:**Learners should be able to**

1. Understand the depreciation and methods of depreciation.
2. Know the Single-Entry System and Statement of affairs Method.
3. Describe the departmental accounts and branch A/c.
4. Understand the valuation of goodwill and methods of valuation of shares.
5. Know the accounting for partnership and calculation of profit-sharing ratio.
6. Recognize the dissolution of partnership and Garner vs Murray methods of insolvent partners.

UNIT I

Depreciation Accounting: Accounting for Depreciation – Need and Significance of Depreciation, Methods of Providing Depreciation- Reserves and Provisions.

UNIT II

Single Entry System: Single Entry System-Meaning and Features-Statement of affairs Method and Conversion Method

UNIT III

Departmental Accounts: Departmental Accounts – Transfers at Cost or Selling Price – Branch accounts Excluding Foreign Branches

UNIT IV

Partnership Account- Valuation of Goodwill-Calculation of Profit Sharing Ratio- Admission - Retirement - Death

UNIT V

Dissolution of Partnership: Insolvency of Partners - Rule in Garner vs Murray -Piecemeal Distribution - Sale of a Company.

Note: - Distribution of Marks: Theory- 20% and Problems -80% Respectively.

Text Book:

1. Jain and Narang. 2010. “Advanced Accounting”, New Delhi, Kalyani Publishers.

Reference Books:

1. T.S.Grewal. 2009. “Advanced Accounting” . New Delhi: Sultan Chand & Sons.
2. M.C.Shukla, T.S.Grewal, S.P.Gupta.2009. “Advanced Accounting”. New Delhi: Sultan Chand & Sons.
3. S.N.Maheswari. 2010. “Advanced Accounting”, New Delhi: Vikas Publishing Co. Ltd.
4. R.L.Gupta & Radhaswamy. 2011. “Advanced Accounting”. New Delhi: Sultan Chand & Sons.
5. N.Vinayagam,B.Charumati. 2009. “Financial Accounting”. New Delhi: S.Chand & Co Ltd.
6. T.S.Reddy, A.Moorthy,2011, “Finaicial Accoutning”,Chennai Margham Publications.

COURSE OBJECTIVES:

To make the students

1. To introduce the students to the Basic of Accounts and the usage of Tally for accounting purpose.
2. To helps students to work with well-known accounting software i.e. Tally ERP.9.
3. To Student will learn to create company, enter accounting voucher entries including advance voucher entire and reconcile bank statement and accrual adjustments.
4. To Gaining knowledge on accounting, inventory and Taxation including GST, TDS with Payroll management also.
5. To learn the prepare to financial statements, etc. in Tally ERP.9 software.
6. To make students ready with required skill for employability in the job market.

COURSE OUTCOMES:

Learners should be able to

1. Understand the create company and enter accounting voucher entries including advance voucher entries.
 2. Manage accounting of any Business or individuals
 3. Creating Computerized Books of accounts with finalizing reports
 4. Various extra topics related to computerized accounting like Auditing, Grouping companies.
 5. Getting Automated Printing salary slips, Scheduled reports, Outstanding reports etc.
 6. Understand the financial statements and taxation and GST.
-
1. Create a primary and sub groups using single or multiple ledger mode
 2. Create minimum 10 ledgers using single or multiple ledger, and alter and delete any 2 ledger
 3. Create a new company, ledger and Enter the following voucher
 - Payment vouchers
 - Receipt
 - Purchase
 - Sales
 - Credit note
 - Debit note
 - Journals
 - Memo
 - Optional
 - Post Dated
 1. Prepare trail balance for the company
 2. Prepare profit & loss a/c and balance sheet
 3. Create stock, stock groups and enter the vouchers
 4. Prepare inventory statements using (calculate inventory using all methods)
 - FIFO & LIFO
 - Simple Average Method
 - Weighted Average Method
 5. Prepare the following
 - Cash flow statement
 - Fund flow statement

6. Prepare the following ratio analysis

Financial ratio
Operating ratio
Investment ratio

7. Prepare the following Statutory and Taxation

Value Added Tax (VAT)
Tax Deducted at Source (TDS)
Tax Collected at Source (TCS)
Service Tax
Backup & Restore

Reference Books:

1. Shraddha Singh, Navneet Mehra , “Tally ERP 9: Power of Simplicity”.
2. Nadhani. 2013. **Tally9.2**. New Delhi: PBP Publication.
3. Rita Bhargava. 2011. **Tally 9.2**. New Delhi. Cyber the Publication.

COURSE OBJECTIVES :**To make the students**

1. To know the concepts of central tendency and dispersion.
2. To understand the correlation and regression concepts.
3. To be aware of the index numbers and trend analysis.
4. To create tables and graphs to format, organize, and interpret data; summarize and present data.
5. To demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
6. Summarize and analyze statistical data to solve practical business related problems.

COURSE OUTCOMES:**Learners should be able to**

1. Produce appropriate graphical and numerical descriptive statistics for different types of data.
2. Calculate and apply the measure of central tendency and dispersion in decision making.
3. Apply the concept of index numbers and trend analysis in business decisions.
4. Demonstrate capabilities as problem-solving, critical thinking, and communication skills related to the discipline of statistics.
5. Interpret the relevance of statistical findings for business problem solving and decision making.
6. Summarize and analyze statistical data to solve practical business related problems.

UNIT I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

UNIT II

Measures of central tendency : Arithmetic Mean , Median , Mode, Measures of dispersion – Range, Quartile deviation, Standard deviation and Coefficient of variation.

UNIT III

Correlation : Definition , Type of correlation , Method of correlation - scatter diagram – Karl Pearson's coefficient of correlation – Spearman's Rank correlation.
Regression: Definition, Regression equations – Methods of forming the regression equations - Problems.

UNIT IV

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre's, Paasche's and Fischer's method – Tests for an ideal index number – Wholesale and Cost of living index .

UNIT V

Time Series: Meaning – Components – Models – Business forecasting – methods of estimating trend – graphic, semi average, moving average and least square method – Seasonal variation – Methods of Simple Average.

TEXT BOOK

1. Pillai R.S.N., and Bagavathi V., 2002., Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCES

1. Dr.P.N.Arora, 1997, A foundation course statistics, S.Chand & Company Ltd, New Delhi.
2. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
3. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.
4. Richard .I.Levin., & David.S.Rubin., 1998. Statistics for management, Seventh edition, Prentice hall of India, New Delhi.

Course Objectives

To make the students

1. To understand the basic concepts of environment and ecosystem
2. To create the awareness the environmental problems among people.
3. To developing an attitude of concern for the environment and biodiversity and its conservation.
4. To know the environmental pollution, causes, effects and control measures of urban and industrial waste.
5. To study the special issue and the environment from unsustainable to sustainable development.
6. To know the Disaster Management including professional and personal activities.

Course Outcomes

Learners should be able to

1. Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
2. Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.
3. Predicting the consequences of human actions on the web of life, global economy and quality of human life.
4. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
5. Understood the environment ethics for climate change, global warming, acid rain and ozone layer depletion.
6. Describe a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

UNIT I

Environment – Definition – Components - Ecosystem -Definition, Concept, Scope, Importance, Structure and Functions of Ecosystem. Energy Flow, Ecological Succession. Food Chains and Food Webs. Classification of Ecosystem. Environmental Pollution –Causes, Effects and Preventive Measures of Air, Water, Soil, Noise and Thermal Pollution.

UNIT II

Biodiversity and its Conservation: Introduction- Definition, Genetic, Species and Ecosystem Diversity, Biogeographical Classification of India- Value of Biodiversity: Consumptive, Productive Uses; Social, Ethical, Aesthetic and Option Values. Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts.

UNIT III

Social Issues and the Environment- Urban Problems Related to Energy- Water Conservation and Management -Rain Water Harvesting- Water Shed Management. Resettlement and Recapitalization. Natural Resources and Associated Problems and Sustainable Utilization. Environmental Education

UNIT IV

Environment and Human Health-Physical Fitness, Human Rights, Value of Education. Environmental Ethics. Global Warming, EPA Act. RIO-Summit. Solid Waste Management: Causes, Effects and Control Measures. Disaster and Rehabilitation Management: Floods, Earthquake, Cyclone and Landslides.

UNIT V

Disaster Management - Basic Terms: Disaster, Hazard, Vulnerability and Risk. Disaster: Definition, Causal Factors and Types: Natural and Man-made Disaster (Causes, Consequences and Mitigation Measures). Disaster Management: Meaning and Definition. Disaster Management Cycle: Disaster Phase, Response Phase, Recovery/Rehabilitation Phase, Risk Reduction/Mitigation Phase and Preparedness Phase (including professional and personal activities).

Reference Books:

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkata, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and Protected areas, Agrobios, India.
3. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
4. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
5. Shaw, R and Krishnamurthy, R.R. (2009). Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
6. Sorokin Pitirim. A, Man And Society In Calamity. New York: Dutton, 1942
7. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page No: 1-7.

Instruction Hours / Week: L: 2 T:0 P: 0 Marks: Internal:100 External: Nil Total: 100

Course Objectives:

1. To make the students learn the Quantitative aptitude problems.
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To make the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
4. To develop and nurture the soft skills of the students through individual and group activities.
5. To expose students to right attitudinal and behavioral aspects and to build the same through activities.
6. To reinforce the competencies in soft skills which are crucial in a social setting.

Course Outcomes:

1. Students will be able to learn the Quantitative aptitude problems.
2. Students will be able to critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Students will be aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
4. Students will be able to develop and nurture the soft skills of the students through individual and group activities.
5. Students will be exposed to right attitudinal and behavioral aspects and to build the same through activities.
6. Students will be able to reinforce the competencies in soft skills which are crucial in a social setting.

UNIT – I

Introduction to Quantitative aptitude, speed maths, problems on numbers, averages, ratios and proportions, problems on ages.

UNIT – II

Number series, Blood relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT III

Percentages, Data interpretation, Profit and loss, Simple interest and Compound interest

UNIT IV

Parts of speech, tense, subject verb agreement, active and passive voice, articles, prepositions.

UNIT V

Conditional Clause, Degrees of Comparison, Goal setting, Interpersonal skills.

(For undergraduates students admitted from 2015 onwards)

Course Objectives:

1. To develop confidence to respond in English during situations where the use of English is imperative.
2. To develop fluency in actual conversation in the English language.
3. To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
4. To develop confidence to respond in English during situations where the use of English is imperative.
5. To develop fluency in actual conversation in the English language.
6. To develop knowledge about business communication.

Course Outcomes:

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.
6. Students developed confidence to respond in English during situations where the use of English is imperative.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Reference Books:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr.Francis M.Peter S.J. “Lets Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

COURSE OBJECTIVES:**To make the students**

1. To make the students learn the techniques of issue of shares and debentures.
2. To understand the Acquisition of Business and Profits prior to incorporation.
3. To enable the students to prepare profit and loss a/c and balance sheet.
4. To understand amalgamation of companies.
5. To understand the Liquidator's Final Statement of Account.
6. To give them an exposure to calculate the value of Goodwill and shares.

COURSE OUTCOMES:**Learner should be able to**

1. The students will be able to raise capital through shares and debentures.
2. Maintain the financial statements of a business entity.
3. The students will be proficient in final accounts.
4. The students will have knowledge about amalgamation of companies.
5. The students will be able to prepare consolidated balance sheet by incorporating accounting standards.
6. The students will have knowledge on the value pf goodwill and shares.

UNIT I

Shares and Debentures: Books of accounts and Statutory Books – Issue of shares and Debentures- Forfeiture and Re- issue of Shares - Underwriting.

UNIT II

Redemption and Acquisition: Redemption of Preference shares and debentures – Acquisition of Business- Profits prior to incorporation.

UNIT III

Final Accounts of Joint Stock Companies: Preparation and Presentation of Final Accounts of Joint Stock Companies as per Company Law Requirements – Determination of Managerial Remuneration.

UNIT IV

Reconstruction: Reduction and Reorganization of Share Capital – Amalgamation, Absorption and Reconstruction (excluding inter-company holdings and Owings)

UNIT V

Valuation: Valuation of Shares and Goodwill – Liquidation of companies – Modes of Winding Up – Order of payments – Procedure of Preparation of Statement of Affairs – List to be Attached to the Statement of Affairs - Liquidator's Final Statement of Account.

Note: Distribution of marks for theory and problems shall be 20% and 80 % respectively.

Text Book

1. Jain S.P. & Narang K.L, 2012 Advanced Accountancy. Kalyani Publishers., Ludhiana.

Reference Books:

1. Reddy & Murthy, 2005 “Financial Accounting”, Margham Publicatuions, , Chennai
2. Gupta R.L. and Radhasamy 2010 “Advanced Accountancy” , S.Chand & Co., New Delhi.
3. Shukla M.C., Grewal T.S., 2010 “Advanced Accounts”, S.Chand & Co Ltd, New Delhi.

4. Maheswari S.N., Maheswari S.K, 2012, “Advanced Accounting” 10th edition, Vikas Publishing House Pvt Ltd, New Delhi.
5. Dr. M.A. Arulanandam, Dr. K.S. Raman, 10th Edition “Advanced Accountancy Part-I”, Himalaya Publications, New Delhi.

15CCU302 CORE - OBJECT ORIENTED PROGRAMMING WITH C ++**COURSE OBJECTIVES:****To make the students**

1. To Introduces Object Oriented Programming concepts using the C++ language.
2. To stresses the object paradigm including classes, inheritance, virtual functions, and templates in the development of C++ programs.
3. To Develop, compile and run simple to moderately complex C++ programs
4. To Identify, compare, select, and use classes and algorithms from the C++ Standard Library.
5. To Provide the principles of data abstraction, inheritance and polymorphism and principles of virtual functions and polymorphism
6. To Introduces handling formatted I/O and unformatted I/O and exception handling. The gain the knowledge about the real-life entity using the objects.

COURSE OUTCOMES:**Learner should be able to**

1. Identify importance of object-oriented programming and difference between structured oriented and object-oriented programming features.
2. Creating simple programs using classes and objects in C++.
3. Implement Object Oriented Programming Concepts in C++.
4. Develop applications using stream I/O and file I/O.
5. Implement simple graphical user interfaces.
6. Implement Object Oriented Programs using templates and exceptional handling concepts.

UNIT I

Principles of Object Oriented Programming: Basic Concepts of Object Oriented Programming – Benefits of OOP – Structure of C++ Program – Declaration of Variables. Control Statements – Decision Making Statements – If ..Else, Jump, Goto, Break, Continue-Switch Case Statements – Do-While – While Statement, For Statement. Inline Functions – Function Overloading.

UNIT II

Classes and Objects: Specifying a Class – Defining Member Functions – Static Data Members – Static Member Functions - Array of Objects –Friendly Functions. Constructors and Destructors: - Constructors – Multiple Constructors in a Class – Constructors with Default Arguments - Copy Constructor – Destructors.

UNIT III

Operator Overloading: Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends – Type Conversions. Inheritance: Introduction – Defining Derived Classes – Single, Multilevel, Multiple, Hierarchical Inheritance- Hybrid Inheritance – Virtual Base Classes – Abstract Classes.

UNIT IV

Pointers: Pointers to Objects – this Pointer – Pointers to Derived Classes – Virtual Functions. Managing Console I/O Operations :- C++ Streams – C++ Stream Classes –

unformatted I/O Operations – Formatted Console I/O Operations – Managing Output with Manipulators.

UNIT V

Files: Classes for File Stream Operations – Opening and Closing a File – Sequential Input and Output Operations – Updating a File Random Access. **Templates and Exceptions:-** Templates – Class Templates – Function Templates – Member Function Templates – Exception Handling.

Text Book:

1. Balagurusamy. E. 2007. Object Oriented Programming with C++. 3rd Edition, Tata McGraw Hill publishing company Ltd, New Delhi.

Reference Books:

1. Ashok N. Kamthane. 2013. Object Oriented Programming with ANSI and Turbo C++, Pearson Education
2. Chandra .B. 2005. OOPS using C++, 2nd Edition, Narosa Publishing House
3. Yashavant Kanetkar. 2013. Let Us C++, 2nd Edition, BPB Publications.
4. John R. Hubbard. 2006. Programming with C++, 2nd Edition, Tata McGraw Hill Publishers

15CCU303 CORE -PRINCIPLES OF MARKETING

COURSE OBJECTIVES:

To make the students

1. To enable the students to understand the basic of marketing.
2. To understand how organizations, identify customers and their wants/needs.
3. To provide thorough knowledge of various concepts and their application relating to marketing planning and management decisions.
4. To provide thorough knowledge of Promotional activities and Physical distribution
5. To comprehend marketing decisions, based upon the combination of product, price, promotion, and distribution elements.
6. To apply key frameworks and methods, and develop analytical skills to solve marketing problems.

COURSE OUTCOMES:

Learner should be able to

1. The students will have the understanding of the importance of marketing.
2. Be familiar with the basic elements of the marketing mix and to provide a framework to evaluate marketing decisions and initiatives.
3. Students will demonstrate analytical skills in identification and resolution of problems pertaining to marketing management.
4. Scan the marketing environment and Discuss ethics and social responsibility in marketing.
5. Recognize organizational markets and buyer behavior and Formulate pricing strategies for products and services.
6. Create strategies for managing marketing channels and supply chains and Integrate marketing communications and direct marketing.

UNIT I

Need and Scope of marketing: Definition and Features – Meaning and Objectives – Functions of Marketing - Modern Marketing Concepts. Market Forecasting – Marketing Research – Meaning and Scope – Objective and Functions – Future of Marketing Research.

UNIT II

Market Information System: Consumer Marketing, Product Planning and Development-Market Segmentation - Product Policy Decision – Product Line and Product Mix – Concept of Product Life Cycle - Market Integration – Product and Branding Strategies

UNIT III

Promotional activities: Need and Importance – Promotional Mix - Sales Promotion – Methods of Sales Promotion – Advertising Functions and Objectives – Media of Advertising – Personal Selling Process.

UNIT IV

Pricing System: Role of Pricing – Objectives – Basic Methods of Price Setting -Factors Affecting Pricing Decision- Procedure of Price Determination.

UNIT V

Channels of Distribution: Meaning – Importance – Objectives – Functions -Types of Different Channels –Distribution Policies-Wholesaler-function and Services-Retailers Functions and Services– Establishment of Sales Policies – Sales Organization Structure – Objectives and Principles.

Text Book:

1. R.S. Pillai & Mrs. Bagavathi . 2014. "Marketing". New Delhi. Sultan Chand & sons.

Reference Books:

1. S. A. Sherlekar, 2000. "Marketing Management". Bangalore: Himalayas publishing house.
2. Richard Still & Gowani. 1999. "Sales Management". New Delhi: Prentice Halls of India.
3. William J. Standon. 1994. "Fundamentals of Marketing". New Delhi: Tata Mcgraw Hil publishing house.

COURSE OBJECTIVES:**To make the students**

1. To familiarize the students with the basic concept of microeconomics.
2. To make student understand the demand and supply analysis in business applications
3. To familiarize students with the production and cost structure under different stages of production.
4. To understand the pricing and output decisions under various market structure.
5. To help students understand and apply the various decision tools to understand the market structure.
6. To learn the National Income Analysis.

COURSE OUTCOMES:**Learner should be able to**

1. Understand the concepts of cost, nature of production and its relationship to Business operations.
2. Understand and apply supply and demand analysis to relevant economic issues.
3. Understood the causes and consequences of different market conditions.
4. Integrate the concept of price and output decisions of firms under various market structure.
5. Understand the links between production costs and the economic models of supply
6. Represent demand, in graphical form, including the downward slope of the demand curve and what shifts the demand curve.

UNIT I

Business Economics and Economic Theory: Economics - Definition - Economic Analysis - Micro and Macro Economics – Meaning – Definition - Scope of Business Economics – Profit Maximization- Economic Cost of Using Resources - Social Responsibilities of Business -Maximizing the Value of a Firm – Basic Techniques of a Firm.

UNIT II

Demand, Supply and Market equilibrium: Demand - Law of Demand- Determinants, Elasticity, Demand Function, Forecasting. Supply-Law of Supply-Elasticity of Supply-Supply Functions-Market Equilibrium –Changes in Market Equilibrium.

UNIT III

Production and Cost Analysis: Production Function- Isoquant Curves Production in the Short Run and Long Run-. Law of Diminishing Marginal Product. Short Run and Long Run Cost of Production –Short Run Total Costs- Cost Curves. Cost Analysis- Concept of Cost and its Types, Cost Output Relationship in Short and Long Period-.

UNIT IV

Market Structure and Pricing Decisions: Classification of Markets – Pricing Under Perfect Competition – Pricing Under Monopoly – Price Discrimination – Pricing Under Monopolistic Competition - Kinked Demand Curve Model – Cournot Model of Duopoly – Monopsony.

UNIT V

National Income Analysis: National Income Measures, Types and Difficulties-Trade Cycles - Concept and Causes of Trade Cycles. Measures to Control Trade Cycles. Macro Economic

Text Book:

1. Sankaran. 2013.”Business Economics” Margham publications Ltd . Chennai

Reference Books:

1. Varshney and Maheshwari 22nd Edition - 2014 Managerial Economics. Sultan Chand & Sons
2. H.L.Ahuja. 2007 Reprint . “Business Economics.” New Delhi. S.Chand & Company Ltd.
3. P.N.Reddy & H.R.Appanaiah. 1995.” Principles of Business Economics.” New Delhi..S.Chand & Company Ltd.
4. Ferguson & R.Rothschild. 1993. “Business Economics”Hong Kong. Macmillan Press Ltd.
5. H.S.Agarwal. 1995. “Business Economics” Ratan Prakashan Mandir.
6. K.P.Sundaram and E.Sundaram 1997. Business Economics. New Delhi: Sultan Chand & Sons

COURSE OBJECTIVES:

To make the students

1. To analyses the overall business environment and evaluate its various components in business decision making.
2. To provides an analysis and examination of significant contemporary ethical issues and challenges existing throughout the professional business arena.
3. To know the different environment like, political, technological and economic environment in the business.
4. To evaluate the implication of Global Environment variables in the Indian Economy.
5. To elucidate the factors of the political environment that influence Business decision making.
6. To examine the impact of Technological, Socio-cultural and Natural environmental factors affecting Business decision making and Legal framework regulating to Competition.

COURSE OUTCOMES:

Learner should be able to

1. Familiarize with the nature of business environment and its components and influence Business decisions.
2. The students will be able to demonstrate and develop conceptual framework of business environment and generate interest in international business.
3. Understand the definition of ethics and the importance and role of ethical behavior in the business world today.
4. Evaluate the implication of Global Environment variables in the context of Indian Economy.
5. Understood the factors of the political environment that influence Business decision making.
6. Understood the impact of Technological, Socio-cultural and Natural environmental factors affecting Business decision making.

UNIT I

Concept of Business Environment- Significance-Types of Environment-External and Internal – Inter - Relationship between Economic and Non-economic environment-Impact of Environment on Business and Strategic Decisions - Culture and Business - Social Responsibilities of Business .

UNIT II

Industrial Policies and Regulations - Industrial Policy up to 1991 - New Industrial Policy - Public, Private, Joint and Co-operative Sectors - Privatization and Disinvestment - Ways of Privatization - Benefits and Arguments Against Privatization - Privatization in India.

UNIT III

Economic Systems – Meaning – Characteristics -Types of Economic Systems-Capitalism-Socialism-Mixed Economy - Economic Planning - Nature, Scope and Significance of Economic Planning in India - Achievements and Failures of Economic Planning.

UNIT IV

Technological environment-Factors Governing Technological Environment-Management of Technology - Patents and Trademarks - Financial Institution in India-IFCI-ICICI-IDBI-IIBISIDBI- SFC's.

UNIT V

Globalisation - Meaning and Dimensions - Features of Current Globalisation –Essential Conditions for Globalisation - Globalisation of Indian Business - Foreign Direct Investment - Concept, Advantages, Disadvantages and Determinants- India's policy towards FDI - Multinational Corporation – Meaning - Merits and Demerits - Control over MNC's-MNC in India.

Text Books

1. Francis Cherunilum - Business Environment: Text and Cases, Himalaya Publishing House, Mumbai.
2. K. Ashwathappa - Essentials of Business Environment, Himalaya Publishing House, Mumbai.

Reference Books

1. Ruddar Dutt and K.P.M. Sundaram - Indian Economy, S. Chand Co. Ltd., New Delhi.
2. Francis Cherunilum, Global Economy and Business Environment, Himalaya Publishing House, Mumbai.

COURSE OBJECTIVES:

To make the students

1. To provide knowledge on Financial System of India and to familiarize the structure of financial markets
2. To introduce students to the world of financial services.
3. To study the various instruments of the money market.
4. To understand the characteristics of a highly developed money market and the recent trends in the money market.
5. To equip students with the knowledge and skills necessary to become employable in the financial service industry.
6. To equip students with the technical and analytical tools, and strategic abilities necessary to understand the evolution and workings of the commercial banking industry.

COURSE OUTCOMES:

Learner should be able to

1. Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
2. Evaluate and create strategies to promote financial products and services.
3. Students would understand instruments that are operational in the money market.
4. Students would be aware about the contribution that the money market does in the economic stability and development of a country.
5. Understand the risk and return portion of different financial instruments.
6. Developing technical, analytical and decision-making skills in preparation for managerial responsibility in the financial management of the banking firm.

UNIT I

Financial Concept: Financial Assets, Intermediaries, Financial Markets, Financial Rate of Return, Financial Instruments. Financial Markets Classification – Development of Financial System in India, Legislative Support – Weakness of Indian Financial System

UNIT II

Money Market – Definition – Money Market Vs Capital Market- Objectives – Features of a Developed Money Market – Importance of Money Market – Composition of Money Market – Participants – Advantages – Drawbacks – Commercial Bill Market – Types of Bills – Importance of Bill Market – Operations in Bill Market – Discount Market – Acceptance Market – Drawbacks – Bills Market Scheme – Treasury Bill Market – Types of Treasury Bills – Operations and Participants – Importance – Commercial Paper – Certificate of Deposit – REPO – Structure of Indian Money Market – Features of Money Market – Recent Developments

UNIT III

Capital Market – Meaning – Stock Exchange – Distinction between New Issue Market and Stock Exchange – Relationship Between New Issues Market and Stock Exchange – Functions of New Issue Market – Instruments of Issues – Players in the New Issue Market – Book Building – Follow on Public Offer – Recent Trends – Reasons for Poor Performance – Suggestions

UNIT IV

Depository System : Definition and Meaning – Objectives – Interacting Institutions – Depository Process – Trading in a Depository System – Depository System in India – Depository Participants – Benefits – NSDL – Central Depository Services (India) Ltd. – Drawbacks – Remedial Measures - Derivatives

UNIT V

RBI – Commercial Banks – GTI – LIC – IDBI – PF – MF- Stock Holding - Corporation – IFCI, SFCI, SEBI – Objectives – Guidelines for Investor Protection

Text Book

1. **Gordon and Natarajan** – Financial Markets and Institutions, Himalaya Publishing House, New Delhi

Reference Books

1. **Bhole, L.M.** – Financial Institutions and Markets, Tata McGraw Hill, New Delhi
2. **Khan, M.Y** – Indian Financial System, Sultan Chand and Sons, New Delhi
3. **Srivastava, R.M.** – Management of Indian Financial Institution, Himalaya Publishing House, Mumbai

COURSE OBJECTIVES:**To make the students**

1. To Introduces Object Oriented Programming concepts using the C++ language.
2. To stresses the object paradigm including classes, inheritance, virtual functions, and templates in the development of C++ programs.
3. To Develop, compile and run simple to moderately complex C++ programs
4. To Identify, compare, select, and use classes and algorithms from the C++ Standard Library.
5. To Provide the principles of data abstraction, inheritance and polymorphism and principles of virtual functions and polymorphism
6. To Introduces handling formatted I/O and unformatted I/O and exception handling. The gain the knowledge about the real-life entity using the objects.

COURSE OUTCOMES:**Learner should be able to**

1. Identify importance of object-oriented programming and difference between structured oriented and object-oriented programming features.
2. Creating simple programs using classes and objects in C++.
3. Implement Object Oriented Programming Concepts in C++.
4. Develop applications using stream I/O and file I/O.
5. Implement simple graphical user interfaces.
6. Implement Object Oriented Programs using templates and exceptional handling concepts.

Write a C++ Program for the Following Concepts

Object and classes:

1. Create a class to implement the data structure STACK . write a constructor to initialize the top of the stack to zero .write a member function PUSH() to insert an element and a member function POP() to delete an element. check for overflow and underflow conditions.
2. Create a class ARITH which consists of a FLOAT and an INTEGER variable. write member functions ADD(),SUB(),MUL(),DIV(),MOD() to perform addition, subtraction, multiplication, division and modulus respectively. write member functions to get and display MAT() object values.

Operator overloading:

3. Create a class MAT as a 2D matrix and R, C represents rows and columns of the matrix. Overload the operators +,-,* to add, subtract, multiply two matrices. Write member functions to get and display MAT() object values.
4. Create a class STRING. Write member functions to initialize to get and display strings. overload the operator + to concatenate two strings, == to compare two strings and a member function to find the length of the strings.

Inheritance:

5. Create a class which consist of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member functions to calculate da, hra, pf depending on the grade and display the pay slip in a neat format using console I/O.
6. Create a class SHAPE which consist of two virtual functions cal_Area() and cal_Per() to calculate area & perimeter of various figures. Derive three classes

SQUARE, RECTANGLE and TRIANGLE from the class SHAPE and calculate area and perimeter of each class separately and display the result.

7. Create two classes which consist of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a FRIEND function common to both classes which takes the object of the above two classes as arguments and the integer and float values of both the objects separately and display the result.

Console I/O:

8. Write a user-defined function USERFUN() which has the formatting commands like setw(), showpos(), precision(). Write a program which prints a multiplication table and uses userfun() for formatting.

Files:

9. Write a program to perform insertion, deletion and updation using files.
10. Write a program which takes a file as arguments and copies into another file with line numbers using command line arguments.

Reference Books:

1. Balagurusamy. E. 2007. Object Oriented Programming with C++. 3rd Edition, Tata McGraw Hill publishing company Ltd, New Delhi.
2. Ashok N. Kamthane. 2013. Object Oriented Programming with ANSI and Turbo C++, Pearson Education
3. Chandra .B. 2005. OOPS using C++, 2nd Edition, Narosa Publishing House
4. Yashavant Kanetkar. 2013. Let Us C++, 2nd Edition, BPB Publications.
5. John R. Hubbard. 2006. Programming with C++, 2nd Edition, Tata McGraw Hill Publishers

Course Objectives:

1. To make the students learn the Quantitative aptitude problems.
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. To make the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
4. To develop and nurture the soft skills of the students through individual and group activities.
5. To expose students to right attitudinal and behavioral aspects and to build the same through activities.
6. To reinforce the competencies in soft skills which are crucial in a social setting.

Course Outcomes:

1. Students will be able to learn the Quantitative aptitude problems.
2. Students will be able to critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
3. Students will be aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
4. Students will be able to develop and nurture the soft skills of the students through individual and group activities.
5. Students will be exposed to right attitudinal and behavioral aspects and to build the same through activities.
6. Students will be able to reinforce the competencies in soft skills which are crucial in a social setting.

UNIT – I

Introduction to Quantitative aptitude, speed maths, problems on numbers, averages, ratios and proportions, problems on ages.

UNIT – II

Number series, Blood relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT III

Percentages, Data interpretation, Profit and loss, Simple interest and Compound interest

UNIT IV

Parts of speech, tense, subject verb agreement, active and passive voice, articles, prepositions.

UNIT V

Conditional Clause, Degrees of Comparison, Goal setting, Interpersonal skills.

(For undergraduates students admitted from 2015 onwards)

Course Objectives:

1. To train the students in understanding the concepts of communication.
2. To be familiar with the four basic skills of English.
3. To train students in developing their written communication.
4. To train students in developing their presentation skills.
5. To acquire the skill of making grammatically correct sentences.
6. To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

OBJECTIVES

To train the students in understanding the concepts of communication.

To train the students in developing their written communication and presentation skills.

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference:

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To acquaint the students with basic concepts used in cost accounting and material management.
2. To make the students understand the various cost involved the respect to labour and overheads.
3. To Identify and calculate various types of costs such as direct, indirect, total, variable, mixed and fixed costs.
4. To determine the costs of producing a product or providing a service using job costing, activity-based costing and process costing
5. To create cost allocation and apportionment of the product of the industry
6. To provide the student knowledge about use of costing data for planning, controls and decision making.

COURSE OUTCOMES:**Learners should be able to**

1. Describe how cost accounting is used for decision making and performance evaluation.
2. Understand the basic concept of cost and how costs are presented in financial statements.
3. Demonstrate how materials, labor and overhead costs are added to a product at each stage of the production cycle.
4. Analyze the basic cost flow model and be able to assign costs in a job cost system.
5. Formulate overhead using predetermined rates and Activity-Based costing.
6. Assess how cost-volume-profit are related and use CVP analysis as a planning and decision making.

UNIT I

Cost Accounting – Definition – Meaning and Scope – Concept and Classification – Costing an aid to Management — Types and Methods of Cost – Elements of Cost Preparation of Cost Sheet and Tender.

UNIT II

Material Control: Levels of Material Control – Need for Material Control – Economic Order Quantity – ABC Analysis – Perpetual Inventory – Purchase and Stores Control: Purchasing of Materials – Procedure and Documentation Involved in Purchasing – Requisition for Stores – Stores Control – Methods of Valuing Material Issue.

UNIT III

Labour and Overhead: System of Wage Payment – Idle Time – Control over Idle Time – Labour Turnover. Overhead – Classification of Overhead – Allocation and Absorption of Overhead.

UNIT IV

Process costing – Features of Process Costing – Process Losses, Wastage, Scrap, Normal Process Loss – Abnormal Loss, Abnormal Gain. (Excluding Inter Process Profits and Equivalent Production).

UNIT V

Operating Costing - Contract Costing – Reconciliation of Cost and Financial accounts.

NOTE: Distribution of marks : Theory 40% and Problems 60%

Text Book:

1. S.P. Jain and K.L. Narang, 2013, “Cost Accounting”, Kalyani Publishers, New Delhi.

Reference Books:

1. **R.S.N. Pillai and V. Bagavathi**, 2013, “Cost Accounting”, S. Chand and Company Ltd., New Delhi.
2. **S.P.Iyyengar**, 2005, “Cost Accounting Principles and Practice”, Sultan Chand, New Delhi.
3. **V.K.Saxena & C.D.Vashist**, 2012, “Cost Accounting”, Sultan Chand, New Delhi.
4. **M.N.Arora**, 2013, “Cost Accounting”, Sultan Chand, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3. To understand and use data manipulation language to query, update, and manage a database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
5. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
6. To Identifies the entity, attributes, identify entity relationship diagrams

COURSE OUTCOMES:**Learners should be able to**

1. Understand the fundamental elements of relational database management systems
2. Understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
3. Design ER-models to represent simple database application scenarios
4. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
5. Improve the database design by normalization.
6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

UNIT I

Database System Architecture Basic concepts: Data System, Data Models, Data Independence, Architecture For a Database System, Distributed Databases. Storage Structures: Representation of Data. Data Structures and Corresponding Operators: Introduction, Relation Approach, Hierarchical Approach, Network Approach.

UNIT II

Relational Model: Entity – Relational Model – Basic Concepts – Keys – Entity – Relationship Diagram –Structure of Relational Database – Relational Algebra – Extended Relational Algebra Operations – Modification of the Database – Integrity Constraints.

UNIT III

SQL: Data Definition Language – Data Manipulation Language – Data Control Language – Transaction Control Language. Embedded SQL: Introduction – Operations not Involving Cursors –Operations involving Cursors – Dynamic statements. Query by Example – Retrieval Operations, Built-in Functions, Update Operations.

UNIT IV

PL/SQL: Introduction to PL/SQL – Advantages of PL/SQL – Architecture of PL/SQL Block –Introduction to PL/SQL Block – Attributes – Control Structures – Concept of Error Handling – Cursor Management.

UNIT V

Normalization: Decomposition, Functional Dependency, First, Second, Third Normal Forms, BCNF, Relations with more than one Candidate Key.

Text Book

1. **Abraham Silber Sehatz, Henry F. Korth & S. Sudharasan**, 2008, “Database System Concepts”, New Delhi. Mc Graw Hill Publication.

Reference Books:

1. C.J.Dates, 2010, “An Introduction to Database System”, 3rd Edition , Narosa Book Distributors Pvt Ltd.
2. Bipin C Desai, 2001 “An Introduction to Database Systems”, Galgotia Publications Pvt Limited.
3. Raghu Ramakrishnan, Johannes Gehrke ,2010 “Database Management Systems”, 3rd Edition, McGraw-Hill Higher Education.
4. Elmasri, Navathe, 2010 “Fundamentals of database Systems”, 6th Edition, Addison Wesley.

COURSE OBJECTIVES:**To make the students**

1. To equip the students with the understanding time value of money & use it for decision making.
2. To evaluate projects and investments is the basic objective of the course.
3. To enable the students to take investment decisions and financial decisions.
4. To acquaint the students about the various aspects of capital structure
5. To provide the students with the basic knowledge of Dividend decisions.
6. To impart knowledge of working capital and cash management.

COURSE OUTCOMES:**Learners should be able to**

1. Students who complete this course will be able understand the use of finance for decision making
2. The students will able to describe time value of money, how a project is made and appraised.
3. Students will know the technicalities of making investment decisions.
4. Students of the course will able to differentiate between the various sources of finance and their pros & cons.
5. Students who complete this course will be able to outline capital requirements for starting a business & management of working capital.
6. Students of the course will able to recommend whether and why an investment should be accepted or rejected.

UNIT I

Introduction: Meaning, Definition, Scope of Financial Management- Financial Decisions Financial Planning – Objectives and Principles of Sound Financial Planning –Long Term – Short Term -Role and Functions of a Finance Manager.

UNIT II

Cost of Capital and Capital Budgeting: Meaning, Definition, Importance of Cost of Capital- Classification of Cost of Capital. Cost of Debt – Preference, Equity and Retained Earnings- Weighted Average Cost of Capital. Capital Budgeting – Significance – Methods of Evaluating Capital Expenditure Proposals. Payback Method – Accounting Rate of Return – Discounted Cash Flow Method

UNIT III

Leverages & Capital Structure: Meaning, Definition, Types of Leverage-EBIT – EPS Analysis. Financial and Operating Risk – Operating Leverage – Financial Leverage-Combined Leverage. Capital Structure Theories – Net Income Approach -Net Operating Income Approach MM Approach and Traditional Approach– Determinants of Capital Structure.

UNIT IV

Working Capital Management: Meaning–Importance– Kinds-Concept- Disadvantages of Excessive and Inadequate Working Capital – Determinants of Working Capital – Cash Management – Motives of Holding Cash – Cash Budget – Receivables Management – Meaning – Purpose of Maintaining Receivables – Inventory Management – Meaning and Kinds - Need of Holding Inventories – Reorder level, Minimum and Maximum, Average Stock Level, Economic Order Quantity.

UNIT V

Dividend policy: Meaning of Dividend –Determinants of Dividend Policy – Classifications of Dividend- Dividend policy- MM Hypothesis, Walter's Model and Gordon's Model.

Text Book

1. Dr. R. Ramachandran and Dr. R. Srinivasan (2010), "Financial Management", Sriram Publications, Trichy.

Reference Books:

1. I. M. Pandey, 2009, Financial Management New Delhi..Vikas Publications.
2. S. Prassanna Chandra 2006, Financial Management, New Delhi Tata McGraw Hill Publications.
3. Shashi K.Gupta and R.K. Sharma, "Financial Management Theory and Practice", Kalyani Publication, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To enrich students with the knowledge of the functioning of banks.
2. To help students realize the quintessential role of banks in the world today.
3. To make the students understand the various services offered and various risks faced by banks.
4. To make them aware of various banking innovations after nationalization.
5. To impart comprehensive knowledge concerning the practical aspects of banking.
6. To help the students with knowledge of electronic banking services

COURSE OUTCOMES:**Learners should be able to**

1. Understand the knowledge on banking and financial system in India.
2. Understand the functions of Commercial Banks.
3. Provide the knowledge about commercial banks and its products.
4. Understand the customer relationship.
5. Understood the digital financial infrastructure.
6. Enable them to understand better customer relationship create awareness about modern banking services like e-banking, m-banking and internet banking

UNIT I

Banks: Origin of Banks – Definition of Bank – Classification of Banks – Banking system – UNIT Banking – Branch Banking – Functions of Modern Commercial Banks – Credit Creation by Commercial Banks.

UNIT II

Central Banking: Functions – Credit Control Measures – Qualitative and quantitative credit control measures – Role of RBI in regulating and controlling banks.

UNIT III

Development Banks: Functions, State Bank of India – Commercial banks and rural financing – Regional Rural Banks – Co-operative banks - NBFC-- IDBI – ICICI.-NBFC- NHB- IFCI

UNIT IV

Services Banking: Automated Teller Machine – Merchant Banking – Mutual Fund – Factoring service – Privatization of commercial.

UNIT V

E-Banking: E-Banking Services- ATM Card- Debit Card- Credit Card- Master Card-Visa Card- NEFT-RTGS-ECS.

TEXT BOOK

1. Natarajan, Parameswaran. (2013), Indian Banking,,: S. Chand and sons, New Delhi

REFERENCE BOOKS

1. Santhanam.(2001) Banking and Financial System Margham Publications, Chennai.
2. Sundaram K.P.M. and Sundaram E.N. (1996) Modern Banking, Sultan Chand and Sons, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To Understand the basics of Relational Databases.
2. To Write SQL code based on ANSI/ISO standards to build and maintain database structures.
3. To Update database content with SQL and transaction handling and Retrieve data from single or multiple tables.
4. To Process data with row and aggregate functions
5. To Manipulate data with correlated and noncorrelated subqueries
6. To Apply views to break down problems and enhance security

COURSE OUTCOMES:**Learners should be able to**

1. Understood the Oracle 11g PL/SQL programming training, attendees write stored procedures, functions, packages, and triggers, and implement complex business rules with oracle 11g.
2. Students will be learning the programming, management, and security issues of working with PL/SQL program units.
3. Students will be learning the built-in packages that come with Oracle, the creation of triggers, and stored procedure features.
4. Understood the database content with SQL and transaction handling and Retrieve data from single or multiple tables.
5. Students will be learning the data with correlated and noncorrelated subqueries.
6. Understood the views to break down problems and enhance security.

1. Create table Company with the following fields and insert the values for 10 employees.

Field Name	Field Type	Field Size
Company Name	Character	15
Proprietor	Character	15
Address	Character	25
Supplier Name	Character	15
No. of employees	Character	4
GP Percent	Number	6 decimal places

Queries:

- a) Display all the records of the company, which are in the ascending order of GP percent.
- b) Display the name of the company whose supplier name is Telco
- c) Display the details of the company whose GP percent is greater than 20 and order by GP percent.
- d) Display the details of the company having the employee ranging from 300 to 1000.
- e) Display the name of the company whose supplier's name is same as the Tata's.

2. Create table named Employee with the following fields and insert the values

Field Name	Field Type	Field Size
Employee Name	Character	15
Employee Code	Number	6
Address	Character	25
Designation	Character	15
Grade	Character	1
Date of Joining	Date	-
Salary	Number	10 with 2 decimal places.

Queries:

- Display the name of the employees whose salary is greater than Rs. 10,000
- Display the details of employees in ascending order according to Employees Code.
- Display the total salary of the employees whose grade is 'A'.
- Display the details of employees earning the highest salary.
- Display the names of the employees who earn more than 'Ravi'.

3. Create table named Student with the following fields and insert the values

Field Name	Field Type	Field Size
Employee Name	Character	15
Gender	Character	6
Roll No	Character	10
Department Name	Character	15
Address	Character	25
Percent	Number	4 with 2 decimal places

Queries:

- Calculate the average percentage of students.
- Display the name of students whose percentage is greater than 80.
- Display the details of the students who got the highest percentage.
- Display the details of the student whose percentage is between 50 and 70.
- Display the details of the student whose percentage is greater than the percentage of the rollno=12CA01.

4. Create table Product with the following fields and insert the values

Field Name	Field Type	Field Size
Product No	6	Number
Product Name	Character	15

Unit of Measure	Character	15
Quantity	Number	6 decimal places.
Total Amount	Number	8 decimal places.

Queries:

- Using update statements calculate the total amount and then record.
- Select the records whose unit of measure is Kg.
- Select the records whose quantity is greater than 10 and less than or equal to 20.
- Calculate the number of records whose unit price is greater than 50 with count operation.

5. Create table PayRoll with the following fields and insert the values

Field Name	Field Type	Field Size
Employee No	Number	8
Employee Name	Character	8
Department	Character	10
Basic Pay	Number	8 with 2 decimal places.
HRA	Number	6 with 2 decimal places.
DA	Number	6 with 2 decimal places.
PF	Number	6 with 2 decimal places.
Net Pay	Number	8 with 2 decimal places.

Queries:

- Update the records to calculate the net pay.
- Arrange the records of employees in ascending order of their net pay.
- Display the details of the employees whose department is Sales.
- Select the details of the employees whose $HRA \geq 1000$ and $DA \leq 900$
- Select the records in descending order.

6. Create table Deposit and loan with the following fields

Field Name	Field Type	Field Type
Account	VarChar	6
Branch Name	VarChar	15
Customer Name	VarChar	20
Balance Amount	VarChar	10
Loan Number	VarChar	7
Loan Amount	VarChar	6

Queries:

- Find the number of loans with amount between 10000 and 50000.
- List in the alphabetical orders the names of all customers who have a loan at the Coimbatore branch.
- Find the average account balance at the Coimbatore branch.
- Update deposit to add interest at 5% to the balance.

- e) Arrange the records in descending order of the loan amount.
 - f) Find the maximum loan amount.
 - g) Find the total amount of deposit in Erode branch.
7. Write a PL/SQL Block to print natural numbers up to n.
 8. Write a PL/SQL Block to print the number in reverse order.
 9. Write a PL/SQL Block to check whether the number is even or odd.
 10. Write a PL/SQL block to print the Fibonacci series.

Reference Books:

1. Abbey Mischael. (1998).Oracle 8.FirstEdition.: McGraw Hill Publishing Company, New Delhi
2. Kevinloney (2008).Oracle 9i Complete References .First Edition.: McGraw Hill Publishing Company, New Delhi
3. Brown Bradley.(2000). Oracle 8i. First Edition.: Tata McGraw-Hill Publishing House. New Delhi
4. Dorsey Paul. (2000). Oracle Designer 2000. First Edition.: Tata McGraw-Hill Publishing House. New Delhi

COURSE OBJECTIVES:**To make the students**

1. To represents the concept of economic development of various fields and human resource.
2. To learn the basics of economic development of agriculture, industry, public finance and economic planning.
3. To understand how planning and infrastructure support can develop an economy.
4. To learn the environmental and resource economics, development economics and international trade.
5. To learn the Industrial Labour Organization and Industrial Policy.
6. To identify the Agricultural Productivity and Reforms.

COURSE OUTCOMES:**Learners should be able to**

1. It will result in comprehensive understanding of Indian Economy
2. Understood the efficiency and equity implications of market interference, including government policy.
3. Understood of the students related to different sectors of Indian Economy.
4. Insight into special fields of your choice, like energy economic, competition policy, industrial economics, financial markets, environmental and resource economics, development economics and international trade.
5. Understood the Foreign Trade and Balance of Payments. GATT and WTO.
6. Understood the Agricultural Productivity and Reforms.

UNIT I

Under Development – Meaning, Characteristics and Causes –Determinants of Economic Development – Economic and Non Economic Factors – Concepts of Growth and Development.

UNIT II

Human Resources – Population Growth as a Retarding Factor – Population Policy, National Income – Concept – Its Measurement – Limitations – Recent Trends in National Income.

UNIT III

Agriculture – Features – Role of Agriculture – Agricultural Productivity and Reforms – Food Problem– Green Revolution.

UNIT IV

Industrialisation – Role of Industries in Economic Development – Major Industries – Iron & Steel, Cotton, Textiles, Sugar – Cottage and Small Scale Industries – Industrial Sickness – Industrial Labour Organisation – Industrial Relation –Industrial Policy – 1948, 1956, 1977, 1980 and 1991.

UNIT V

Economic Planning – A Brief Resume of Five Years Plans – The Tenth Five Year Plan – 2002-2007. India's Foreign Trade and Balance of Payments – GATT – WTO and Indian Economy.

Reference Books:

1. Dutt and Sundaram , 2013, “Indian Economy”, 10th edition,Sulthan Chand & Sons.
2. Dhinagara,2013, “I.C Indian Economy”, I st edition,Sulthan Chand& Sons.
3. Jheingan M.L,2011, “Economic Development and Planning”, Vrinda Publication,PLT.
4. Five Year Plan Reports - Govt. of India
5. Jain P.C,1969, “Indian Economic Problem” ,Chitanya Publication house

COURSE OBJECTIVES:

To make the students

1. To know about the concepts of advertising and various types of advertising.
2. To provide students with detailed knowledge of some of the marketing mixes such as Sales and Promotion.
3. To identify the terms and concepts that are commonly used in promotion and advertising.
4. To demonstrate preparation of evaluation tools for promotion and advertising campaigns
5. To understand the motivational aspects of salesmen.
6. To demonstrate preparation to comprehend the basic advertising and promotion concepts and functions.

COURSE OUTCOMES:

Learners should be able to

1. Analyze the expanding environment of media and communication techniques.
2. Assess the strengths, weaknesses, opportunities and threats (SWOT) of different kinds of promotional campaigns.
3. understood the importance of market segmentation, position and action objectives to the development of an advertising and promotion program.
4. Develop creative strategies for advertising.
5. Plan media strategy, scheduling, and vehicle selection.
6. Assess strategic uses of sales promotions.

UNIT I

Advertising – Meaning - Importance – Objectives – Media - Forms of Media- Press - Newspaper, Trade Journal- Magazines- Outdoor Advertising – Posters - Banners- Neon Signs, Publicity, Literature Booklets, Folders - House Organizations - Direct Mail Advertising- Cinema and Theatre Programme – Radio And Television Advertising- Exhibition - Trade Fair – Transportation Advertising.

UNIT II

Advertising Agencies – Advertising Budgets - Advertising Appeals - Advertising Organisations – Social Effects of Advertising - Advertising Copy - Objectives – Essentials – Types - Elements of Copy Writing - Headlines, Body Copy- Illustration- Catchy Phrases and Slogans - Identification Marks.

UNIT III

Advertising Layout – Functions - Design of Layout- Typography Printing Process- Lithography – Printing Plates and Reproduction Paper, and Cloth - Size Of Advertising - Repeat Advertising - Advertising Campaign - Steps In Campaign Planning.

UNIT IV

Sales Force Management - Importance- Sales Force Decision- Sales Force Size – Recruitment and Selection - Training – Methods - Motivating Salesman Controlling - Compensation and Incentives - Fixing Sales Territories - Quota – Evaluation.

UNIT V

Sales Promotion - Meaning - Methods – Promotional Strategy – Marketing Communication and Persuasion – Promotional Instruments - Techniques of Sales Promotion – Consumer and Dealers Promotion - After Sales Service – Packing – guarantee – Personal Selling – Objectives – Salesmanship – Process of Personal Selling – Types of Salesman.

TEXT BOOK

1. Sontaki C.N. 2000. Advertising and Sales Management. Ludhiana: Kalyani Publishers.

REFERENCES

1. Chunawalla, Reddy, Appanaiah. 2001. An Introduction to Advertising and Marketing Research. Mumbai: Himalaya Publishing House.
2. S.A.Chunuwalla, K.C.Sethia. 1997. Foundations of Advertising Theory and Practice, Mumbai: Himalaya Publishing House.
3. Julian Cummins. 1991. Sales Promotion, New Delhi: Universal Book Stall
4. Sandage Fryburger Rotzoll. 1996. Advertising Theory and Practice. Delhi: A.I.T.B.S Publishers and Distributors.

COURSE OBJECTIVES:

To make the students

1. To Understanding the basic concepts of ethics and its role in business, entrepreneurship and economy,
2. To Apply ethical principles in the process of leadership and decision-making,
3. To Become familiar with the benefits of corporate social responsibility in the context of globalized economic and social relations
4. To Identify consequences of unethical business activities on the development of Croatian / transition / global society
5. To be able to recognize the essential characteristics of "good society".
6. To make students aware of the social responsibilities of business.

COURSE OUTCOMES:

Learners should be able to

1. Augmenting the importance of ethics in business and business communication interpersonal relationships.
2. Ability to apply critical and argumentative thinking in the business judgment.
3. Understood the application of fundamental ethical principles in the business decision-making and action taking.
4. Analyze the relationship between macroeconomic policy and good economics, the importance of corporate social responsibility.
5. Understood the importance of the care for the environment and education.
6. Be able to prepare a code of ethics as a statement of norms and beliefs, and shape the company and strategy in business practice companies.

UNIT I

Introduction to Business Ethics – Definition – Meaning - Nature and Objectives of Ethics; Meaning and Nature of Business Ethics; Factors Affecting Business Ethics – Ethical Organization -Characteristics of an Ethical Organization; Corporate Moral Excellence – Corporate Citizenship, Theories of Ethics – Utilitarian, Separatist and Integrative View of Ethics; Stages of Ethical Consciousness in Business; Relationship between Law and Moral Standards.

UNIT II

Ethical Issues in Human Resource Management – The Principle of Ethical Hiring – Equality of Opportunity – Ethics and Remuneration – Ethics in Retirement; Ethical Issues in Operation and Purchase Management – Quality Control; Ethical Problems and Dilemmas in Operations Management; Role of Purchase Manager – Code of Ethics for Purchases; Ethical Issues in Global buyer – Supplier Relationships.

UNIT III

Ethical Issues in Marketing Strategy – Ethical Issues in Marketing Mix – Product – Price – Promotion – Place – Process – People – Physical Evidence; Ethical issues and Consumerism – Consumer Protection – Consumer Welfare – Consumer Delight – Consumer Rights.

UNIT IV

Ethical Issues in Finance – Ethical Issues in Mergers and Acquisitions – Hostile Takeovers – Insider Trading – Money Laundering; Ethical Issues in Accounting Professional Conduct of

Accountants; Ethics and Financial Statements – Fictitious Revenues – Fraudulent Timing Differences – Concealed Liabilities and Expenses – Fraudulent Disclosures and Omissions – Fraudulent Valuation of Assets – Ethical Auditing.

UNIT V

Corporate Social Responsibility (CSR) Meaning – Definition – Methods – Evaluation; Internal Stakeholders – Share holders – Employees – Management; External Stakeholders – Consumers – Suppliers – Creditors – Competitors – Community; Global and Local issues in Management – Black Money – Poverty – Child Labour – Gender equality and so on. Ethical issues in MNCs; Environmental Ethics – Environmental Issues in India – Greening and Green Initiatives – Sustainable Development – Waste Management.

Text Book

1. Business Ethics and Corporate Governance, (2003), ICFAI Center for Management Research, Hyderabad.

Reference Books

1. AC Fernando, 2009, 'Business Ethics – An Indian Perspective', Pearson Education, New Delhi.
2. John R Boatright (2009), Ethics and the conduct of Business, Pearson Education (Singapore) Pvt.Ltd, Indian Branch, Delhi.
3. Cyriac K, 2000, "*Managerial Ethics and Social Issues — Readings and Cases*", *Reading material for Business Ethics, XLRI Jamshedpur*.
4. Fr. McGrath, (2008), SJ Basic Managerial skills for all, Prentice Hall of India, New Delhi.
5. Davis Keith and Blomstorm, (1987), Business, Society and Environment, Tata McGraw – Hill Ltd., New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To help students learn the basic concepts and importance of Management Accounting.
2. To help the students analyze and interpret financial statements.
3. To enlighten students on Financial Statement Analysis with the emphasis on the preparation of fund flow and cash flow statement.
4. To support management in planning, organizing, directing, controlling and decision-making in a variety of business.
5. To help the students estimate working capital with the help of data given
6. To develop skills for decision making.

COURSE OUTCOMES:**Learners should be able to**

1. Students understand the significance of basic concept, importance & Functions of Management Accounting.
2. Students learn Vertical format of Balance Sheet and Profit & Loss Account and also Trend Analysis, Comparative Analysis and also Common Size Statement.
3. Give proper idea on financial statement analysis in practical point of view.
4. Understood the concept of fund flow and cash flow statement.
5. Gain the knowledge about budget control keeping in mind the scope of the concept.
6. Students learn to concept of marginal costing with practical problems.

UNIT I

Introduction to Management Accounting: Meaning, Nature and Scope and Functions of Management Accounting – Relationship between Management Accounting, Cost Accounting and Financial Accounting – Role of Management Accounting in Decision Making – Installation of Management Accounting System.

UNIT II

Financial Statements and Accounting Ratios: Meaning, Nature and Limitations of Financial Statements – Analysis and Interpretations – Types – Common Size, Comparative and Trend Analysis – Meaning, Objectives, Significance and Limitations of Ratios – Classifications of Ratios – Profitability or Activity Ratios, Turnover Ratios, and Financial Ratio.

UNIT III

Fund flow and Cash flow Analysis: Fund Flow Analysis: Meaning – Definition- Uses and Limitation – Procedure for Preparing Fund Flow Statement. Cash Flow Analysis: Meaning – Objectives – Uses and Significance of CFS – Comparison between Funds Flow and Cash Flow Statements – Preparation of Cash Flow Statement as per Cost Accounting Standards.

UNIT IV

Marginal Costing: Meaning, Scope and Objectives of Marginal Costing – Cost Volume Profit Analysis – Contribution – Break Even Point – Margin of Safety – Break Even Chart – Problems Excluding Decision Making.

UNIT V

Budgetary Control: Definition, Objectives, Advantages and Limitations of Budgetary Control, Classification of Budgets, Purchase Budget, Production Budget, Sales Budget, Cash Budget, Flexible Budget, Master Budgets and Zero Based Budgets – Steps in Budgetary Control.

Note: Distribution of marks for theory and problems shall be 20 % and 80 %.

Text Book

1. Jain and Narang,. (2012) Cost and Management Accounting. Ludhiana Kalyani Publishers.

Reference Books:

1. Man Mohan & Goyal. Management Accounting. New Delhi. Sahitya bhavan..
2. Battacharya, S.K. John Dearden. (2011).Accounting for management. New Delhi. Vikas Publishing House Pvt. Ltd.
3. Srinivasan. N.P. (2008). Management and Financial Accounting. New Delhi. Sterling Publishers Pvt Ltd.
4. Khan M.Y. and Jain. P.K. (2008). Management and Cost Accounting. New Delhi Tata McGraw-Hill Publishing Company Ltd.

COURSE OBJECTIVES:

To make the students

1. To provide working knowledge of framework of taxation system in India.
2. To provide thorough knowledge of various concepts and their application relating to direct tax laws with a view to integrating the relevance of these laws with financial planning and management decisions.
3. To provide thorough knowledge of laws and practices of income tax.
4. The course aims to help students to comprehend the basic principles of the laws governing Direct and Indirect taxes.
5. To provide students with a working knowledge of the fundamental tax principles and rules that apply to commonly encountered transactions undertaken by companies and individuals
6. To enable students to appreciate the wider economic, social, administrative-compliance and political contexts within which taxes are imposed.

COURSE OUTCOMES:

Learners should be able to

1. Utilize the definitions of the various components of income tax law.
2. Analyze simple fact situations and recognize income tax ramifications
3. Apply basic tax concepts to simple fact situations and communicate potential income tax ramifications in writing and orally.
4. Apply an understanding of the different ways a case can progress from audit to court.
5. Students with a working knowledge of the fundamental tax principles and rules that apply to commonly encountered transactions undertaken by companies and individuals.
6. Understood the students to appreciate the wider economic, social, administrative-compliance and political contexts within which taxes are imposed.

UNIT I

Income Tax Act 1961: Definition of Income – Agricultural Income – Person - Assessment Year – Previous Year – Assessee – Assessee in Default – Total Income - Scope of income – Charge of Tax – Residential Status – Exempted Income.

UNIT II

Salaries: Computation of Income from Salaries – Different Forms Salary – Allowances – Perquisites and Their Valuation – Deduction from Salary.

UNIT III

House Property and Business Income: Computation of Income from House Property - Profits and Gains of Business or Profession – I – Meaning of Business or Profession – Computation of Profits and Gains of Business or Profession of an Individual – Expenses Expressly Allowed – Expenses Expressly Disallowed.

UNIT IV

Capital Gain and Income from other Sources: Computation of Capital Gain – Computation of Income from other Sources

UNIT V

Computation of Total Income: Deductions to be made in Computing Total Income of Individual – Aggregation of Income - Set off and Carry Forward of Losses. Rates of Tax for Individuals – Computation of Tax Liability.

Note: Distribution of marks for theory and problems shall be 20 % and 80 % respectively.

Text

1. Gaur and Narang,(Assessment Year: 2016 – 2017, 44th Edition). Income Tax Law and Practice. Kalyani Publishers.Ludhiana

References

1. Mehrothra, 2013 Income Tax Law and Practice. Snow White publications. New Delhi
2. Jayaprakash Reddy, 2010 Taxation. APH Publishing Corporation. New Delhi
3. Dinkare Pagarae, 2009 Direct Tax. Sultan Chand and Sons. New Delhi

15CCU503 CORE- SOFTWARE DEVELOPMENT WITH VISUAL BASIC

COURSE OBJECTIVES:

To make the students

1. To enable the students to know the concepts.
2. To introduces computer programming using the Visual BASIC programming language with object-oriented programming principles.
3. To Emphasis is on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger.
4. To learn to students should be able to design, code, test and debug at a beginning level.
5. To understand about the tools and properties.
6. To understand about application and Window based features.

COURSE OUTCOMES:

Learners should be able to

1. Design, create, build, and debug Visual Basic applications.
2. Explore Visual Basic's Integrated Development Environment (IDE).
3. Implement syntax rules in Visual Basic programs.
4. Explain variables and data types used in program development.
5. Apply arithmetic operations for displaying numeric output and decision structures for determining different operations.
6. Apply loop structures to perform repetitive tasks and procedures, sub-procedures, and functions to create manageable code.

UNIT I

VB Fundamentals: Getting Started – The Visual Basic Environment – Customizing a Form - First Step in Programming: The Code Window, Variables, Datatypes, Constants, Strings, Numbers, Statements in Visual Basic: The Comment and the End Statement.

UNIT II

First Steps in Building the User Interface : The Tool Box – Creating Controls –Name Property – Properties of Command Button – Simple Event Procedures for Command Buttons – Image Controls – Text boxes – Labels – Navigating between Controls – Message Boxes – The Grid – Picture Box – Rich Text Box.

UNIT III

Organizing Information via Controls: Control Arrays – List and Combo Boxes – Flex Grid Controls. Controlling Program Flow: Determinant Loops – Indeterminant Loops – Making Decisions - Select Case - Nested - If - Then – The GOTO Statement.

UNIT IV

Built-in Functions. String Functions – Numeric Functions – Date and Time Functions – Financial Functions. Functions and Procedures: Function Procedures and Sub Procedures.

UNIT V

Tool Box Revisited : Frames – Option Buttons – Check Boxes - Scrollbars – Timers - Image List Control – List View Control – Progress Bar Control – Slider Control – Status Bar Control – Menus – MDI forms. Database Objects (DAO & ADO)

Text Book:

1. Gary Cornell. 2005. “Visual Basic 6 from the Ground up”. New Delhi: Tata McGraw Hill Publishing house.

Reference Books

1. Varalakshmi. 2003. “Visual Basic Programmes for Beginners”. New Delhi: Scitech Publication India Ltd.
2. Scoh Jarol. 1995. “Visual Basic Multimedia”. New Delhi: Galgotia Publishing House.

COURSE OBJECTIVES:**To make the students**

1. To enable the students to know the concepts.
2. To understand about the tools and properties.
3. To understand about application and Window based features
4. To E 102 is a technology applications course that is designed to introduce students to formulating and implementing.
5. To analysis and design problems in a digital environment.
6. To formulate one or more solution techniques or algorithms, and code

COURSE OUTCOMES:**Learners should be able to**

1. Demonstrate knowledge of programming terminology and how applied using Visual Basic (e.g., variables, selection statements, repetition statements, etc).
 2. Develop a Graphical User Interface (GUI) based on problem description
 3. Develop an Event Planning Chart based on problem description so as to define the processing that is to occur based on specific events
 4. Develop an Algorithm to verify processing is accurate
 5. Develop and debug applications using Visual Basic 2010 (or version required for the course) that runs under Windows operating system
 6. Develop programs that retrieve input from a file as opposed to input only provided by user
-
1. Write a Program to perform the text manipulation using alignment and format function.
 2. Write a VB program to find the given number is Prime or not.
 3. Write a VB program to calculate the simple interest and the compound interest.
 4. Write a VB program to compute the Total Marks and Display the Results of a Student in the Exams.
 5. Write a VB program to calculate the Quadratic Equation.
 6. Write a VB Program for performing String Operations.
 7. Write a VB program to implement the calculator.
 8. Write a VB program to perform Menu Operations.
 9. Write a VB program to implement flex grid.
 10. Write a VB program to present product details like purchase, sales, profit, etc., by declaring array functions and present details in a rich Text Book box (RTF).
 11. Write a VB program to implement Employee Details Using ADO.
 12. Write a VB program to implement pay slip for an organization and create a database using SQL and ADO control.
 13. Write a VB program to create a bank customer database by declaring simple array and multiple arrays using ADO control.
 14. Write to VB Program to display tree view and list view of folders and files from a directory of an organization.
 15. Write a VB program to implement the Animated Dice.

References Books

1. Gary Cornell. 2005. “Visual Basic 6 from the Ground up”. New Delhi: Tata McGraw Hill Publishing house.
2. Varalakshmi. 2003. “Visual Basic Programmes for Beginners”. New Delhi: Scitech Publication India Ltd.
3. Scoh Jarol. 1995. “Visual Basic Multimedia”. New Delhi: Galgotia Publishing House.

COURSE OBJECTIVES:

To make the students

1. To enhance the student's practical exposure in both Commerce and Computer oriented applications
2. To Knowledge the basic and broad knowledge in business laws in management.
3. To Ability to apply concepts, principles and theories to understand simple business laws.
4. To learn the global Perspective of Awareness of the different business law and its impacts on businesses.
5. To know for shares & allotment, letter of shares and transfer of shares.
6. To learn the students Tax liability, PAN, Filling form-16.

COURSE OUTCOMES:

Learners should be able to

On completion of this course, the students will be able to:

1. Understood the concepts in business laws with respect to foreign trade
2. Students will be able to global business laws to current business environment
3. Understood the principle of international business and strategies adopted by firms to expand globally
4. Integrate concept of business law with foreign trade.
5. Understood the Filling up application forms for admission to Co-operative Societies
6. Understood loan application forms and deposit Challan.

EXERCISES

1. Preparation of Purchase Book, Sales Book, Purchase Return Book, Sales Return Book, Bills Receivable Book and Bills Payable Book
2. Preparation of Entry Pass, Gate Pass
3. Preparation of Inward bill and Outward bill register
4. Preparation of Cost Sheet and Bin Card
5. Applications for shares & allotment, letter of shares and transfer of shares
6. Opening of Savings Account, Current Account and FDR's
7. Filling up application forms for admission to Co-operative Societies
8. Filling up loan application forms and deposit Challan
9. Filling Jewel application for, releasing of Jewellery in jewel loans and repayment
10. Preparation of Agenda and Meeting minutes
11. Computation of Tax liability, PAN, Filling form-16, Preparation of Saral form
12. Drawing, endorsing and Crossing of Cheques, Bills of Exchange and Promissory Note
13. Preparation of an Advertisement copy, collection of advertisement in dailies and journal, critically evaluating the advertisement copy

14. Life Insurance account opening form

15. Post Office- Money order form

Computer Applications Oriented

1. Online Purchase and settlement

2. online Electricity Bill payment

3. E-Ticket Reservation(Bus, Railways, Airways, etc.,)

4. Online Insurance Premium payment

5. Online Mobile recharge

6. Usage of resume wizard

7. Creation of Website

8. Online fund transfer, RTGS, NFT

NOTE:

Students may be asked to collect original or Xerox copies of the documents and affix them on the record note book after having filled up. Drawing of the documents should not be insisted. Distribution of Marks: Practical 75% and Record Note Book 25%

15CCU504A	CORE – ELECTIVE-I CORE- INVESTMENT MANAGEMENT	Semester V				
		L	T	P	C	
		5	-	-	5	

COURSE OBJECTIVES:

To make the students

1. To learn the knowledge and skills to select and employ base level tools for financial analysis.
2. To Understand different investment alternatives in the market
3. To Understand how securities are traded in the market
4. To able to analyze and price different securities
5. To able to Recent Trends Stock market operations
6. To learn the measurement of return

COURSE OUTCOMES:

Learners should be able to

1. Understood the students in understanding the scope of investment.
2. Understood with the stock markets operations in the economy.
3. Understood understanding the various prospects of investment and market operations.
4. Understood the students the company analysis and market structure and Efficient Frontier Portfolio Selection.
5. Familiarizes the students in understanding the scope of investment.
6. Acquaint them with the stock markets operations in the economy and various prospects of investment.

UNIT I

Investment: Nature, Meaning and Scope of Investment – Importance of Investment – Factors Influencing Investment – Investment Media- Features of Investment Programme – Investment Process – Alternative Forms of Investment – Mutual Funds.

UNIT II

Capital Market and Stock Exchange in India- Structure of Capital Market – New Issue Market – Stock Exchanges in India- Mechanics of Trading in Stock Exchange- Legal Control of Stock Exchanges – SEBI and its Role , Guidance- NSE - OTCEI- Recent Trends- Stock Market Operations- Security Market Indicators.

UNIT III

Risk- Causes of Risk- Types of Risk- Return- Measurement of Return.

UNIT IV

Fundamental and Technical and Security Evaluation: Economic Analysis- Industry Analysis- Company Analysis- Technical Analysis-Scope-Basic Theories.

UNIT V

Portfolio Analysis and Management: Portfolio Analysis, Scope-Elements of Portfolio- Markowitz Theory- Sharpe Ideal Model- Efficient Frontier Portfolio Selection - Types of Portfolio- Internal Diversification.

Note: the question paper shall be covered of 100% theory.

Text Book:

1. Avadani, 2009 Edition, Investment Management New Delhi Himalaya Publications.

Reference Books

1. Gopalakrishnan, 2005, Investment Management, Ludiana. Kalyani Publications.
2. Khan & Jain 2002. Investment Management New Delhi.Tata Mcgraw hill.
3. Preeti singh, 2007 Investment Management New Delhi Himalaya Publications.
4. Avadani,2005 Investment Management and Portfolio analysis, New Delhi Himalaya Publications.
5. Rustagi, Investment Management and Portfolio analysis, edition 2009, Iain Book House., New Delhi

COURSE OBJECTIVES:

To make the students

1. To understand consumer behavior in an informed and systematic way.
2. To appreciate the personal and environmental factors that influence consumer decisions.
3. To understand the strategic implications of consumer influences, and marketing decisions.
4. To analyse personal, socio-cultural, and environmental dimensions that influence consumer decisions making
5. To knowledge about Consumer Decision Making Process
6. To know about leadership quality.

COURSE OUTCOMES:

Learners should be able to

1. Understood the personal and Environmental factors.
2. Students will be able to the personal, environmental factors that influence consumer decisions.
3. Understood the consumer groups.
4. Understood the consumer orientation progress.
5. Know about consumer behaviour process.
6. Students will be able to consumer perspectives.

UNIT I

Introduction: Definition, Scope, and Application of Consumer Behavior- Evolution of Consumer Behavior as a Field of Study and its Relationship with Marketing; Behavioral Dimension - Interdisciplinary Nature of Consumer Behavior Studies

UNIT II

The Consumer Decision Making Process: Buying Motives - Buying Roles, Consumer Decision Making Process, Levels of Consumer Decision Making, Perspectives - Models

UNIT III

Psychological Influences on Consumer Decision Making: Consumers Needs and Motivation, Emotions and Mood, Consumer Involvement; Consumer Learning, Personality, Self-concept and Self-image; Consumer Perception, Risk and Imagery; Consumer Attitude: Belief, Attitude and Intention, Formation - Change - Consumer Communication.

UNIT IV

Sociological Influences: Consumer Groups - Consumer Reference Groups, Family and Life Cycle, Social Class and Mobility, Lifestyle Analysis - Culture; Sub-Culture, Cross Culture - Interpersonal Communication and Influence, Opinion Leadership.

UNIT V

Diffusion of Innovation: Consumer Orientation - Diffusion Process, Adoption Process, Consumer Innovators, Multiplicative Innovation Adoption (MIA) Model.

Text Books:

1. Schiffman, Leon.G, Kanuk Leslie Lazar, and Kumar Ramesh. S., “Consumer Behavior”, Pearson Education, 10th Edition, 2012.
2. Gupta S.L & Pal Sumitra, “Consumer Behaviour: An Indian Perspective Text and cases”, Sultan Chand, 2nd Edition, 2011.

Reference Books:

1. Peter Paul J., and Olson Jerry C., “Consumer Behavior and Marketing Strategy”, Irwin/McGraw Hill Higher Education, 2009.
2. Solomon.M.R., “Consumer Behavior: Buying, Having, and Being”, PHI Learning, 9th Edition, 2011.
3. Loudon, David, Bitta Albert Della, “Consumer Behavior: Concepts and Applications”, Tata McGraw Hill Education Private Limited, 4th Edition, 2001.

	Semester V			
	L	T	P	C
15CCU504C	5	-	-	5

CORE – ELECTIVE – II
RETAIL MANAGEMENT

COURSE OBJECTIVES:

To make the students

1. To Retailing and its Evolution, in the Indian and Global Markets.
2. To Exposure to Customer Relationship Management and its Operations in Retailing.
3. To Provide exposure and skills to establish service operations and marketing channel systems.
4. To familiarize the students with organized retail and, the value it creates.
5. To strategic and operational decision-making processes in the organized retail.
6. To supply chain activities which create the value in the organized retail industry

COURSE OUTCOMES:

Learners should be able to

1. Understood the functions of retail business and various retail formats and retail channels.
2. Understood the difference between Retail and Manufacturing Supply Chain.
3. Understand, key drivers of retail supply chain and how to select a retail store location.
4. Analyze Retail Market and Financial Strategy including product pricing.
5. Integrate the various Supply Chain partners and how to collaborate with them?
6. Students will be able to Information Base, Process, Technology, People, Privacy Issues.

UNIT I

Introduction To Retailing: Retail Functions - Rise of Retailing - Consumerism - Challenges - Consumer Proximity - Technology - Rise of Retailing in India - Key Markets - FDI in Retail; Challenges in India - New Entrants - Emerging Sectors - Suppliers and Buyers – Rivalry.

UNIT II

Evolution of Retail: Theories - Retail Lifecycle - Business Models - Ownership, Merchandise Offered, Franchise, Non Store, Direct Marketing, Tele, Vending Machines, Kiosks, Cash and Carry Global Experience - Brand Management.

UNIT III

Customer Relationship Management: Definition - Goals - Concepts - Components - Customer Lifecycle - B2B, B2C, Innovations - Customer Touch Points - CRM leaders, Choice and Establishment, Training - CRM Functions - Support Channels – Strategy Development - Building Components, Analysis, Customer Segments, Common Barriers - Building Infrastructure, Information Base, Process, Technology, People, Ensuring Quality, Privacy Issues.

UNIT IV

Service Operations: Characteristics - Operations - Bench Marking - Strategy – Enterprise Design - Service Quality - Facility Location - Management of Operations -Supply Relationships - Vehicle Routing - Optimizing Techniques - Models – Training.

UNIT V

Marketing Channel Systems: Concepts - Participants - Environment - Behavioral Process - Developing a Marketing Channel - Strategy - Design - Platform - Product / Pricing Issues - Brand Management - Positioning - Repositioning – Franchising.

Text Books

1. Pradhan Swapna, “Retailing Management: Text and Case’s”, McGraw Hill Education. 4th Ed., New Delhi
2. J.N.Jain & P.P.Singh, “Modern Retail Management”, Deep & Deep Publications, New Delhi

15CCU521	INSTITUTIONAL TRAINING	Semester V			
		L	T	P	C
		-	-	-	3

COURSE OBJECTIVES:
To make the students

1. To know the working of Internet, uses of search engines and procedure to develop a web page.
2. To make the students expertise in creating Web Page.
3. To Make After the successful completion of the course the student must know the concepts of Internet and design a Web Page. understand the principles of creating an effective web page,
4. To become the familiar with graphic design principles the relate to web design and learn how to implement theories into practice.
5. To develop skills in analyzing the usability of a web site.
6. To understand how to plan and conduct user research related to web usability.

COURSE OUTCOMES:
Learners should be able to

1. Understood develop the resource of internet
2. Understood the formatting the table organizations
3. Know about the multimedia and control.
4. Understood the about layout positions
5. Students will be able to Evaluate the web technology.
6. Understood the familiar with graphic design principles the relate to web design and learn how to implement theories into practice

UNIT I

Introduction to Internet - Resources of Internet – Hardware and Software Requirements of Internet. Internet Service Providers – Internet Services – Protocols – Concepts – Internet Client and Internet servers.

UNIT II

Introduction to HTML – Functions of HTML in Web Publishing – Basic Structural Elements and their Usage – Traditional Text and Formatting – Using Tables for Organisation and Layout – Forms – Frames and Frame sets - Style Sheets of Formatting - Advanced Layouts and Positioning with Style Sheets.

UNIT III

Using images with HTML – Merging Multimedia, Controls, and Plug-ins with HTML – Using the HTML Object Model and Creating Dynamic HTML Pages – Manipulating Objects and Responding to User Interaction.

UNIT IV

Scripting Basics – Client Side Image Maps – Introducing Java Script – Creating Simple Java Scripts – Using Java Scripts for Forms – Using Java Scripts with Style Sheets.

UNIT V

Introduction to ASP – Active Server Objects – Active Server Components – Cookies - Database Management with ASP. Emerging and Alternate Web Technologies – Active X Controls for the WWW - XML

Text book:

1. Shelly Powers, 2008. “Dynamic Web publishing”, Techmedia.

Reference Books:

1. Harley Hann. 2009. “The Internet Complete Reference”. New Delhi: Tata McGraw Hill Publishing house.
2. Scot Johnson et al.2010. “Using Active Server Pages”. Que.
3. Merser Dave. 2010. “HTML”. New Delhi: Tata McGraw Hill Publishing House.
4. Wyke R Allen. 2012. “Java Scirpt” Unleashed 2000. NewDelhi: Tech media.

COURSE OBJECTIVES:

To make the students

1. To study about the Import and Export Duty in India
2. To gain knowledge of various provisions of Excise Duty
3. To know about Central Sales Tax
4. To know about general procedure of center duty
5. To understand Registration
6. To know Filing of Returns

COURSE OUTCOMES:

Learners should be able to

1. Describe the indirect taxes and criticisms of these taxes
2. Able to Compare and contrast direct tax and indirect tax
3. Understood the Generate examples of indirect tax
4. Understood the General Procedure of Central Excise
5. Students will be able to custom duty Excise.
6. Understood the Abatement of Duty in Damaged or Deteriorated Good

UNIT I

Indian Tax System : Direct and Indirect Taxes – Principles of Taxation – Taxable Capacity – Scope and Functioning - Shifting and Incidence of Indirect Taxes

UNIT II

Central Exercise: Nature and Scope of Central Excise – Important Terms and Definitions Under the Central Excise Act – General Procedure of Central Excise – Clearance and Excisable Goods – Concession to Small Scale Industry Under Central Excise Act, CENVAT.

UNIT-III

Customs Duty - Different Types of Customs Import Duties - Abatement of Duty in Damaged or Deteriorated Goods - Remission on Duty on Lost, Destroyed or Abandoned Goods - Customs Tariff Act 1985 - Customs Duty Drawback.

UNIT-IV

Central Sales Tax Act 1956 - Objectives of the CST – Levy and Collection of CST – Sales and Deemed Sales - Subsequent Sales - Registration - Compulsory Registration - Voluntary Registration - Security from Dealer-Registration Procedure.

UNIT-V

VAT: Introduction to VAT, Goods and Dealers – Categories of Sales – Assessment and Audit – Registration of Dealers – Input and Output Tax – Exempted Sales and Zero Rated Sales – Filing of Returns- Penalties.

REFERENCE:

1. V.S.Datey, “Indirect Taxes”, Taxmann Publications (P) Ltd., New Delhi 2002
2. Balachandran, “Indirect Taxation”, Sultan Chand &Co., New Delhi 2006.
3. R.L.Gupta V.K.Gupta, “Indirect Tax”

CORE – ELECTIVE-II

15CCU602B E-COMMERCE AND INFORMATION TECHNOLOGY

COURSE OBJECTIVES:

To make the students

1. To enable the students to be aware on the emerging changes in marketing and advertising.
2. To successful completion of the course the student must be well versed with the e-Commerce strategies in Practical application.
3. To ecommerce market has also evolved beyond the narrow buying and selling of goods
4. To entertainment and communications
5. To fundamental daily personal services
6. To ecommerce that have the opportunity to substantially enhance the daily lives of all individuals.

COURSE OUTCOMES:

Learners should be able to

1. Understood the Resource Discovery Paradigms
2. Provide Electronic Commerce
3. Understood the informal structure
4. students will be able to concept on video and electronic concepts
5. Understood the information consumer discovery.
6. Students will be able to the opportunity to substantially enhance the daily lives of all individuals.

UNIT I

Advertising and Marketing on the Internet: The New Age of Information-Based Marketing Advertising on the Internet – Charting the On-line Marketing Process-Market Research. Consumer Search and Resource Discovery: Search and Resource Discovery Paradigms – Information Search and Retrieval – Electronic Commerce Catalogs or Directories – Information Filtering –Consumer Data Interface.

UNIT II

Software Agents: Characteristics and Properties of Agents –Technology Behind software Agents – Telescript Agent Language- Safe-Tcl –Applets, Browsers and Software agents – Software Agents in Action. Internet Protocol Suite: Layers and Networking – Internet Protocol Suite – SLIP and PPP – Other Forms of IP-Based Networking-Mobile TCP/IP-Based Networking- Multicast IP- Next Generation IP.

UNIT III

Multimedia and Digital Video: Concepts-Digital Video and Electronic Commerce-Desktop Video Processing-Desktop Video Conferencing. Broadband Telecommunications: Concepts-Frame Relay-Cell Relay-Switched Multimegabit Data Service-ATM.

UNIT IV

Mobile and Wireless Computing Fundamentals Framework- Wireless delivery Technology and Switching Methods –Mobile Information Access Devices-Mobile Data Internetworking Standards- Cellular Data Communication Protocols-Mobile Computing Applications-Personal Communication Service.

UNIT V

Structure Documents: Fundamentals-SGML. CORBA: Distributed Objects. Transaction Processing- Online Purchases-Online Share Trading –Railway/Air Ticket Reservation.

Text Books:

1. Ravi Kalakota & Andrew b. Whinston , “Frontiers of Electronic Commerce”, Dorling Kindersley (India) Pvt.Ltd-2006

Reference Books:

1. Bharat Bhasker , “Electronic Commerce”, Tata Mc Graw Hill Publishing Co Ltd, New Delhi-2006.
2. Daniel Minoli, Emma Minoli “Web Commerce Technology Handbook”, Tata McGraw Hill Publishing, New Delhi.
3. .Dr.C.S.Rayudu,”E-Commerce &E-Business”, Himalaya Publishing House, New Delhi, 2004.

COURSE OBJECTIVES:

To make the students

1. To expose the students to the basics of cyber laws.
2. To enable students to learn laws and rules governing electronic commerce, contracts, IPRs etc.
3. To know rapid growth of the information technology
4. To understand Cyber Law prevents or reduces the damage from cybercriminal activities
5. To understanding the protecting information access, privacy, communications, intellectual property
6. To about the Internet, World Wide Web (WWW), email, computers

COURSE OUTCOMES:

Learners should be able to

1. Understood the Regulation and Cyber law
2. Understood copyright in digital media
3. Know the about Regulators under IT
4. Understand Software Development & Licensing Agreements
5. Understood Legal, Security & Technical Issues in Cyber Contracts
6. Understood Indian Penal Codes and Cyber Crimes.

UNIT I

Cyber Space - Meaning - Interface of Technology - Scope - Regulation. Cyber law: Meaning, Scope of Cyber Laws – UNICTRAL Model Law.

UNIT II

Intellectual Property Issues in Cyber Space - Domain Names and Related Issues- Copyright in the Digital Media - Patents in the Cyber World.

UNIT III

Digital Signature and Information Technology Act 2000 - Reasons - Aims - Objectives and Applications. Regulators under IT Act - Role of Certifying Authority- Digital Signature Certificates - Duties of the Subscribers.

UNIT IV

Electronic Contracts – Meaning – Essential Features – Legal, Security & Technical Issues in Cyber Contracts - Types of Contracts - Employment Contracts - Consultant Agreements – Agreement Related to Sales - Non-Disclosure Agreements – Software Development & Licensing Agreements –Shrink Wrap Contract – Browse Wrap Contract – Escrow Agreements- Provisions Under Information Technology Act 2000.

UNIT V

Cyber Crimes – Types – Indian Penal Codes and Cyber Crimes - Offences and Contraventions.

Text Book

1. Vakul.Sharma, 2011 'Information Technology Law & Practice', Universal law publishing company, New Delhi.

Reference Books

1. Yatindra Singh, 2010, 'Cyber Laws', Universal law publishing company, New Delhi.
2. Sood Vivek, 2001, 'Cyber Law Simplified', Tata McGraw-Hill Education, New Delhi.

COURSE OBJECTIVES:**To make the students**

1. To familiar with graphic design principles that relate to web design and learn how to implement theories into practice.
2. To Develop skills in analyzing the usability of a web site.
3. To Understand how to plan and conduct user research related to web usability.
4. To Learn the language of the web: HTML and CSS grid layout and flexbox.
5. To Learn techniques of responsive web design, including media queries and digital imaging (Adobe Photoshop.)
6. To Develop basic programming skills using Javascript and jQuery and embed social media content into web pages

COURSE OUTCOMES:**Learners should be able to**

1. Students will develop an understanding of the formalistic (aesthetic) aspects of design and visual communication. [MM/MAC]
 2. Students will demonstrate cross-platform (web, mobile, broadcast, print) storytelling skills. [MM/MAC: 4.2]
 3. Students will become familiar with graphic design and/or game theory and be able to apply this theory to real world projects. [IM]
 4. Analyze a web page and identify its elements and attributes.
 5. Students will be able to create web pages using XHTML
 6. Enables students to create Cascading Style Sheets using JavaScript (Client side programming).
-
1. Students will be able to develop basic programming skills using Javascript and jQuery and embed social media content into web pages. Create web pages for a business organization using HTML frames.
 2. Write a program using HTML to display the ordered list and unordered list of a departmental store.
 3. Program to display image and text using HTML tag for an advertisement of a Company product.
 4. Create a table to list out products using HTML tag.
 5. Create a document using formatting and alignment using Java script to display sales letter.
 6. Prepare a resume using Java script.
 7. Create a web site of your department with minimum 5 links using HTML.
 8. Create a document using form to support local process of order form using Java script.
 9. Create a form of the customer survey of the user to enter general name and address Information using Java Script.
 10. Create a frame to display a multiform document using Java script.

Reference Books

1. Thomas .A. Powell. 2012. HTML Computer reference. New Delhi. Tata .
2. Mr Mark Lassoff , 1 edition (April 9, 2013), Javascript for beginners, LearnToProgram Incorporated.

15CCU691	PROJECT	Semester VI			
		L	T	P	C
		-	-	15	5

COURSE OBJECTIVES:**To make the students**

1. To create interest in the minds of students towards Auditing Profession.
2. To familiarize the students with the Principles of Auditing.
3. On successful completion of this course, the student should be well versed in the fundamental concepts of Auditing.
4. To apply the rules and procedures when there is a change in professional.
5. To apply the procedures surrounding conflicts of interest when giving corporate and financial advice.
6. To learn the appointment and Discuss the principles and legal rules applying to books and papers.

COURSE OUTCOMES:**Learners should be able to**

1. Demonstrate an understanding of the nature and scope of auditing and related services.
2. Describe and discuss the regulatory framework of auditing and related services.
3. Understood the ethical standards of an auditor.
4. Understood the stages of an audit and methods of gathering audit evidence.
5. Show understanding and be able to interpret different types of audit reports
6. Be able to the need for the auditor to display integrity, independence and objectivity and importance of ethical conduct for the accounting profession.

UNIT I

Auditing– Origin – Definition – Objectives – Types – Advantages and Limitations – Qualities of an Auditor – Audit Programmes.

UNIT II

Internal Control – Internal Check and Internal Audit –Audit Note Book – Working Papers. Vouching – Voucher – Vouching of Cash Book – Vouching of Trading Transactions – Vouching of Impersonal Ledger.

UNIT III

Verification and Valuation of Assets and Liabilities – Auditor's position regarding the valuation and verifications of Assets and Liabilities – Depreciation – Reserves and Provisions – Secret Reserves.

UNIT IV

Audit of Joint Stock Companies – Qualification – Dis-qualifications – Various modes of Appointment of Company Auditor – Rights and Duties – Liabilities of a Company Auditor – Share Capital and Share Transfer Audit – Audit Report – Contents and Types.

UNIT V

Investigation – Objectives of Investigation – Audit of Computerized Accounts – Electronic Auditing – Investigation under the Provisions of Companies Act.

Reference Books:

1. B.N. Tandon, "Practical Auditing", S Chand Company Ltd.

2. F.R.M De Paula, “Auditing-the English language Society and Sir Isaac Pitman and Sons Ltd,London.
3. Spicer and Pegler, “Auditing: Khatalia’s Auditing” .
4. Kamal Gupta, “Auditing “ , Tata Mcgriall Publications.

COURSE OBJECTIVES:**To make the students**

1. To enlighten the students' knowledge on Banking and Insurance regulation acts.
2. To gain an appreciation of the principles of insurance law and the particular operation of contract law in the insurance context.
3. To develop ability to analyze insurance problems and apply legal doctrine and policy considerations to them.
4. To acquire insight into the structure and substance of insurance policies;
5. To evaluate the effectiveness of legislation in controlling the insurance industry
6. To learn the protecting the interests of consumers of insurance products and insurers.

COURSE OUTCOMES:**Learners should be able to**

1. Understand basic legal concepts and general principles of law;
2. Gain knowledge and understanding of the laws relevant to insurance;
3. Gain knowledge and understanding of the system which applies these laws; and
4. Develop an analytical approach to the application of knowledge and skills to simple problems.
5. Students will be able to insight into the structure and substance of insurance policies.
6. Understood the effectiveness of legislation in controlling the insurance industry.

Unit – I

Banker and Customer – Definition – Relationship - Functions of Commercial Banks – Recent Developments in Banking,

Unit – II

Negotiable Instrument Act - Crossing - Endorsement - Material Alteration – Payment of cheques : Circumstances for dishonour - Precautions and Statutory Protection of Paying and Collecting Banker.

Unit – III

Insurance : Meaning - Functions - Principles : General, Specific and Miscellaneous. Classification of Insurance: Based on Nature, Business and Risk – Impact of LPG on Indian Insurance Industry.

Unit – IV

Legal dimension of Insurance : Insurance Act, 1938 – Life Insurance Act , 1956 – General Insurance Business Act, 1932 – Consumer Protection Act,1986.

Unit - V

IRDA - Mission - Composition of Authority - Duties, Powers and Functions - Powers of Authority - Duties, Powers and Functions- Powers of Central Government in IRDA Functioning

Reference Books:

1. **Varshney**, “ Banking Theory, Law and Practice”, Sultan & Chand Ltd.

2. **Gordon and Nataraj**, “Banking Theory, Law and Practice”, Himalaya Publishing House..
3. **M.L. Tannan**, “Banking Law and Practice”, Thacker & Co Ltd.
4. **B.S Bodla, M.C. Garg & K.P. Singh**, “Insurance - Fundamentals, Environment & Procedures” , Deep & Deep Publications Pvt. Ltd., New Delhi, 2004.
5. **M.N. Mishra**, “Insurance – Principles and Practice”, S.Chand & Company Ltd., New Delhi, 2006

KARPAGAM UNIVERSITY
COIMBATORE-641021
Department of Commerce with Computer Application
B.COM CA (Hons)

For the Student admitted during the year 2015 Batch
Scheme of Examination

Code	Subjects	Ins*	Marks			Exams/hrs	Credit
			CIA	ESE	TOT		
SEMESTER-V							
15CCU505	Company Law	-	40	60	100	3	5
SEMESTER-V1							
15CCU604	Banking And Insurance Law	-	40	60	100	3	5
	TOTAL	-	80	120	200	-	10

Note: The candidate who have secured 75% aggregate marks in each I, II, III and IV semester in Part III papers (Inclusive NME but Excluding Languages) and have passed in single attempt are eligible to register for Honours Degree.

The Student who have registered for Honours Degree shall have to write two theory papers (self study) of credits each one with 5th semester regular papers and another one with 6th semester regular papers(the two papers are considered as Part II papers)

SEMESTER –V

15CCU505

COMPANY LAW

5C

Objectives: To enlighten the students' knowledge on Companies Act. After the successful completion of the course the student should have a through knowledge on Formation of Company, Documents required and Acts pertaining to it.

Unit - I

Company – Definition – Characteristics – Kinds – Privileges of Private Company – Formation of a Company.

Unit - II

Memorandum of Association – Meaning – Purpose – Alteration of Memorandum – Doctrine of Ultravires – Articles of Association – Meaning – Forms – Contents – Alteration of Articles – Doctrine of Indoor management

Unit - III

Prospectus – Definition – Contents – Deemed Prospectus – Misstatement in Prospectus – Kinds of Shares and Debentures.

Unit - IV

Director and Secretary – Qualification and Disqualification – Appointment – Removal – Remuneration – Powers, Duties and Liabilities.

Unit - V

Meetings – Requisites of Valid Meeting – Types of Meeting – Winding up – Meaning - Modes of Winding Up.

Reference Books:

1. **N. D. Kapoor**, “Company Law” Sultan Chand & Sons, New Delhi 2005
2. **Bagriyal A.K**, “Company Law”, Vikas Publishing House, New Delhi
3. **Gower L.C.B**, “Principles of Modern Company Law”, Steven & Sons, London.
4. **Ramaiya A**, “Guide to the Companies Act”, Wadhwa & Co., Nagpur
5. **Singh Avtar**, “Company Law”, Eastern Book Co., Lucknow

SEMESTER – VI

15CCU604

BANKING AND INSURANCE LAW

5C

Objectives: To enlighten the students' knowledge on Banking and Insurance regulation acts. After the successful completion of the course the student should have a through knowledge on Indian Banking and Insurance system and acts pertaining to it.

Unit – I

Banker and Customer – Definition – Relationship - Functions of Commercial Banks – Recent Developments in Banking,

Unit – II

Negotiable Instrument Act - Crossing - Endorsement - Material Alteration – Payment of cheques : Circumstances for dishonour - Precautions and Statutory Protection of Paying and Collecting Banker.

Unit – III

Insurance : Meaning - Functions - Principles : General, Specific and Miscellaneous. Classification of Insurance: Based on Nature, Business and Risk – Impact of LPG on Indian Insurance Industry.

Unit – IV

Legal dimension of Insurance : Insurance Act, 1938 – Life Insurance Act , 1956 – General Insurance Business Act, 1932 – Consumer Protection Act,1986.

Unit - V

IRDA - Mission - Composition of Authority - Duties, Powers and Functions - Powers of Authority - Duties, Powers and Functions- Powers of Central Government in IRDA Functioning

Reference Books:

1. **Varshney**, “ Banking Theory, Law and Practice”, Sultan & Chand Ltd.
2. **Gordon and Nataraj**, “Banking Theory, Law and Practice”, Himalaya Publishing House..
3. **M.L. Tannan**, “Banking Law and Practice”, Thacker & Co Ltd.
4. **B.S Bodla, M.C. Garg & K.P. Singh**, “Insurance - Fundamentals, Environment & Procedures” , Deep & Deep Publications Pvt. Ltd., New Delhi, 2004.
5. **M.N. Mishra**, “Insurance – Principles and Practice”, S.Chand & Company Ltd., New Delhi, 2006

KARPAGAM ACADEMY OF HIGHER EDUCATION,
(Deemed to be University)
(Established Under Section 3 of UGC Act 1956)
MASTER OF COMMERCE (Computer Applications)
M.Com. (CA)
(For the Students admitted during the year 2015 – 2017 Batch onwards)

Scheme of Examination

Course Code	Name of the Course	Objectives and Outcomes		Instruction Hours / Week			Credits	Maximum Marks		
		PEOs	Pos	L	T	P		CIA	ESE	Total
								40	60	100
Semester 1										
15CCP101	Corporate Finance	I,II	a,e	5	-	-	4	40	60	100
15CCP102	Managerial Economics	IV	b,g,h	4	-	-	3	40	60	100
15CCP103	Operations Research	IV	b,g,h	4	1	-	4	40	60	100
15CCP104	Marketing Management	IV	b,g,h	4	-	-	4	40	60	100
15CCP105	Object Oriented Programming with C++	I, II, III	a,e c,d,f,i,j	6	-	-	5	40	60	100
15CCP111	C++ (Practical)	I, II, III	a,e c,d,f,i,j	-	-	4	2	40	60	100
	Journal Paper Analysis & Presentation	III	c,d,f,i,j	2	-	-	-	0	0	0
				25	1	4	22	240	360	600
Semester II										
15CCP201	Applied Cost Accounting	IV	b,g,h	5	-	-	5	40	60	100
15CCP202	Core: Direct Taxation and Tax Planning	III	c,d,f,i,j	5	-	-	5	40	60	100
15CCP203	Core: Insurance and Risk Management	I,II	a,e	5	-	-	4	40	60	100
15CCP204A	Organizational Behavior	I,II	a,e	4	-	-	3	40	60	100
15CCP204B	Modern Management Practice	I,II	a,e	4	-	-	3	40	60	100
15CCP204C	Consumer Behavior	IV	b,g,h	4	-	-	3	40	60	100
15CCP204D	Working Capital Management	I,II, IV	a,e, b,g, h	4	-	-	3	40	60	100
15CCP204E	Advertisement and Sales Promotion	IV	b,g,h	4	-	-	3	40	60	100
15CCP205	Core: Visual Basic.Net	I, II,	a,e	5	-	-	4	40	60	100

		III	c,d,f,i,j							
15CCP211	Core: Practical 2 - VB.Net	I, II, III	a,e c,d,f,i,j	-	-	4	2	40	60	100
	Journal Paper Analysis and Presentation	III	c,d,f,i,j	2	-	-	-			
15OEP201	Open Elective - Stock Market Investments	I, II, III	a,e c,d,f,i,j	-	-	-	3	0	0	100
				26	0	4	26	240	360	600
Semester III										
15CCP301	Core: Management Accounting	IV	b,g,h	6	-	-	6	40	60	100
15CCP302	Business Research Methods and Techniques	III	c,d,f,i,j	5	-	-	4	40	60	100
15CCP303	Core : Java	I, II, III	a,e c,d,f,i,j	5	-	-	5	40	60	100
15CCP304A	Investment Management	III	c,d,f,i,j	4	-	-	3	40	60	100
15CCP304B	International Financial Management	I,II	a,e	4	-	-	3	40	60	100
15CCP304C	International Business	IV	b,g,h	4	-	-	3	40	60	100
15CCP304D	Strategic Management	IV	b,g,h	4	-	-	3	40	60	100
15CCP304E	Industrial Relations	I, II, III	a,e c,d,f,i,j	4	-	-	3	40	60	100
15CCP311	Core Practical 3 - Java	I, II, III	a,e c,d,f,i,j	-	-	4	2	40	60	100
15CCP312	Core Practical 4: SPSS	I, II, III	a,e c,d,f,i,j	-	-	4	2	40	60	100
	Journal Paper Analysis and Presentation	III	c,d,f,i,j	2	-	-	-	-	-	-
				22	0	8	22	240	360	600
Semester IV										
15CCP401	Core: Financial Services	I, II, III	a,e c,d,f,i,j	6	-	-	5	40	60	100
15CCP402	Core: Corporate Administration and Secretarial Practices	I, II, III	a,e c,d,f,i,j	6	-	-	5	40	60	100
15CCP403	Core: Entrepreneurship and Small Business Management	IV	b,g,h	6	-	-	5	40	60	100
15CCP491	Project and Viva – Voce	III	c,d,f,i,j	-	-	12	5	80	120	200
				18	-	12	20	200	300	500
							90	920	1380	2400

PROGRAMME OUTCOMES (PO)

- a) Postgraduates will develop an understanding of various commerce functions such as finance, accounting, financial analysis, project evaluation, cost accounting and gain expertise in computer application.
- b) Postgraduates will have exposure to solve complex commerce problems and analyze problems critically through research based or project based approach of learning with the support of computer applications.
- c) Postgraduates will excerpt information from various sources and apply mathematical, analytical, statistical and IT tools for financial and accounting analysis.
- d) Postgraduates will develop an ability to effectively communicate both orally and in written forms.
- e) Postgraduates will appreciate the importance of working independently and in a team in order to achieve common goals.
- f) Postgraduates will acquire critical and analytical thinking and will be able to apply the same in effective decision making.
- g) Postgraduates will evaluate the implications of uncertainty in global perspective and cross cultural issues that affect the functioning of the system or business.
- h) Postgraduates will acquire professional and intellectual integrity, professional code of conduct, ethics and values to contribute for sustainable development of society by becoming socially responsible citizen.

PROGRAMME SPECIFIC OUTCOMES (PSO)

- i) Postgraduates will acquire ability to employ management knowledge and skills in their career advancement and personal enrichment
- j) Postgraduates will acquire ability to utilize the programming skills or the latest computer application for developing a new software or usage of the existing tool in the decision-making process.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- I. Postgraduates will gain advanced knowledge in the domain of commerce, management and finance
- II. Postgraduates will understand the system functioning and develop the capability of modeling, designing, implementing and verifying a computing system to meet specified requirements while considering real-world constraints.

- III. Postgraduates will attain research insights, professional skills and competencies to enhance lifelong learning and excel in diverse career path
- IV. Postgraduates will adapt to a rapidly changing global environment and become socially responsible and value driven citizens committed to sustainable growth.

Program Educational Objectives	Program Outcomes									
	a	b	c	d	e	f	g	h	i	J
Postgraduates will gain advanced knowledge in the domain of commerce, management and finance	✓				✓					
Postgraduates will understand the system functioning and develop the capability of modeling, designing, implementing and verifying a computing system to meet specified requirements while considering real-world constraints.	✓				✓					
Postgraduates will attain research insights, professional skills and competencies to enhance lifelong learning and excel in diverse career path			✓	✓		✓			✓	✓
Postgraduates will adapt to a rapidly changing global environment and become socially responsible and value driven citizens committed to sustainable growth.		✓					✓	✓		

COURSE OBJECTIVES:**To make the students**

1. To Explain the core concepts of corporate finance and its importance in managing a business
2. To understand the nature, importance, structure of corporate finance related areas.
3. To impart knowledge regarding source of finance for a business.
4. To develop a conceptual framework of finance function
5. To acquaint the participants with the tools, techniques
6. To know the process of financial management in the realm of financial decision making.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the role of a financial manager and their role in taking decisions professionally.
2. Demonstrate knowledge and compute value of money over time
3. Apply the concept to Evaluate the business proposal applying capital budgeting techniques
4. Compute the cost of capital and financial leverage to estimate the optimal capital structure
5. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.
6. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions.

Unit – I

Scope and Functions of Finance – Role of Financial Manager – Goals of Financial Management – Functions of Controller and Treasurers in India

Unit – II

Cost of Capital – Significance – Concepts of Cost of Capital – Cost of Debt Capital, Preference Capital, Equity Capital and Retained Earnings – Weighted Average Cost of Capital

Unit – III

Capital Structure – Concept – Capital Structure Theories – Net Income Theory, Net Operating Income Theory – MM's Proportion on Capital Structure – Determinants of Optimal Capital Structure – Financial and Operating Leverage

Unit – IV

Capital Budgeting Decisions – Investment Evaluation Criteria – Payback Method – ARR – NPV Method – IRR – Profitability Index – Risk Analysis in Capital Budgeting – Nature of Risk – Conventional and Statistical Technique to handle risk

Unit –V

Management of Working Capital – Determinants of Working Capital – Management of Accounts Receivable, Inventory and Cash – Financing of Working Capital – Dividend Theories – Walter’s Model – Gordon’s Model – MM’s Hypothesis – Dividend Policy – Determinants of Dividend Policy.

Note: Theory 60 Marks Problems : 40 Marks

TEXT BOOK

1. **I.M. Pandey** (2014) Financial Management, Vikas Publishing House Pvt. Ltd., New Delhi

REFERENCES

1. **Prasana Chandra** (2012) Financial Management – Theory and Practice, Tata Mc Graw Hill Publishing Company Ltd., New Delhi
2. **Khan M.Y and P.K. Jain** (2014) Financial Management, Tata Mc Graw Hill Publishing Company Ltd., New Delhi

15CCP102	MANAGERIAL ECONOMICS	Semester – I			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To obtain fundamental knowledge on economic concepts and tools that have direct managerial applications.
2. To illustrate the application of economic theory and methodology as an alternative in managerial decisions.
3. To gain a rigorous understanding of competitive markets as well as alternative market structures.
4. To obtain familiarity on the macro level business components like money, banking, monetary policy, fiscal policy, trade, business cycles and balance of payment and understand the forces determining macroeconomic variables such as inflation, unemployment, interest rates, and the exchange rate.
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills
6. To enable students to obtain managerial problem solving skills.

COURSE OUTCOMES:

Learners should be able to

1. Apply the economic way of thinking to individual decisions and business decisions
2. Measure the responsiveness of consumers' demand to changes in the price of a goods or service, and understand how prices get determined in markets,
3. Understand the different costs of production and how they affect short and long run decisions and derive the equilibrium conditions for cost minimization and profit maximization
4. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run
5. Critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.
6. Understand and exhibit the communication skills to convey the thoughts and ideas to the individuals and group.

Unit - I

Nature, Objectives and Scope of Managerial Economics – Role and Responsibilities of Managerial Economist – Circular Flow of Economic Activity – Nature of the Firm – Economic Profit – Profits in the Market System

Unit – II

Demand Theory and Analysis – Supply Theory and Analysis

Unit – III

Production Theory – Cost Theory – Cost Concept – Cost Output Relationship – Break Even Analysis

Unit – IV

Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly, Duopoly, Bilateral Monopoly – Monopsony

Unit – V

Pricing Decision – Pricing of Goods and Services – Pricing and Employment of Inputs – Pricing in Public Sector – Risk and Decision Making – Input – Output Analysis

TEXT BOOK

1. **Varshney and Maheswari** (2014) Managerial Economics, Sultan Chand and Sons, New Delhi

REFERENCES

1. **Heynes, Mole and Paul** (2007) Managerial Economics, Tata Mc Graw Hill Publications, New Delhi
2. **Joel Dean (2011)** – Managerial Economics, Mangal Deep Publications, Jaipur
3. **Sumitra Pal (2011)** Managerial Economics, Mac Millan

COURSE OBJECTIVES:

Course Objectives

This course enables the students

1. To provide essential knowledge on Linear programming
2. To offer practical exposure to transportation and assignment problems
3. To gain the knowledge on Assignment and Queuing Theory Problems
4. To train students on Inventory Control
5. To helps to facilitates the learning of network analysis
6. To enhance learner knowledge in optimal use of performance measures of queues, optimal use of Inventory and Network scheduling with various applications in mathematics

Course Outcomes

On successful completion of this course, the students will be able to

1. Students may gather relevant knowledge for minimizing Operation Cost
2. Students are equipped to cut total cost and able to minimize time required for completing assigned task
3. Students could learn to maintain optimal level of inventory
4. Understand various mathematical applications in industries.
5. Decision making for real time environment.
6. course concentrates on Linear programming, transportation model, Queuing theory and Inventory

Unit – I

Introduction to Operations Research – Application in Management Decision Making – Linear Programming: Formulation of LPP – Graphical Solution to LPP – Simplex Method (using slack variables only)

Unit - II

Transportation Model: Introduction – Mathematical Formulation –Finding Initial Basic Feasible Solutions – Optimum Solution for Nondegeneracy and Degeneracy Model - Unbalanced Transportation Problems and Maximization case in Transportation Problem- Traveling Sales Man Problem.

Unit- III

The Assignment problem - Mathematical Formulation of the Problem – Hungarian Method –Unbalanced Assignment Problem- Maximization Case in Assignment Problem - Travelling Salesman Problem. Queuing Theory : Introduction – Characteristics of Queuing System. Problems in $(M/M/1):(\infty/FIFO)$ and $(M/M/1):(N/FIFO)$ models

Unit - IV

Inventory Control: Introduction – Costs involved in Inventory – Deterministic EOQ Models – Purchasing Model without and with Shortage, Manufacturing Model without and with Shortage -Price Break

Unit - V

PERT and CPM: Network Representation – Calculation of Earliest expected time, latest allowable occurrence time. CPM - Various Floats for Activities – Critical Path- PERT –Time Estimates in PERT- Probability of Meeting scheduled date of Completion of Projects

TEXT BOOK

1. **Kanthi Swarup, Gupta P.K., Man Mohan.,** (2006) Operations Research, Sultan Chand and Sons, New Delhi.

REFERENCES

1. **Sharma J.K.,** (2008), Operations Research Theory Applications, Macmillan India Ltd, New Delhi.
2. **Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K.,** (2005), Resource Management Techniques, A. R. Publications, Nagapatinam.
3. **Shanthi Sophia Bharathi D.,**(1999),Operations Research/ Resource management techniques, Charulatha Publications.
4. **Hamdy A.Taha.,** Operations Research, (2007), Pearson education, Prentice Hall.
5. **Vittal** – Operations Research – Margham Publications

15CCP104	Semester – I			
	L	T	P	C
	4	-	-	4

MARKETING MANAGEMENT

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of marketing, and 4Ps of Marketing
2. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. To apply the marketing concepts and skills lifelong.
4. To understand the recent trends in marketing strategies of a companies.
5. To understand the consumer behavior and to adopt the decision according to the consumer.
6. To know the promotion strategies followed by a company.

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of marketing, and 4Ps of Marketing
2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. Apply the marketing concepts and skills lifelong.
4. Apply the marketing strategies of a company's effectively.
5. To be familiar in behavior of consumer in related to market and to take decision effectively.
6. To implement the correct promotion strategies.

Unit-I

Definition of Marketing and Marketing Management – Object and Importance of Marketing – Evolution of Concept of Marketing – Recent Development in Marketing Concept – Marketing Functions – Approaches to the Study of Marketing – Market Segmentation – Basis – Criteria – Benefits.

Unit-II

Product Policy: Product Planning and Development – Product Life Cycle – Product Line and Product Mix Strategies. Branding: Features – Types – Functions. Packaging: Features – Types – Advantages – Brand Name and Trademark.

Unit-III

Pricing: Definition - Objectives of Pricing Decisions - Factors influencing Pricing Decisions – Methods of Setting Prices – Cost – Demand and Competition – Pricing Policies and Strategies.

Unit-IV

Sales Promotion: Meaning and Definition – Objectives and Importance of Sales Promotion – Personal Selling – Steps in Personal Selling - Advertising – Meaning – Objectives – Functions and Importance – Kinds of Media – Direct Marketing – Multi-level Marketing. Distribution Channels: Types of Channels – Factors affecting Choice of Distribution.

Unit-V

Marketing of Services – E-Marketing – Marketing Ethics – Consumerism – Meaning – Evolution – Types of Exploitation – Consumer Rights – Laws Protecting the Consumer Interest – Consumer Protection Acts – Consumer Courts - Retail Marketing – Methods – Problems – Retail Marketing in India – Customer Relationship Management

TEXT BOOK

1. **R.S.N. Pillai & Bagavathi** (2012), Modern Marketing Principles and Practices, S. Chand & Co Pvt., Ltd, New Delhi.

REFERENCES

1. **CB Gupta and Dr. Rajan Nair** (2014), Marketing Management, Sultan Chand & Sons, New Delhi.
2. **Philip Kotler** (2014), Principles of Marketing, Prentice Hall of India, New Delhi.

15CCP105	OBJECTED ORIENTED PROGRAMMING WITH C ++	Semester – I			
		L	T	P	C
		6	-	-	5

COURSE OBJECTIVES:

To make the students

1. To understand the concept of OOPS with C++
2. To familiarize on the classes, objects, pointers.
3. To comprehend on the working with the files.
4. To critically analyse and write appropriate programme with use of classes, objects and pointers.
5. To develop programming based on the need.
6. To develop programming based on the need.

COURSE OUTCOMES:

Learners should be able to

1. Understand the concept of OOPS with C++ and apply the learning for lifelong.
2. Familiarize on the classes, objects, pointers
3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.
4. Write the program and present orally and in written form.
5. Develop programming based on the need. T
6. Develop practical skills by using C++ Program

Unit - I

Oriented programming- Principles of Object Oriented Programming – a Look at Procedure and Object Oriented Paradigm – Basic Concepts of Object Oriented Programming- Basic Concepts of Object Oriented Programming- Benefits of OOP – Object Oriented Languages – Application of OOP, Beginning with C++ - What is C++? – Applications of C++ - C++ Statements – Structure of C++ Program.

Unit - II

Tokens and Control Structures- Tokens , Expressions and Control Structures – Token – Keywords – Identifiers – Basic and User – Defined Data Types – Operators in C++ - Operator Overloading- Operator Precedence – Control Structure Functions in C++ - the Main Function – Call By Reference – Return by Reference – In line Function – Function Overloading.

Unit -III

Classes and objects – Introduction- Specifying a Class – Defining Member Function – Nesting of Member Functions - Private Member Functions- Arrays within a Class – Static Data Members- Static Member Functions- Array of Objects – Objects as Function Arguments- Friendly Functions- Pointers to Members. Constructors and Destructors

Unit - IV

Operator Overloading – Type Conversions – Introduction – Defining Operator Overloading– Manipulation of String using Operators – Rules for Overloading Operators- Types Conversions. Inheritance – Abstract Classes.

Unit - V

Pointers, Virtual functions and Polymorphism – Pointers to Objects – This Pointer – Pointer to Derived Classes – Virtual Functions. Working with Files – Classes for File Stream Operations Opening and Closing a File

TEXT BOOK

1. **E.Balagurusamy** (2013) Object Oriented Programming with C++, Tata McGraw Hill Publishing company limited

REFERENCES

1. **K.R.Venugopal, Rajkumar. T.Ravishankar** (2013) - Mastering C+, Tata McGraw-hill publishing company limited
2. **D.Ravichandran** (2011) Programming with C++”, Tata McGraw-Hill Publishing Company Limited

COURSE OBJECTIVES:**To make the students**

1. To understand the concept of OOPS with C++
2. To familiarize on the classes, objects, pointers.
3. To comprehend on the working with the files.
4. To critically analyse and write appropriate programme with use of classes, objects and pointers.
5. To develop programming based on the need.
6. To develop practical skills by using C++ Program

COURSE OUTCOMES:**Learners should be able to**

1. Understand the concept of OOPS with C++, classes, objects, pointers, working with file and apply the learning for lifelong.
 2. Develop Program using the Classes, objects and printers.
 3. Critically analyse the need and develop the program in OOPS with C++ required for the situation.
 4. Write the program and present orally and in written form.
 5. Develop programming based on the need.
 6. Develop practical skills by using C++ Program
1. Pay Roll calculation (Using simple program)
 2. Find out EOQ, Minimum Level, Maximum Level, Re-order level (Using simple program)
 3. Write a c++ program to calculate the working capital using class and objects (member Function should be write inside and outside the class)
 4. Calculate Simple Interest and compound interest using inline functions.
 5. Calculate Depreciation – by using constructors and Destructors
 6. Write a C++ program to calculate the sum and product numbers using operator overloading.
 7. Write a c++ program to prepare the cost sheet using inheritance
 8. Calculation of BEP and MOS (give your own data).
 9. Perform bank transactions like deposit, withdrawal, interest's calculation – by using classes and objects.
 10. Program to create the student files and prepare the marks slips by accessing the File.
 11. Write a perform to calculate over all cost of capital

12. Write a program to calculate funds from operation using (member function outside the class)

COURSE OBJECTIVES:**To make the students**

1. To Explain the core concepts of costing, costing types and its importance in managing a business
2. To develop a conceptual framework of costing and to acquaint the participants with the tools, techniques
3. To know the process of cost reduction and control in the realm of decision making.
4. To familiarizes students with the various concepts and elements of cost
5. To Create cost consciousness among the students
6. To provide the students knowledge about use of costing data for Planning, Control and decision making

COURSEOUTCOMES:**Learners should be able to**

1. Explain the core concepts of costing, costing types and its importance in managing a business
2. Develop a conceptual framework of costing and to acquaint the participants with the tools, techniques and process cost reduction and control in the realm of decision making
3. Compute using different costing methods.
4. Demonstrate capabilities of teamwork, problem-solving and critical thinking
5. Communication skills related to finance decisions.
6. course include Material Cost, Labour Cost, Overheads, Process Costing, Activity Based Costing and Target Costing

Unit – I

Cost Accounting – Meaning and Objectives – Importance – Limitations – Limitations of Financial Accounting – Differences between Cost Accounting and Financial Accounting, Cost Accounting and Management Accounting – Methods of Costing – Elements of Cost – Preparation of Cost Sheet – Tender – Quotations – Reconciliation of Cost and Financial Accounting

Unit – II

Material Control – Objectives – Levels of Inventory – EOQ – Methods of Inventory Control – Methods of Valuing Material Issues – Control over Wages – Scrap and Spoilage - Labour - Labour Cost Control – Importance – Systems of Wage Payment – Incentives – Idle Time – Control Over Idle Time – Labour Turnover

Unit – III

Overheads – Classification of Overheads – Allocation, Apportionment and Absorption of Overheads – Methods of Absorption of Overheads

Unit – IV

Process Costing – Features – General Principles – Comparison between Job Costing and Process Costing – Process Losses – Normal Loss – Abnormal Loss – Abnormal Gains – Inter Process Profit – Equivalent Production – Procedure for Evaluation – Joint Product and by Product

Unit-V

Activity Based Costing: Meaning and Methodology of Activity Based Costing (ABC Analysis) -Merits, Demerits and Suitability of Activity Based Costing- Implementation of Activity Based Costing- Draw Back of Conventional Costing - Target costing: Meaning-Characteristics-Principles-Implementation of Target Costing- Installation of Target Costing-Target Costing Vs. Traditional Costing- Life Cycle Costing-Meaning-Definition-Applications of LCC -Importance-Process of LCC

TEXT BOOK

1. **S.P. Jain and K.L. Narang** (2012) Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi

REFERENCES

1. **S.P.Iyyangar** (2005) Cost Accounting Principles and Practices, Sultan Chand and Sons, New Delhi
2. **R.S.N. Pillai and Bhagavathi** (2010) Cost Accounting, Sultan Chand and Sons, New Delhi
3. **S.N. Maheswari** (2013) Cost Accounting, Sultan Chand and Sons, New Delhi

Semester – II			
L	T	P	C
5	-	-	4

15CCP202 DIRECT TAXATION AND TAX PLANNING

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of assessment, assessee, Income heads and the Income Tax laws.
2. To help students to understand different heads of income
3. To learn the tools and techniques to compute the tax for the various income heads.
4. To select the best ways to compute the income tax based on the income heads for various assessee and to gain a lifelong learning for applying the IT calculation for various income heads based on each case of assessee.
5. To communicate orally and in written form the income tax concepts and computations.
6. To be familiar with the laws pertaining to the Income Tax and apply it lifelong.

COURSE OUTCOMES:

Learners should be able to

1. Comprehend on the concepts related to assessment, assessee, Income heads and the Income Tax laws.
2. Compute Income Tax Returns.
3. Provide the students knowledge about Tax planning
4. Formulate the Income Tax calculations by critically analyzing the assessee's situation under various income heads and deductions and acquire a Lifelong practice for computation of Tax under various income heads and deductions for any assessee
5. Communicate orally and in written the Income tax computation under various income heads and deductions.
6. Familiar with the laws pertaining to the Income Tax and its apply it lifelong.

Unit- I

Income Tax Act 1961- Scope of income - Total Income and residential status - income which do not form part of the total income – Income from Salaries.

Unit - II

Income from House Property – Profits and gains of business or profession – Income From business- Income from Profession.

Unit - III

Capital Gains – Capital Gain –Short Term and Long Term Gain - Income from other sources – Aggregation of income- set off and carry forward of losses.

Unit - IV

Deduction out of Gross Total Income - Computation of Total Income- Assessment of Individual.

Unit - V

Tax Planning – Advance payment of tax –Tax Deducted at Source - ETDS Software - Returns to be submitted by various assesses-Different Types of Tax Planning – Tax Software – e-filing Procedure e-filing of income tax return.

Note: The question paper shall cover 40% theory and 60% problems

TEXT BOOK

1. Gaur and Narang (2013) Income Tax Law and Practice, Kalyani Publishers, Ludhiana

REFERENCES

- 1. Mehrothra (2007)** Income Tax Law and Practice, Snow White Publications, New Delhi
- 2. Jayaprakash Reddy** (2014) Taxation, APH Publishing Corporation, New Delhi

15CCP203	INSURANCE AND RISK MANAGEMENT	Semester – II			
		L	T	P	C
		5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. To comprehend on the reforms in Indian insurance industry.
3. To understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. To create awareness among students on various insurance policies and the procedures followed on availing policies
5. To communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
6. To create awareness among students on various insurance policies and the procedures followed on availing policies

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. Comprehend on the reforms in Indian insurance industry.
3. Understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. Communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. Understand the types of risks, risk management, Life and General Insurance
6. Create awareness among students on various insurance policies and the procedures followed on availing policies

Unit – I

Introduction to Risk Management : The Concept of Risk – Risk Vs Uncertainty – Types of Risks: Market Risk, Credit Risk, Operational Risk, Interest Risk, Business Risk, Systematic Risk – Classifying Pure Risks – Methods of Handling Pure Risks – Risk Management Process – Risk Financing Techniques – Risk Management Objectives – Risk Management Information System (RMIS) – Risk Control

Unit - II

Risk Management by Individuals: Factors affecting individual demands for insurance – Risk Management by Corporations – Corporate Risk Management Process – Types of Risk Managing Firms

Unit – III

Growth and Development of Indian Insurance Industry – Regulations of Insurance Business and the Emerging Scenario – Introduction to Life and General Insurance – Life Insurance: Features of Life Insurance – Essentials of Life Insurance Contract – Kinds of Insurance Policies – Premium Determination – Life Policy Conditions

Unit –IV

Fire Insurance – Fire Insurance Contracts – Fire Insurance Coverage – Policies for Stocks – Rate Fixation in Fire Insurance – Settlement of Claims – Marine Insurance: Marine Insurance Contract – Types of Marine Insurance – Marine Cargo Losses and Frauds – Settlement of Claims

Unit – V

Miscellaneous Insurance: Motor Insurance – Employer's Liability Insurance – Personal Accident and Sickness Insurance – Aviation Insurance – Burglary Insurance – Fidelity Guarantee Insurance – Engineering Insurance – Cattle Insurance – Crop Insurance

TEXT BOOK

1. Dr. P.K. Gupta (2015) Insurance and Risk Management, Himalaya Publishing House

REFERENCES

1. Mishra (2012), Insurance Principles and Practice, S. Chand & Sons

2. Periasamy (2011), Insurance Principles and Practice, Himalaya Publishing House, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To understand the basic concepts of organizational behavior.
2. To analyze the individual behavior traits required for performing as individual or group.
3. To obtain the knowledge and skills of perceiving, motivating using different learning styles.
4. To understand how to perform in group and team and how to manage the power, politics and conflict.
5. To recognize the importance of organizational culture and organizational change.
6. The course comprise of Organizational behavior, Personality, Attitude, Stress and Organizational Conflict

COURSE OUTCOMES:**Learners should be able to:**

1. Analyze behavior issues in the context of the organizational behavior theories and concepts.
2. Assess the behavior of the individuals and groups in organization by applying personality, motivation and learning theories.
3. Manage team and resolve conflict arising between the members.
4. Explain how organizational changes held in the company
5. and culture affect working relationships within organizations.
6. Exhibit the communication skills to convey the thoughts and ideas to the individuals and group.

Unit – I

Organizational Behaviour – Nature – Disciplines contributing to Organizational Behavior – Role of Organizational Behavior – Foundations of Organizational Behavior – Implications of Hawthorne Experiments

Unit – II

Individual Difference – Nature – Causes – Models of Man – Perception – Perceptual Process – Perceptual Selectivity – Distortion in Perception – Personality – Determinants of Personality

Unit – III

Attitude – Concepts – Theories of Attitude Formation – Factors in Attitude Formations – Attitude Change. Stress – Causes of Stress – Effects of Stress – Stress Coping Strategies – Individual and Organizational

Unit – IV

Group Dynamics – Concepts and Features of Group – Types of Groups – Formal and Informal Groups – Causes of Informal Organizations – Types of Industrial Organization – Effects of Informal Organization – Group Cohesiveness

Unit – V

Organizational Conflicts – Functional and Dysfunctional Aspects of Conflicts – Role Conflicts – Interpersonal Conflict – Conflict Management

TEXT BOOK

Aswathappa K (2012) Organizational Behaviour, Himalaya Publishing House, Mumbai

REFERENCES

Steven MC Shane (2014), Organizational Behaviour, Tata Mc Graw Hill Publishing, New Delhi

Stephen Robbins (2013), Organizational Behaviour, Prentice Hall of India learning Pvt. Ltd., New Delhi

COURSE OBJECTIVES:

To make the students

1. To Understand the concept of management
2. To understand on the concept of Strategic Management.
3. To understand on the concept of Organizational Structures
4. To identify the concept of Leadership and Quality of Work Life
5. To understand the concept of Team Management
6. To understand the concept of Team Conflict

COURSE OUTCOMES:

Learners should be able to

1. Understand the concept of management
2. Understand on the concept of Strategic Management.
3. Understand on the concept of Organizational Structures
4. Identify the concept of Leadership and Quality of Work Life
5. Understand the concept of Team Management
6. Understand the concept of Team Conflict

Unit – I

Fundamentals of Management - Characteristics of Well managed companies – Managerial Process –Managerial Skills and roles –Managing the Internal and External Environment –Strategies of the Environment Management –Managing for Competitive Advantage –Cost –Quality –Speed –Innovations –Globalization –Challenges of a Manager in the 21st Century

Unit – II

Strategic Management - SWOT Analysis –BCG matrix –Classification of Strategies -Managerial Decision Making –Group Decision Making –Corporate Social Responsibility –Strategies -Indian experiences in CSR

Unit – III

Organizational Structures - Kinds of Organizational Structures - Hybrid and Matrix Structures - Span of Control - Delegation of Authority - Centralized and

Decentralized Structures - Organizing for Optimal Size - Strategies of Responsive Organization - Customer Relationship Management - TQM - 6 Sigma.

Unit – IV

Leadership - Transactional and Transformational Leaders - Traditional and Contemporary Perspective on Leadership - Situational Theories - Developing Leadership Skills - Motivating for Performance - Reinforcements for Performance - Expectancy Theory - Job Enrichment - Empowerment - Establishing Equity and Quality of Work Life.

Unit – V

Management Teams - Managing High Performance Teams - Team Development - Cohesiveness - Managing Conflicts in Team - Managing Technology and Innovations in Competitive Environment - Managing Change - Shaping the future.

TEXT BOOK

1. **Bateman Thomas S,&. Snell Scott A**, (2008), Competing in the New Era, 8th Edition, Tata McGraw Hill Publishing Company Ltd.,

REFERENCES

1. **Certo Sameul C, Certo S. Travis**, (2011), Modern Management: Concepts and Skills; 11th Edition, PHI Pvt. Ltd.,
2. **Pyzdek Thomas** (2014), Six Sigma Project Planner, Tata McGraw Hill Education Pvt. Ltd.,

COURSE OBJECTIVES:**To make the students**

1. To understand the consumer behavior concepts, dimensions used in consumer behaviour research.
2. To recognize the Internal Influencing factors that affect the Consumer Behaviour
3. To identify the external Influencing factors that affect the Consumer Behaviour
4. To conceptualize on the consumer decision making process.
5. To know the application consumer behaviour concepts to access the changing behavior of the customers.
6. To appreciate the personal and environmental factors that influence consumer decisions. To understand the strategic implications of consumer influences, and marketing decisions

COURSEOUTCOMES:**Learners should be able to**

1. Understand the importance of Culture, Subculture, Social Class, Reference Groups
2. Understand the importance of Family Influences in Consumer Behaviour.
3. Explore, analyze and compare the core theories of consumer behaviour and its application in both consumer and organizational markets
4. Appraise models of Consumer Behaviour and determine their relevance to particular marketing situations
5. Critique the theoretical perspectives associated with consumer decision making, including recognizing cognitive biases and heuristics
6. Demonstrate capabilities of teamwork, critical thinking, and communication skills related to investment decisions.

Unit – I

Definition, scope, and application of Consumer Behavior-Evolution of Consumer Behavior as a field of study and its relationship with Marketing; Behavioral Dimension-Interdisciplinary Nature of Consumer Behavior studies

Unit – II

Consumer Decision Making Process - Buying Motives - Buying Roles, Consumer Decision Making Process, Levels of Consumer Decision Making, Perspectives-Models

Unit – III

Psychological Influence on Consumer Decision Making – Consumers Needs & Motivation, Emotions and Mood, Consumer Involvement; Consumer Learning, Personality, Self-concept and Self-image; Consumer Perception, Risk and Imagery; Consumer Attitude: Belief, Attitude and Intention, Formation-Change-Consumer Communication.

Unit – IV

Sociological Influences – Consumer Groups - Consumer Reference Groups, Family and Life cycle, Social Class and Mobility, Lifestyle Analysis - Culture; Sub-Culture, Cross Culture - Interpersonal Communication and influence, Opinion Leadership.

Unit – V

Diffusion of Motivation - Consumer Orientation - Diffusion Process, Adoption Process, Consumer Innovators, Multiplicative Innovation Adoption (MIA) Model.

TEXT BOOKS

1. **Schiffman, Leon.G, Kanuk Leslie Lazar, and Kumar Ramesh. S.,**(2010), Consumer Behavior; Pearson Education, 10th Edition
2. **Gupta S.L & Pal Sumitra** (2013), Consumer Behaviour: An Indian Perspective Text and Cases; Sultan Chand, 2nd Edition

REFERENCES

1. **Peter Paul J., and Olson Jerry C.,** (2010), Consumer Behavior and Marketing Strategy, Irwin/McGraw Hill Higher Education
2. **Solomon,M.R.,** (2014), Consumer Behavior: Buying, Having, and Being, PHI Learning, 9th Edition
3. **Loudon, David, Bitta Albert Della** (2001), Consumer Behavior: Concepts and Applications; Tata McGraw Hill Education Private Limited, 4th Edition

15CCP204D	WORKING CAPITAL MANAGEMENT	Semester – II			
		L	T	P	C
		4	-	-	3

Course objectives:

To make the students

1. Being specialized in finance present day managers to be aware of short term movement of capital and problems related to working capital management
2. To study about the importance of working capital.
3. To learn the factors of cash management.
4. To understand credit policy of receivable management.
5. To learn the various techniques of inventory management.
6. To provide clear view of committee's recommendation on working capital.

Course outcomes (Cos):

Learners should be able to

1. Estimate the requirements and manage the working capital required for the business
2. Analyze the different sources of capital and computation of cost of capital.
3. Develop cash management techniques
4. Evaluate the components of financial leverage, dividend policies and capital structure theories and its application in business.
5. Develop new techniques in managing and controlling inventory in organizations
6. Analyze the Committee recommendations on working capital financing

Unit - I

Working Capital Policy Overall Considerations - Importance of Working Capital Management - Concept of Working Capital - Risk and Return Trade off Financing Working Capital - Sources and Uses of Working Capital - Factor influencing Working Capital Requirements Issues in Working Capital Policy - Size of Working Capital Forecasting and Management of Working Capital.

Unit - II

Cash Management: Importance - Factors influencing Cash Balance Determining minimum Cash Balance - Cash Budgeting - Cash Control Monitoring Collections and Disbursement - Cash Management Models.

Unit - III

Inventory Management - Need for inventories and importance of its Management - Techniques for Managing Inventory - Different Models Recorder - Point - Pricing of Raw Materials and Valuation of Stock - Monitoring and Control of Inventories

Unit - IV

Receivables Management Credit Policy - Credits evaluation credit granting decisions - Control receivables - Collection policy

Unit - V

Financing Current Assets: Trade Credit - Short - term Bank Finance - Commercial paper - Public Deposits - Committees on Working Capital Regulation of Bank credit - Recommendation

TEXT BOOK

1. **Agarwal Gaurav** (2011) Working Capital Management, Vayu Education of India, New Delhi

REFERENCES

1. **Gitmen L.J** (1987), Basic Managerial Finance Harper & Raw
2. **Weston J.F and Copeland T.E** (1995) Managerial Finance, Dryden P. New York
3. **I.M Pandey** (2014) Financial Management, Vikas Pub, New Delhi
4. **Bhalla V.K.** (2013) Working Capital Management, S.Chand Publishing New Delhi

15CCP204E	ADVERTISEMENT AND SALES PROMOTION	Semester – II			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To know about the various types of advertising
2. To understand the motivational aspects of salesmen
3. To understand the concept of sales force management
4. To know about the social effects of advertising
5. To know about the promotional strategy.
6. To introduce the students to latest methods and tools of advertising and sales promotion.

COURSE OUTCOMES:

Learners should be able to

1. Knowing the concepts of advertising.
2. Getting the details about the various types of advertising
3. Understanding the motivational aspects of salesmen
4. Understanding the concept of sales force management
5. Knowing about the social effects of advertising
6. Knowing about the promotional strategy.

Unit - I

Advertising - Features, Purpose, Scope and Function - Classifications - Social and Economic Aspects & Ethical Issues in Advertising - Need for Advertising.

Unit – II

Advertising Process - Advertising Strategy - Psychology of Target Audience - Effectiveness of Advertising - Buying Behavior - Audience Perception -Setting Advertising Objectives, Advertisement Planning and Organization -Advertisement Copy.

Unit - III

Advertising Media - Role of Media - Print Media - Radio and Television - Online Advertising - Media research - Media Selection - Advertising Budget - Evaluation of Effectiveness of Advertising - Areas of Assessment - Media testing

Unit – IV

Sales Promotions - Scope - Functions and Importance - Sales Promotional Methods - Fundamental of Successful Selling - Retail Marketing

Unit – V

Salesmanship - Salesmen Recruitment and Training - Personnel Selling - Skills for Good Salesmanship - Training of Sales Personnel - Motivating and Evaluating Sales Personnel - Sales Records - Rewarding Good Salesmanship

TEXT BOOK

1. **Mahendra Mohan**, (2008) Advertising Management, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. **Philip Kotler, Kevin Lane Keller, Abraham Koshy, Mithileshwar Jha** (2013), 'Marketing Management', Pearson Education, New Delhi.
2. **Rathore (1998)**, 'Advertising Management', Himalaya Publishing House, New Delhi.
3. **Francis Cherunilam** (2010) Advertisement and Salesmanship, Himalaya Publishing House
4. **Varma and Agarwal** (2000), Salesmanship and Publicity, King Books, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of Visual Basics.Net and its application.
2. To learn tools and utilize the tools of Visual Basic.net to design programmes.
3. To communicate orally and in written form the Concept of Visual Basics.Net and its application.
4. To understand the Visual Basic Language and Loops
5. To understand the Object-Oriented Programming
6. To understand the Data Access with ADO.NET

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of Visual Basics.Net and its application.
2. Learn tools and utilize the tools of Visual Basic.net to design programmes.
3. Communicate orally and in written form the Concept of Visual Basics.Net and its application.
4. Know the Visual Basic Language and Loops
5. Know the Object-Oriented Programming
6. Exhibit the Menus and Dialog-Boxes

Unit-I

Getting Started With VB.NET: The Integrated Development Environment-IDE Components- Environment Options. Visual Basic: The Language -Variables-Constants-Arrays – Variables as Objects-Flow Control Statements.

Unit-II

Writing and Using Procedures: Module Coding – Arguments. Working with Forms: Appearance of Forms- Loading and Showing Forms -Designing Menus. Multiple Document Interface

Unit- III

Basic Windows Controls: Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls. More Windows Control: The common Dialog Controls-The Rich

TextBox Control.The TreeView and ListView Controls: Examining the Advanced Controls-The TreeView Control-The ListView Control-Content Page Holder

Unit-IV

Handling Strings, characters and Dates: Handling Strings and Characters – Handling Dates. Working with Folders and Files: Accessing Folders and Files – Accessing Files. Drawing and Painting with Visual Basic: Displaying Images – Drawing with GDI – Co-ordinate Transformation – Bitmaps.

Unit-V

Databases: Architecture and Basic Concepts: What is database? - Server Explorer – Structured Query Language – The Query Builder – Building database Application with ADO.Net: The Architecture of ADO.Net-Creating the dataset – Data Binding – Programming the Data Adapter Objects – The Command and Data Reader Object. Programming the ADO.Net objects: The Structure of the dataset – The DataForm Wizard – Transactions – Performing Update Operations.

TEXT BOOK

1. **Evangelos Petroustos** (2006) Mastering Vb. Net, SYBEX Inc., USA.

REFERENCES

1. **Steven Holzner** (2005) Vb.Net Programming Black Book , Dream Tech Publications, USA
2. **Bill Evjen, Scott Hanselman, Farhan Mohammed, Srinivasa Siva Kumar and Devin Rader** (2006) Asp.Net 2.0, Wiley Publication, USA.
3. **Burrowss W.E and D. Langford** (2003) Learning Programming using Visual Basic .Net, 1st Edition, McGraw Hill, New Delhi.
4. **Jeffrey R. Shapiro** (2008) The Complete Reference Visual Basic.Net, 1st Edition, Tata -McGraw-Hill Edition, New Delhi.
5. **Richard Bowman** (2002) Visual Basic.Net, Hungry Minds Inc. Publication, Canada

COURSE OBJECTIVES:**To make the students**

1. To understand use of classes, objects and create programmes by applying it
2. To understand and write programs VB.Net
3. To Understand the basic approaches to the design of software applications
4. To understand the date and time handling functions
5. To understand the Program using classes and objects
6. To understand the concept of database connectivity

COURSEOUTCOMES:**Learners should be able to**

1. Implement Object Oriented Programming Concepts
2. Use and create packages and interfaces in a VB.Net
3. Use graphical user interface
4. Exhibit communication skills to communicate the output derived from the program.
5. Understand the date and time handling functions
6. Exhibit to develop an application to create inventory management system

VISUALBASIC .NET

1. Calculate Simple interest and compound Interest
2. Find mouse events and coordinates where the mouse is clicked.
3. Implement Calculator.
4. Implement Notepad
5. Draw several shapes and fill with color.
6. Perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
7. Calculate the days elapsed between the given two dates.
8. Create Menu and link multiple forms with different colors.
9. Animate the picture using animation control.
10. Check whether given string is a Palindrome or not.

11. Generate Fibonacci series for the input given using Input box.
12. Calculate the total marks of the student and print the grade
13. Maintain details of students. Use Crystal Report to generate report.
14. Implement Employee Payroll.
15. Create and manipulate a File.

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of investing and mechanics for formulating investment decisions.
2. To communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. To apply the investing concepts and skills lifelong.
4. To analyse the EIC framework make decisions based on investing in different avenues.
5. To Critically evaluate the risk return parameters and select the best alternative.
6. To Communicate in written form and prepare report

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of investing and mechanics for formulating investment decisions.
2. Communicate orally and in written form the concepts of Concept of investing and mechanics for formulating investment decisions.
3. Apply the investing concepts and skills lifelong.
4. Analyse the EIC framework make decisions based on investing in different avenues.
5. Critically evaluate the risk return parameters and select the best alternative.
6. Communicate in written form and prepare report

Unit – I

Investment: Basics of Investment – Investment, Speculation and Gambling – Investment Environment – Investment Categories – SEBI Functions

Unit – II

Stock Market: Markets for Securities and their functions – Primary Markets – Secondary Markets – Processes of Buying and Selling Securities – Types of Securities – Security Market Indicators.

Unit – III

Risk – Return Framework: Security Returns – Measurement of Returns – Concept of Risk – Systematic Risk – and Unsystematic Risk

Unit -IV

Fundamental Analysis: Basics of Economic Analysis and Industry Analysis – Company Analysis – Non Financial Parameters – Financial Parameters – Analysis of Financial Statements.

Unit-V

Technical Analysis: The Dow Theory – Technical indicators of the Overall Market –Indicators for Individual Stocks – Charting Techniques.

TEXT BOOKS

1. **Avadhani V.A.** (2014), Securities Analysis and Portfolio management, Himalaya Publishing House, Delhi
2. **Preethi Singh**, (2014), Investment Management, Himalaya Publishing, Delhi,

REFERENCES

1. **Bhalla V.K.**, (2009), Investment Management, S. Chand & Co, New Delhi
2. **Gopalakrishnan** (2005) Investment Management, Kalyani Publications
3. **Dhanesh Kumar** (2010) Investment Management and Security Analysis, Mac Millan Publication, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. To comprehend on the contemporary issues relevant to accounting concepts.
3. To analyse the alternatives using appropriate tools and techniques.
4. To solve the problems and take decisions based on the result.
5. To communicate orally and in written form the concepts and solutions.
6. To provide the students knowledge about budgetary control.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of management accounting, costing behaviour, budgeting and enrich the lifelong learning.
2. Comprehend on the contemporary issues relevant to accounting concepts.
3. Analyse the alternatives using appropriate tools and techniques.
4. Solve the problems and take decisions based on the result.
5. Communicate orally and in written form the concepts and solutions.
6. course incorporates Financial Statement Analysis, Ratio Analysis, Fund Flow and Cash Flow Analysis, Budgeting and Marginal Costing

Unit – I

Management Accounting – Meaning – Definition – Objectives and Scope – Relationship between Management Accounting and Financial Accounting – Management Accounting and Cost Accounting

Unit – II

Financial Statement Analysis – Types of Financial Statement Analysis - Ratio Analysis – Meaning – Uses – Limitations – Classification of Ratios – Computation of Ratios from Financial Statements

Unit – III

Fund Flow Analysis – Cash Flow Analysis – Working Capital Statements – Funds from Operations

Unit – IV

Budgetary Control – Flexible Budget – Sales Budget – Cash Budget – Production Budget – Purchase Budget

Unit – V

Marginal Costing – Break Even Analysis – Applications of Marginal Costing Techniques – Determination of Sales Mix – Key factor – Make or Buy Decision (Simple Problems Only)

Note: Theory -20% Problems - 80%

TEXT BOOK

1. **S.N. Maheswari** (2007) Management Accounting, Kalyani Publishers, New Delhi

REFERENCES

1. **Sharma Shashi K. Gupta** (2003) Management Accounting, Kalyani Publishers, New Delhi
2. **P.K. Khan and Jain** (2009) Management Accounting, Tata Mc Graw Hill, New Delhi

15CCP302	BUSINESS RESEARCH METHODS AND TECHNIQUES	Semester – III			
		L	T	P	C
		5	-	-	4

COURSE OBJECTIVES:

To make the students

1. To understand the basic framework of research and research process and its important in business decision.
2. To develop an understanding of various research designs and sampling techniques and its application.
3. To identify appropriate sources of information and methods of data collection for solving a business issue.
4. To understand the selection of appropriate tools to analyse the quantitative and qualitative data.
5. To understand the ethical norms for research and select the best type of research report and be familiar with the content to be included in the report.
6. To gain the sampling techniques along with hypothesis testing.

COURSE OUTCOMES :

Learners should be able to

1. Assess the best suitable research type and formulate the research objective for the business problem.
2. Formulate the suitable research designs and select appropriate sampling techniques for the research.
3. Select the appropriate data collection method for solving the business issue and decide the appropriate measurement scale for designing the instrument for data collection.
4. Apply appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.
5. Demonstrate capabilities of team work, problem-solving, critical thinking, and communication skills and design a suitable research report based on the ethical norms of research.
6. The course comprise of Types of Research, Research Design, Sampling, Data Collection, Scaling Techniques, Hypothesis Testing and Statistics

Unit-I

Introduction to Research: Meaning – Purpose – Types of Research – Significance – Qualities of a good research – Steps in Research - Identification, Selection and Formulation of Research Problem. Research Design: Components of Research Design – Methods of Research Design.

Unit-II

Sampling Design: Census and Sample Survey – Characteristics of a Good Sample Plan – Steps in Sampling – Types of Sampling – Advantages and Limitations of Sampling. Data Collection: Primary Data - Meaning – Significance – Methods of Collecting Data: Observation – Interview Schedule – Questionnaire. Secondary Data – Meaning - Sources of Secondary Data – Precautions while using Secondary Data.

Unit-III

Scaling Techniques: Meaning of Scale–Measurement of Scale – Important Scaling Techniques - Processing of Data - Editing – Purpose – Analysis and Interpretation of Data: Meaning – Need for Interpretation – Techniques of Interpretation.- Report Writing: Types of Research Reports – Layout of the Report – Steps in Writing the Report – Contents of Research Reports

Unit-IV

Hypothesis: Characteristics of a good Hypothesis – Formulation of Hypothesis – Procedure for Testing of Hypothesis – T test, F test and Chi Square Test, Analysis of Variance - Business Forecasting – Exponential Smoothing

Unit-V

Descriptive Statistics - Measures of Central Tendency: - Mean, Median and Mode - Standard deviation – Karl Pearson Correlation – Spearman Rank Correlation - Regression Models – Inferential Statistics – Multivariate Analysis - Factor Analysis – Kruskal Wallis Test

Note:

The question paper shall cover 80% theory and 20% problems

TEXT BOOK

1. **C. R. Kothari**, (2014) Research Methodology – Methods and Techniques, New Age International (P) Limited, Publishers, New Delhi

REFERENCES

1. **Anil Kumar Gupta** (2011) Research Methodology: Methods and Techniques, Vayu Education of India, New Delhi
2. **O.R. Krishnaswami and M. Ranganatham** (2014), Methodology of Research in Social Sciences, Himalaya Publishing House Pvt. Ltd., Mumbai.
3. **S.P. Gupta** (2014), Practical Statistics, S. Chand and Co., New Delhi.
4. **Dr.A. Vinayagamoorthy** (2013), Business Research Methods, Vaishali Publications
5. **Saravanavel** (2008) Research Methodology, Kitab Mahal
6. **Rao** (2013) Research Methodology in Commerce and Management, Streling Publishers

COURSE OBJECTIVES:**To make the students**

1. To understand of fundamental programming constructs and concepts
2. To comprehend on the object-oriented programming concepts of Class and Object
3. To gain knowledge on the packages and interface and its applications.
4. To obtain the application of Multi thread models in programming
5. To know about the applet class and its application
6. To know about the Creating an executable applet

COURSEOUTCOMES:**Learners should be able to**

1. Obtain programming skills in the Java programming language,
2. Gain knowledge of object-oriented paradigm in the Java programming language
3. Know about the usage of the Java programming language for various programming technologies
4. Understand to usage tools to design webpage using the java programming and realize the usage of standard and third-party Java's API's when writing applications.
5. Exhibit the communication skills to convey the output of the programme.
6. Gain knowledge of Creating an executable applet

Unit – I

An overview of Java: Object oriented programming – Java features – Java environment - Data types, variables and arrays. Operators- Expressions - Control Statements: Branching statements – Iteration statements – Jump statements – Sample java program.

Unit – II

Classes – Objects – Methods – Constructors – The this keyword – finalize () method – Overloading methods – Returning objects – Recursion – Static – Final – Nested inner classes – Command line arguments – Inheritance.

Unit – III

Packages and Interfaces: Packages – Access protection – Importing packages – Interfaces – Exception handling: Fundamentals – Exception types – Try and catch – Multiple catch – Nested try – throw – throws – finally – Build in exception.

Unit – IV

Multithread programming: Thread model –Life cycle of thread – Creating thread – Multiple threads – Thread priorities – Synchronization – Inter thread Communication – Suspending, Resuming and Stopping threads – I/O Applets, and other topics.

Unit – V

The Applet Class: Basics – Building applet code – Applet life cycle – Creating an executable applet – Designing a web page – Running the applet – Getting input from the user – Graphics programming: The graphic class – Lines and rectangles – Circles and ellipses – Using control loops in applets – Drawing bar charts.

TEXT BOOK

Partrick Naughton (2002) Java Hand Book First edition New Delhi McGraw hill osborne Media

REFERENCES

Herbert Schmidt (2007) Java Complete Reference, Tata McGraw hill 2000. ISRD groups, ,”Introduction to object oriented programming through Java” First edition ,Tata McGraw hill.

E.Balagurysamy (2009) Programming with Java, Third edition, Tata Mcgraw-hill Publishing Company limited.

Schildt, (2011) Java Completer Reference, Seventh Edition , Tata Mcgraw-hill Publishing Company limited.

C.Muthu (2008) Java Programming Essentials ,Vijay Ni Code Imprints(P) Ltd.

COURSE OBJECTIVES:**To make the students**

1. To understand of investment concepts and investment avenues available.
2. To calculate the intrinsic value of securities and understand risk-return relationship.
3. To know about the fundamental analysis and technical analysis and its application.
4. To comprehend the investment theory and its relevance in the current context.
5. To recognize different performance measures and evaluate the performance of the portfolio.
6. To enlighten the students on the various methods of Portfolio management adopted in practice.

COURSE OUTCOMES:**Learners should be able to**

1. Choose the appropriate investment avenues based on the individual risk return profile.
2. Calculate the intrinsic value and evaluate the performance based on risk-return.
3. Select the security based on the fundamental and technical analytical tools.
4. Evaluate the performance of the portfolio using the different measures.
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to investment decisions.
6. consists of Concepts of Investment, Types of Risk, Stock Market, Fundamental and Technical Analysis and Portfolio Analysis

Unit- I

Introduction of Investment: Concepts of Investment – Common Forms of Investment - Types of Securities – Government Securities – Government Securities Market — India Money Market and Capital Market Institutions- Risk and Return – Systematic and Unsystematic Risk.

Unit - II

Stock Markets: Concepts – Bull- Bear-PE Ratio-Different Stock Market Ratio - SEBI - Structure – Functioning – NSE and BSE – Functions – Listing of Securities – New Issue Market- Mechanics of Trading in Stock Exchange – Evaluation of Securities, Equity , Preference, Debt, Hybrid Securities, - OTCEI .

Unit - III

Fundamental Analysis - Economic analysis and Industry analysis: Asset Pricing Theories – APT- Option Pricing Theory – Economic Analysis –Economic Forecasting – Stock Investment Decision Techniques - Company Analysis – Industry Analysis

Unit - IV

Technical Analysis–Charting Methods – Market Indicators – Trend Analysis - Trend Reversal – Patterns Moving Average – Exponential Moving Average – Oscillators –RSI - Fundamental Analysis Vs. Technical Analysis.

Unit - V

Portfolio Analysis: Methods of Portfolio Construction – Selection of Portfolio Management- Practical Aspects – Performance Evaluation - Portfolio Revision – Problems.

Note: This Paper consisting of 80% Theory and 20% Problem.

TEXT BOOK

1. **Preeti Singh** (2014) Investment Management – Himalaya Publishing House, Bangalore

REFERENCES

1. **Prasanna Chandra** (2012) Investment Analysis and Portfolio management , TMH, 2nd Edition.
2. **Fisher Donald** (2000) Security Analysis & Portfolio Management, Prentice Hall of India, New Delhi
3. **V A Avadhani** (2011) Securities Analysis & Portfolio Mgmt., Himalaya Publishing House, Bangalore
4. **Kevin S** (2005) Portfolio Management, Prentice Hall of India Pvt., Ltd., New Delhi

	Semester – III			
	L	T	P	C
15CCP304B INTERNATIONAL FINANCIAL MANAGEMENT	4	-	-	3

Course Objectives

To make the students

1. To make the students understand principles of financial management
2. To enable the students to take investment decisions.
3. To help the students to make financial decisions.
4. To provide the students with the basic knowledge of Dividend decisions.
5. To impart knowledge of working capital and cash management.
6. To provide knowledge on Foreign exchange and its significance in a developing economy

Course Outcomes

Learners should be able to

1. Students will be familiarized with basic concepts of financial management.
2. Students will know the technicalities of making investment decisions.
3. Students will be capable of making financing decisions.
4. Students will be familiarized with concepts of dividend decisions.
5. Students will be capable of making working capitalization and cash management.
6. course includes Balance of Payment, International Monetary System, Foreign Exchange Market, Foreign Exchange Risk and International Financial Market Instruments

Unit - I

IFM- Nature and Scope, IFM and Domestic Financial Management- Balance of payments - Significance- Preparation of BOP Statement - Link between BOP and the Economy.

Unit - II

International Monetary System - Gold Standard - IMF and World Bank Exchange Rate Mechanism - Factors influencing Exchange Rate - Purchasing Power Parity and Interest Rate Parity Theorems.

Unit - III

Foreign Exchange Market Transactions Spot, Forward, Futures, Options and Swaps - Arbitrage and Speculation in Foreign Exchange Market.- Exchange Arithmetic, Spread, Premium and Discount. – Currency Derivatives and Swaps

Unit - IV

Foreign Exchange Exposure - Managing Transaction, Translation and Operating Exposure - Techniques for covering the Foreign Exchange Risk - Internal and External Techniques of Risk.

Unit -V

International Financial Market Instruments - International Equities - ADR and GDR - Foreign Bond and Euro-bond - Short-term and Medium-term instruments.

TEXT BOOK

1. **V.Sharan** (2012) International Financial Management, 4th Edition, Prentice Hall of India

REFERENCES

1. **Bhalla V,K.** (2007) International Financial Management, Anmal Publications Pvt. Ltd., New Delhi
2. **Apte** (2011) International Financial Management, Tata Mc Graw Hill Public Co., Ltd., New Delhi

15CCP304C	INTERNATIONAL BUSINESS	Semester – III			
		L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

To make the students

1. To make the students to understand the concepts of International business
2. To know the export procedure for production and shipment
3. To enhance knowledge in EXIM policy
4. To understand the Logistics and International marketing channel decision.
5. To get an insight on the need for documentation, Process of obtaining Export and Import License
6. To Understand the Concept of Export, EXIM strategies, custom clearance and Export incentive schemes.

COURSE OUTCOMES:

Learners should be able to

1. Comprehend the concepts of International business, trade procedures and Exim Policy apply lifelong
2. Understand the basics of shipment, foreign trade and international agencies and agreement.
3. Demonstrate capabilities of analysing problems, team work and communication skills
4. Develop knowledge on international financial institutions
5. Acquire knowledge on foreign trade.
6. Understand Financing of foreign trade and Documentation.

Unit – I

International Business - Meaning, Nature and Scope - Role of Foreign Trade in the Economic Development of India - Balance of Payment in the context of Economic Growth Process - Trade Balance - Current Account Position and Capital Account Position - Trends - Principles of BOP - Correction of adverse BOP.

Unit-II

Euro Currency Market - GATT - WTO, World Bank and IMF - Functions

Unit -III

Export Marketing - Meaning - An overview of export marketing - Differences between Export Marketing and Domestic Marketing - Salient Features and Basic Functions of Export Marketing - Export Barriers - Tariff and Non-tariff - Export Market Analysis - Feasibility of Market Entry - Sources of Market Information - Assessing Sale Prospects

Unit -IV

Composition and Direction of India's Imports and Exports - Past Trends, Present Position and Prospects - Project Consultancy and Service Exports - Trends, Prospects and Problems - Important Documents used in Foreign Trade.

Unit -V

Foreign Exchange - Theories of Foreign Exchange - Administration of Foreign Exchange - Rate Determination - Factors influencing fluctuations in Foreign Exchange - Exchange control in India.

TEXT BOOK

1. **Subba Rao** (2008) International Business, Himalaya Publishing House, Mumbai

REFERENCES

1. **Francis Cherunilam** (2010), International Business Text and Cases, Prentice Hall of India, New Delhi
2. **Daniel S John D** (2012) International Business, Himalaya Publishing House, Mumbai

15CCP304D	STRATEGIC MANAGEMENT	Semester – III			
		L	T	P	C
		4	-	-	3

Course Objectives:

1. To expose participants to various perspectives and concepts in the field of Strategic Management
2. To get the knowledge on setting mission and vision for organization growth
3. To help participants develop skills for analyzing business environment to the solution of business problems
4. To carry out effective SWOT analysis and learn core competence of business
5. To acquaint students with strategy formulation and implementation techniques
6. To help students master the analytical tools of strategic management

Course Outcomes (Cos) :

1. Set the mission and vision in personal and organizational level
2. To analyze the environment in strategic planning and ability to take Strategic decisions
3. To be able to apply the basic concepts, principles and practices associated with strategy formulation and implementation.
4. To be able to analyze industry factors, and identify their impact on profitability and strategic positioning
5. To be able to assess the resources and constraints for strategy making in a business Organization
6. Communicate effectively strategic evaluation and control techniques

Unit – I

Strategic Management – Meaning and Definition, Strategic Management Process – Forming Vision, Setting objectives, Crafting a Strategy, Implementation and Evaluation, Characteristics, Benefits of Strategic Management, Dysfunctions of Strategic Management

Unit – II

Industry Analysis and Competitive Environment. The Macro Environment – Demographic, Political, Social and Cultural. Technological, Global Environment – Assessing the impact of General Environment. The Micro Environment – the Competitive Environment – The five forces of Competition, New Entrants, Direct Competition, Buyers, Suppliers and Substitutes – Rivalry in the Industry

Unit – III

Evaluating Company Resources and Competitive Capabilities – Identifying Company Strengths and Resource Capabilities – Identifying Company Weaknesses and Resource Deficiencies, Identifying Company Competencies and Capabilities, Identifying a Company's Market Opportunities, Identifying Threat to a Company's Future Profitability (SWOT Analysis). Strategic options for achieving Cost Competitiveness. The Value Chain – Primary and Support Activities

Unit – IV

Strategy and Competitive Advantage – Low Cost Leadership Strategies, Differentiation Strategies, Focus Strategies. Merger and Acquisition – Vertical Integration Strategies. First-Mover Advantages and Disadvantages. Strategy and competitive advantage over the Life Cycle

Unit- V

Responding to shifts in competitive Advantages – New Developments affecting Competitive Advantage – New Technology –New Distribution Channel, Economic Shifts – change in the neighboring industries and change in Government Regulation. Response options – Prospecting, Defending, and Harvesting. Uncertainty – Impact of Environmental Development, Ability to Adjust

TEXT BOOK

1. **Robert A.Pitts and David Lei**, (2009), Strategic Management-Building and Sustaining Competitive Advantage, Published by South –Western, Thomas Learning Inc. New Delhi.

REFERENCES

1. **Arthur A. Thompson, Jr. and A.J. Strickland** ,(2007), Strategic Management – Concepts and cases, Tata Mcgraw Hill Co, New Delhi.
2. **John A.Pearce II and Richard B.Robin son,Jr**, (2010), Strategic Management-Strategy Formulation and implementation, A.IT.B.S and Distributors, New Delhi.

COURSE OBJECTIVES:
To make the students

1. To Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. To comprehend on the reforms in Indian insurance industry.
3. To understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. To communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. To offer knowledge on managing industrial relations and the processes, regulations and the authorities regarding industrial relations.
6. To enable students acquire knowledge on fundamental objects and principles of individual laws; understand the significant provisions of the various Acts applicable to Labour Legislation.

COURSE OUTCOMES:
Learners should be able to

1. Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. Comprehend on the reforms in Indian insurance industry.
3. Understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. Communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. The course encompass Labour Problems, Trade unionism, Industrial Disputes, Management and Personnel Administration and Grievances
6. Course includes Factories Act, Workmen Compensation Act, Wages Act, Gratuity Act, Bonus Act and Industrial Dispute Act

Unit – I

Labour Problems and Labour Market, Indian Labour Market -Employers Organisations Definition, Types, Role and Functions, Origin, Growth and Pattern of Employers Organisations in India. Issues relating to Employers Organisations in India.

Unit - II

Trade Unionism: Definition, Approaches to Trade Unions, Types of Unions, Functions and Role, History of Trade Unions in India, Problems and Future.

Unit - III

Industrial Disputes, Forms, Causes Prevention and Settlement -Legislative Measures. Analysis of Disputes, Industrial Relations Machinery in India.

Unit - IV

Management and Personnel Administration - Managing, Working and living in a Changing world. Managers and their Personnel Concepts. Personnel Administration and the Line Organisation. Organisation Structure and Management Development

Unit -V

Diagnosing Organisational Health Situational Thinking; A Systematic Approach - Interviewing -Indicators of Organisational Health -Personnel Research Turnover and Internal Mobility, Complaints and Grievances, Occupational Safety and Health Trends.

TEXT BOOK

1. **C.B. Memoria, Satish Mamorai and S.V. Gankar (2013)**, Dynamic of Industrial Law, Himalaya Publishing House Pvt. Ltd.,

REFERENCES

1. **Singh** (2008) Industrial Relations and Labour Laws, Excel Books, New Delhi
2. **Arora** (2007) Industrial Relations, Excel Books, New Delhi
3. **Monappa Arun** (2012) Industrial Relations, Tata Mc Graw Hill New Delhi

15CCP305 LOGISTIC AND SUPPLY CHAIN MANAGEMENT	Semester – III			
	L	T	P	C
	-	-	-	3

COURSE OBJECTIVES:

To make the students

1. To understand the concept and functions of logistics management.
2. To learn the basics of supply chain management and supply chain relationship
3. To communicate the knowledge on logistics information system
4. To critically evaluate the design of operational mechanism of warehouse and logistics administration
5. To Introduce the concept and impact of Logistics and Supply Chain Management, with a competitive strategy overview.
6. To expose the various dimensions of Financial Supply Chain Management with the perspective of e-finance and its legal aspects

COURSEOUTCOMES:

Learners should be able to

1. Understand the concept and functions of logistics management.
2. Analysis the basics of supply chain management and supply chain relationship
3. Communicate the knowledge on logistics information system
4. Critically evaluate the design of operational mechanism of warehouse and logistics administration
5. course consists of Inventory Management, Warehousing and Supply Chain Management
6. Expose the various dimensions of Financial Supply Chain Management with the perspective of e-finance and its legal aspects

Unit – I

Introduction to Logistics- Fundamentals of Logistics-Definition and Activities-Aims and Importance-Progress in Logistics and Current trends-Organization and achieving integration

Unit-II

Planning the Supply Chain - Logistics Strategy-Implementing the Strategy-Locating Facilities-Planning Resources-Controlling Material Flow

Unit-III

Measuring and Improving Performance of Supply Chain - Procurement-Inventory Management -Warehousing and Material Handling Transport-Global Logistics

Unit-IV

Supply Chain Management - Basic Concepts of Supply Chain Management- Planning and Sourcing-Making and Delivering Returns-IT and Supply Chain Management

Unit - V

Financial Supply Chain-Elements of Financial Supply Chain Management-The Evolution of e-Financial Supply Chain-E-Financial Supply Chain' (Banks Perspective)- Legal Aspects of e-Financial Supply Chain

TEXT BOOK

1. **Agarwal** (2003), Logistics and Supply Chain Management, Mac Millan India Pvt., Ltd., New Delhi

REFERENCES

1. **Donald Waters** (2009), Supply Chain Management : An: Introduction to Logistics, Palgrave Macmillan
2. **Christopher Martin** (2005), Logistics and Supply Chain Management: Creating Value Adding Networks, 2nd Edition, FT Prentice Hall

15CCP311	PRACTICAL 3 - JAVA	Semester – III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES:

To make the students

1. To understand and write programs the JAVA programming language
2. To Use standard and third-party Java's API's when writing applications.
3. To test a Java application of medium complexity, consisting of multiple classes.
4. To understand Java-based software code of medium-to-high complexity by applying it
5. To Understand the basic approaches to the design of software applications.
6. To understand the perform string operations

COURSEOUTCOMES:

Learners should be able to

1. Implement Object Oriented Programming Concepts
2. Use and create packages and interfaces in a Java program
3. Use graphical user interface in Java programs and handle security implementations in Java
4. Create Applets; Implement exception handling in Java; implement Multithreading and use Input/output Streams
5. Exhibit the multiplication tables by multithreading
6. Exhibit communication skills to communicate the output derived from the program
1. Write a program to find the sum of series $1+X+X^2+X^3+.....$
2. Write a program to find prime or not.
3. Write a program to find average of five numbers.
4. Define a class for employee with name and data of appointment create employee objects and sort them as per their date of appointment.
5. Write a program to find factorial of number using recursion.
6. Write a program to find simple interest getting values from keyboard.
7. Write a program to find maximum of N numbers.
8. Write a program to find maximum and sum of an array.

9. Write a program to perform string operations.
10. Write a program to accept more strings and arrange them in alphabetical order.
11. Write a program to create a window and draw cross lines.
12. Write a program to create an applet and draw the shape.
13. Write a program to create a window with a background color and display the message.
14. Write a program for multiplication tables by multithreading.
15. Write a program to create an exception for mark out of bounds. If mark is greater than 100 throw an exception.

COURSE OBJECTIVES:**To make the students**

1. To understand the Importance of SPSS and the features for entering the data according to the variable type.
2. To understand and apply the descriptive analytical tools
3. To know the univariate tools and its application
4. To comprehend the application of Bivariate analysis
5. To understand and compute the multivariate analysis using the package.
6. To understand the correlation analysis

COURSEOUTCOMES:**Learners should be able to**

1. Create datasheet and enter the data
2. Compute descriptive statistics using the package and graphically represent the data.
3. Perform univariate and bivariate analysis in the software package.
4. Perform multivariate analysis in the software package.
5. Perform the correlation analysis
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills to infer the output.

Workout the following statistics:

1. Descriptive Statistics
2. Chi-square
3. Independent Sample 't' Test
4. Paired 't' Test
5. Analysis of Variance (ANOVA)
6. Karl Pearson Correlation
7. Spearman Rank Correlation
8. Regression

9. Factor Analysis
10. Kolmogorov and Smirnov test
11. Mann Whitney U Test
12. Wilcoxon Test
13. Friedman Rank Test
14. Kruskal Wallis H-Test
15. Garrett Ranking

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept financial services its impact on economy
2. To categorise financial services as fund based and fees based services
3. To understand the application of the fee and fund based services in economic development.
4. To communicate orally and in written form the understanding of financial services concepts and application.
5. To expose the students to the contemporary theory and practice of Indian Financial Services Sector
6. To familiarize the students with various types of Financial Services and their role in Social Change.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept financial services its impact on economy
2. Categorise financial services as fund based and fees based services
3. Understand the application of the fee and fund based services in economic development.
4. Communicate orally and in written form the understanding of financial services concepts and application.
5. comprise of Financial Instruments, Merchant Banking, Hire Purchase, Leasing, Venture Capital, Factoring, Mutual Funds and Credit Rating
6. Know the various types of Financial Services and their role in Social Change.

Unit – I

Financial Services – Meaning – Classification – Scope – Fund Based Activities – Non Fund Based Activities – Modern Activities – Sources of Revenue – Causes for Financial Innovation – New Financial Products and Services – Innovative Financial Instruments – Challenges facing the Financial Service Sector. Merchant Banking – Definition – Origin – Merchant Banking in India- Merchant Banks and Commercial Banks – Services of Merchant Banks- Qualities required of Merchant Bankers – Problems – Scope of Merchant Banking in India

Unit – II

Hire Purchase – Meaning – Features – Legal Position – Hire Purchase and Credit Sale – Hire Purchase and Instalment Sale – Hire Purchase and Leasing – Origin and Development – Banks and Hire Purchase Business – Bank Credit for Hire Purchase.

Leasing – Definition – Steps in Leasing Transactions – Types of Lease – Advantages and Disadvantage of Lease – Problems of Leasing

Unit – III

Venture Capital – Concept – Meaning – Features – Scope of Venture Capital – Importance – Method of Venture Financing – Suggestion for the Growth of Venture Capital – Factoring – Meaning – Functions – Types – Factoring Vs Discounting – Benefits of Factoring

Unit – IV

Mutual Funds – Types – Importance – Selection of a Fund – Securitization – Stages of Securitization – Benefits – Derivatives – Kinds – Forward, Future, Options and Swaps.

Unit – V

Credit Rating – Definition and Meaning – Functions of Credit Rating – Origin – Credit Rating in India – Benefits of Credit Rating – Credit Rating Agencies in India: CRISIL, ICRA, CARE- Limitations of Rating – Future of Credit Rating in India

TEXT BOOK

1. **E Gordon and K. Natarajan** (2014) Financial Markets and Services, Himalaya Publishing House, Mumbai

REFERENCES

1. **Khan M.Y.** (2013), Financial Services, Tata McGraw Hill Company Ltd, New Delhi.
2. **Dharmaraj** (2010) Financial Services, S. Chand & Sons Ltd., New Delhi
3. **Tripathy Nalini Prava** (2007) Financial Services, Prentice Hall of India, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. To comprehend on the reforms in Indian insurance industry.
3. To understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. To communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. To enable the students to understand the procedures in Company Law.
6. To enable them to acquire skills needed for socially relevant and good corporate governance

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of risk, and insurance a product to mitigate risk, its design and pricing
2. Comprehend on the reforms in Indian insurance industry.
3. Understand the categorization and application of the life and non-life insurance as a risk mitigation instrument,
4. Communicate orally and in written form the understanding of insurance, insurance types, designing and pricing.
5. course covers Company Hierarchy, Rules relating to Directors, Company Secretary, Meetings and Types of Meetings
6. Enable them to acquire skills needed for socially relevant and good corporate governance

Unit – I

Company Administration – Hierarchy – Share Holders – Membership – Termination – Rights and Duties – Board of Directors – Qualification – Appointment – Powers – Duties – Other Managerial Personnel

Unit – II

Company Secretary – Meaning – Types – Qualities – Appointment – Dismissal – Power – Rights – Duties and Liabilities – Role of a Secretary in the Administration of a Company

Unit – III

Meeting – Law Governing Meetings – Requisites of a Valid Meeting – Chairman of a Meeting – Appointment – Duties – Powers – Notice – Agenda – Minutes – Quorum – Motion – Resolution – Methods of Voting

Unit – IV

Kinds of Company Meetings – Board of Directors Meeting – Share holder Meeting – Statutory Meeting – Annual General Meeting – Extraordinary General Meeting – Duties of a Company Secretary relating to the Meetings

Unit – V

Drafting of Correspondence relating to the Meetings – Drafting of Notices – Agenda and Minutes of the Meetings of Shareholders and Directors – Drafting of Chairman’s Speech – Annual Report and Auditors Report

TEXT BOOK

1. **Kuchhal, M.C.**, (2008) Secretarial Practice, Vikas Publishing House Pvt. Ltd., New Delhi

REFERENCES

1. **N.D. Kapoor** (2015) Elements of Company Law, Sultan Chand and Sons, New Delhi
2. **Ashok K. Bagrial** (2007) Company Law, Vikas Publishing House Pvt. Ltd., New Delhi

15CCP403	ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT	Semester – IV			
		L	T	P	C
		6	-	-	5

COURSE OBJECTIVES:

1. To make the students
2. To Understand the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. To communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
4. To apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
5. To initiate the required skills for entrepreneurial development.
6. To help students understand the process of establishing and developing an enterprise

COURSE OUTCOMES:

Learners should be able to

1. Understand the Concept of entrepreneurship, entities of business, creating ideas, mobilizing funds and support from government.
2. Communicate orally and in written form the Concept of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government.
3. Apply the understanding of entrepreneurship, types of entrepreneurs, entities of business, creating ideas, mobilizing funds and support from government in lifelong practice.
4. course include Entrepreneur and Entrepreneurship, Market and Technical Analysis, Diversification, Sub-contracting, Incentives and Subsidies.
5. Initiate the required skills for entrepreneurial development.
6. Help students understand the process of establishing and developing an enterprise

Unit – I

Small Business Enterprise - Small Business framework - Concept and Definition- Nature and Characteristics - Relationship between Small and Large Business - Scope and Types of Small Business - Rationale and Objectives - Small Business as seed bed of Entrepreneurship

Unit –II

Entrepreneurship - Entrepreneur and Entrepreneurship Concept - Distinction between Entrepreneur and Manager - Entrepreneurial Competency - Functions - Types (including women and rural).

Unit – III

Establishing a Small Enterprise - Learning the important steps for starting a Business - Project Identification and Selecting the Product - Generation and Screening the Project Ideas - Market Analysis - Technical Analysis, Financial Analysis (up to cost of production) Project Formulation - Assessment of Project Feasibility - Preparation of Project Report - Dealing with basic startup problems.

Unit –IV

Growth Strategy - Growth strategy for Small Business - Need for Growth - Types of Growth Strategy - Expansion - Diversification-Sub contracting.

Unit-V

Institutional Support - Sources of Finance - Financial Support to Small Business- Various Incentives and Subsidies - Central and State Government Schemes

TEXT BOOKS

1. **Khanka S. S**, (2012), Entrepreneurial Development, Sultan Chand Publications
2. **Shaprio Alan C**, (2002), Multinational Financial Management, Prentice Hall of India, 4th Ed.,

REFERENCES

1. **Gupta C.B, & Srinivasan N.P**,(2014), Entrepreneurial Development, Sultan Chand & Sons
2. **Suresh Jayasree**, (2010), Entrepreneurial Development, Margham Publications

COURSE OBJECTIVES:**To make the students**

1. To understand the international marketing environment.
2. To enlighten learners about overseas market research, sources of marketing information and the guidelines to identify foreign markets.
3. To guide global product planning, standardization and adaptation
4. To Understand the Concept of marketing, and 4Ps of Marketing
5. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
6. To apply the marketing concepts and skills lifelong.

COURSE OUTCOMES:**Learners should be able to**

1. Understand the Concept of marketing, and 4Ps of Marketing
2. Communicate orally and in written form the concepts of marketing and 4 Ps of marketing
3. Apply the marketing concepts and skills lifelong.
4. comprise types of Environments in Global Marketing, Global Marketing Environments, Entry and Expansion Strategies, Product and Channel Decisions and Pricing and Promotional Decisions
5. To communicate orally and in written form the concepts of marketing and 4 Ps of marketing
6. To apply the marketing concepts and skills lifelong.

Unit – I

Introduction to International and Global Marketing- The Marketing Concept- The Three Principles of Marketing-Global Marketing-Importance of Global Marketing-Management Orientations-Driving and Restraining forces affecting Global Integration and Global Marketing

Unit - II

Global Marketing Environment- Economic, Socio-cultural, and Political Environments-Global Market Segmentation – Global Product Positioning – Product Adoption – International Product Life Cycle – International Marketing Strategies – Product Policy, Pricing Policy and Place Policy

Unit - III

Entry and Expansion strategies: Marketing and Sourcing-Decision criteria for International Business-Entry and Expansion Model-Exporting-Additional International Alternatives-Marketing Strategy Alternatives-Cooperative Strategies and Global Strategic Partnerships (GSP)-Nature of GSP- International Partnerships in Developing Countries-Competitive Analysis and Strategy- Industry Analysis: Forces influencing Competition-Strategic Positions-Competitive Innovation and Strategic Intent.

Unit – IV

Product and Channel Decisions - Product Decisions- Product Saturation levels in Global Markets- Product Design Considerations- Attitudes toward Country of Origin-Geographic Expansion: Strategic Alternatives- New products in Global marketing-Global marketing channels and Physical Distribution-Channel objectives and Constraints-Distribution Channels: Terminology and structure-International channel Innovation-Channel strategy for New Market Entry-Physical Distribution and Logistics

Unit-V

Pricing and Promotion Decisions- Pricing Decisions-Basic Pricing Concepts-Environmental influences on Pricing Decisions-Global Pricing Objectives and Strategies-Gray market goods-Dumping-Transfer Pricing-Global Pricing: Three pricing alternatives-Global Advertising and Branding-Selecting an Advertising Agency-Advertising Appeals-Public relations and Publicity-Personal Selling-Sales Promotion-Direct Marketing-Trade shows and exhibitions-Sponsorship promotion.

TEXT BOOK

1. **Keegan J.Warren and Bhargava K. Naval** (2011), Global Marketing Management, Dorling Kindersley (India) Pvt. Ltd (Licensee of Pearson Education in South Asia), 7th Edition

REFERENCES

1. **Philip R. Cateora, John L. Graham and Prashant Salwan** (2010), International Marketing, Tata McGraw Hill Publishing Company Ltd, Special Indian 13th Edition,

2. **Rajagopal** (2010), International Marketing, Vikas Publishing House Pvt Ltd,
3. **Srinivasan** (2008) International Marketing, Prentice Hall of India, New Delhi
4. Rajendra Nargundkar (2008) International Marketing, Excel Books, New Delhi

COURSE OBJECTIVES:**To make the students**

1. To identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. To analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. To apply the theoretical and practical learning of doing research into lifelong practice.
5. To Communicate in oral and written form and prepare report
6. To Work in team and exhibit leadership skills

COURSE OUTCOMES:**Learners should be able to**

1. Identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills

The students should select a problem in Accounting, Finance, Marketing or any other areas related to commerce.

Report should contain

- Introduction
 - Introduction about the industry
 - Introduction about the Company
 - Review of literature – Minimum 10 papers from referred journal
 - Need for the Study

- Objectives
- Research Methodology
 - Research Design
 - Sampling Design
 - Sources of Data Collection
 - Tools used for analysis
 - Limitation
- Data analysis and interpretation
- Findings and Suggestions
- Conclusion
- Bibliography (APA format)

BACHELOR OF COMPUTER APPLICATIONS (BCA)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2015 – 2016)



**DEPARTMENT OF COMPUTER
APPLICATIONS FACULTY OF ARTS, SCIENCE
AND HUMANITIES**

**KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)**

(Established Under Section 3 of UGC Act, 1956)

**Eachanari (Post), Coimbatore – 641 021.
Tamilnadu, India**

Phone No. 0422-2980011 - 15

Fax No: 0422-2980022-23

**E mail ID: info@karpagam.com Web:
www.kahedu.edu.in**



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University) (Established Under
Section 3 of UGC Act, 1956)

FACULTY OF ARTS, SCIENCE AND HUMANITIES UNDER – GRADUATE PROGRAMMES

(REGULAR PROGRAMME)

SYLLABUS

(2015)

CHOICE BASED CREDIT SYSTEM (CBCS)

**Eachanari (Post), Coimbatore – 641 021.
Tamilnadu, India**

Phone No. 0422-2980011 - 15

Fax No: 0422-2980022-23

**E mail ID: info@karpagam.com Web:
www.kahedu.edu.in**

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
முதல்பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

(For I-UG Science Degree Classes) 15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு- V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

Unit I:**Prose:** Google Guys (Extract) – Richard L Brandt**Poetry:** The Blind Pedlar – Osbert Sitwell**Short Story:** A Garden So Rich – Christie Craig**Vocabulary:** Prefixes, Antonyms, Sentence Completion**Grammar:** Articles, Adverbs, Pronouns**Composition:** Proverb Expansion**Unit II:****Prose:** Happiness 101 – Geeta Padmanabhan**Poetry:** An Old Woman – Arun Kolatkar**Vocabulary:** Suffixes, Analogies**Grammar:** Nouns, Adjectives**Composition:** Dialogue Writing**Unit III:****Prose:** Structured Procrastination – John Perry**Short Story:** The Umbrella Man – Roald Dahl**One-Act Play:** The Boy Who Stopped Smiling – Ramu Ramanathan**Vocabulary:** Synonyms, Euphemisms, Word Definitions**Grammar:** Verbs, Conjunctions and Interjection, Indirect/Reported Speech**Unit IV:****Poetry:** No Sentence – Anjum Hassan**One-Act Play:** While the Auto Waits- O' Henry**Vocabulary:** Words Often Confused, Anagrams**Grammar:** Prepositions, Voice- Active and Passive**Composition:** Letter Writing- Informal

15ENU101

ENGLISH - I

4H- 4C

Instruction Hours / week: L: 4 T: 0 P: 0 C: 4

Marks: Internal: 40 External: 60

Total: 100

End Semester Exam: 3 Hours

Unit V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Text Books:

1. Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference Books:

1. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course Objectives:

- To understand the fundamentals of computer
- To learn the structure of C programming language.
- To learn how to perform structures.
- To learn how to design C using pointers.
- To learn about array concepts
- To learn dynamic memory allocation and file handling in C.

Course Outcomes (COs):

Upon completion of this course the students will be able to :

1. Understand the fundamentals of computer and its uses
2. Understand about the Input, Output Devices and types of programming languages.
3. Apply the basic concepts of C programming language.
4. Understand how to apply concepts to implement functions and different types of functions.
5. Understand the concepts of arrays and the difference between union and structures.
6. Apply the concepts of structures, pointers, file handling and able to write programs

Unit-I

Introduction to Computers: Evolution of Computers, Generation of Computers, Classification of Computers, Block Diagram of a Digital Computer, types of OS. Input / Output Devices: Input Devices -Keyboard, Mouse, Output Devices – VDU, Printers. Types of Programming Languages, Classification of software: Application software and System Software, Structured Programming, Algorithms and Flowcharts with Examples.

Unit-II

Introduction - An Overview of C – Keywords and Identifier – Variables - Declarations of Variables - Typedef – Enum - Constants – Data Types – Operators – Expressions - C Formatted I/O Operations. Decision Making and Branching Statements – Decision Making and Looping Statements – Arrays -Strings - String Handling Functions.

Unit-III

Functions : Introduction - Definition of Functions - Function Declaration - Category of Functions - Nesting of Functions – Recursion - Passing Arrays to Function. Storage Classes – Auto-extern-static-register. Structures and Unions – Introduction - Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Arrays of Structure - Unions .

Unit-IV

Pointers – Introduction – Declaring Pointer Variables - Pointer and Arrays - Pointers and Strings – Array of Pointers - Functions and Pointers - Function Returning Pointers -Pointers to functions - Pointers and Structures.

Unit-V

File Management in C – Introduction - Defining a File - Closing a file – Input/output operations on files - Error handling During I/O Operations - Random Access to Files - Command Line Arguments - Dynamic Memory Allocation-The Preprocessor.

TEXT BOOK

1. Ashok N. Kamthane. 2013. Fundamentals of Computers and C Programming. 2nd Edition, Pearson education, New Delhi.

REFERENCE BOOKS

1. Balagurusamy .E. 2012. Programming in ANSI C. 6th Edition, Tata McGraw Hill Publishers, New Delhi.
2. Dixit .J.B. 2007. Programming in C. 1st Edition, Firewall Media Publications, New Delhi.
3. Susant K. Rout. 2008. Cimple- C is Simple. 1st Edition, Tata McGraw Hill Publishers, New Delhi.
4. Yeswanth Kanetkar. 2007. Let Us C. 8th Edition, BPB Publications, New Delhi.
5. Karthikeyan.E. 2008. Textbook on C: Fundamentals, data structure & Programming, 1st Edition , PHI Publications, New Delhi.

WEB SITES

1. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
2. <http://www2.its.strath.ac.uk/courses/c/>
3. <http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Instruction Hours / week: L: 0 T: 0 P: 5 C: 3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

- To understand the fundamentals of computer
- To learn the structure of C programming language.
- To learn how to perform structures.
- To learn how to design C using pointers.
- To learn about array concepts
- To learn dynamic memory allocation and file handling in C.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the fundamentals of computer and its uses
2. Understand about the Input, Output Devices and types of programming languages.
3. Apply the basic concepts of C programming language.
4. Understand how to apply concepts to implement functions and different types of functions.
5. Understand the concepts of arrays and the difference between union and structures.
6. Apply the concepts of structures, pointers, file handling and able to write programs

List of Programs:

1. Write a program to solve all possible roots in Quadratic Equation
2. Write a program to implement bubble sort
3. Write a program to convert a given number into words
4. Write a program to perform matrix multiplication
5. Write a program to count the vowels in a given sentence
6. Write a program to perform Stack Manipulations
7. Write a program to check the given string is palindrome or not
8. Write a program to find a substring in the main string without using library function
9. Write a program to prepare an employee pay slip using files.
10. Write a program to copy the content of one file to another file using command line arguments.

Course Objectives

- To understand the fundamentals of digital electronics.
- To learn the basic signals by discrete bands of analog and digital.
- To learn about the number systems.
- To learn how to design the logic gates and the logic circuits
- To learn digital to analog converters.
- To learn encoder and decoder.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. To learn the fundamentals of different numbering system, conversions and the basics laws of Boolean algebra.
2. To provide a strong foundation in construction of Sequential and Combinational Circuits.
3. To familiarize with the function of Logic Gates, Flip Flops.
4. Understand the Shift Registers, Counters.
5. Understand the Encoder, Decoder circuits.
6. Apply the concepts of A/D & D/A Converters and its Applications.

Unit I – Number System and Codes

Introduction to Digital concepts – Number Systems: Decimal, Binary, Octal and Hexadecimal Numbers – Conversion – 1's and 2's Complements of Binary Numbers – Binary Arithmetic with Signed and Unsigned Numbers – Codes: Binary Coded Decimal (BCD) — Excess-3 – Gray Code — ASCII Codes — Error Detection and Correction Codes.

Unit II – Logic Gates and Boolean Algebra

Introduction to Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates. Boolean Logic and Expression, Laws and Rules of Boolean Algebra, DeMorgan's Theorem – Simplification using Boolean Algebra – Karnaugh Map.

Unit III – Combinational Logic Circuits

Basic overview of Logic functions – Basic Adders & Subtractor – Parallel Binary Adder – 4-bit Binary Adder/Subtractor – Comparators – Encoders and Decoders – Code Converters – Multiplexers and Demultiplexers — Parity Generators/Checkers.

Unit IV – Sequential Logic Circuits

Flip-flops: RS – Clocked RS – Edge-triggered RS, D, and JK – JK Master-Slave flip flops – Registers and its Types – SISO, SIPO, PISO, PIPO – Shift Registers and its Types – Ring Counters – Asynchronous and Synchronous Counter – UP/DOWN Counter- Ring Counter.

Unit V – D/A, A/D Converters

Digital to Analog converters: Resistor Networks - Binary Ladder – Analog to Digital converters: Counter type – Ramp type – Successive Approximation Type.

TEXT BOOKS

1. Salilvahanan , 2014. Digital Electronics and its Principles, Seventh Edition, Tata McGraw Hill , New Delhi. .[UNIT I]
2. Albert Paul Malvino, Donald P. Leach and Goutam Saha, 2010, Seventh Edition. Digital Principles and Application, Tata McGraw Hill, New Delhi.[UNIT II - IV]
3. Morris Mano, 2013. Digital Design: With an Introduction to Verilog HDL, Fifth Edition, Pearson Education.[UNIT- V]

REFERENCE BOOKS

1. Modern Digital Electronics, Jain R.P, Tata McGraw Hill Company, Fourth Edition, 2012.
2. Integrated Circuits, Botkar K.R, Khanna Publications, Fourth Edition, 2008.

Course Objectives

- To understand the fundamentals of digital electronics.
- To learn the basic signals by discrete bands of analog and digital.
- To learn about the number systems.
- To learn how to design the logic gates and the logic circuits
- To learn digital to analog converters.
- To learn encoder and decoder.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. To learn the fundamentals of different numbering system, conversions and the basics laws of Boolean algebra.
2. To provide a strong foundation in construction of Sequential and Combinational Circuits.
3. To familiarize with the function of Logic Gates, Flip Flops.
4. Understand the Shift Registers, Counters.
5. Understand the Encoder, Decoder circuits.
6. Apply the concepts of A/D & D/A Converters and its Applications.

(Any 8 Experiments)

1. Verification of basic gates
2. Realization of Logic Gates Using Universal Gates
3. Adder using Gates
4. Subtractor using Gates.
5. Multiplexer
6. Demultiplexer
7. Encoder
8. Decoder
9. Study of Flip-flops
10. Binary to Gray and Gray to Binary Converter

Instruction Hours/week: L: 2 T: 0 P: 0 C:1**Marks: Internal: 100 External: Nil Total: 100****Course Objective:**

- To train students to acquire knowledge about the self-esteem and self confidence
- To develop the goal-setting, positive thinking, competitive spirit, cooperation.
- To improve the qualities of discipline, leadership, team-spirit, diligence, punctuality.
- To provide the backdrop for the development of their creative talents.
- To understand the inter-personal, family relationships and spirituality
- To learn about human values and social values.

Course Outcome:

After the completion of this course, a successful student will be able to:

1. understand the integral development of human beings
2. manage to adopt sustainable lifestyle
3. get awareness about the values and their significance and role
4. imbibe the concept of discipline and freedom
5. aware and face social with the basic moral values.
6. Maintain the inter-personal relationship

Unit – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

Unit – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

Unit – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

Unit – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

Unit – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

Text Books

1. Karpagam Academy of Higher Education, Study Material, 2015.

Instruction Hours / week: L: 2 T: 0 P: 0 C: 0
Total: 100

Marks: Internal: 100 External: Nil

Course Objective:

- To train students to understand the basic concepts of Quantitative Ability
- To understand the number series, analysis problems.
- To acquire knowledge about the analytical, verbal and logical reasoning.
- To practice to evaluate various real-life situations
- To develop the knowledge on communication and presentation skills.
- To improve communication skill

Course Outcome:

After the completion of this course, a successful student will be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning skills
3. Acquire satisfactory competency in use of verbal reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
5. Compete in various competitive exams like TNPSC, UPSC.etc.
6. Improve the communication skill

Unit - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

Unit - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

Unit – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

Unit – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

Unit - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஐந்தாம் பருவம் மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்திய குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை. 1. இலை இல பிடவம், திணை - முல்லை,

ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுண்ணேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோப்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,
நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.
2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.
3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.
4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.
5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

idia

Course Objectives:

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

Unit I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

Unit II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

Unit III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

Unit IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

Unit V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Text Book

1. Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference Book

1. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course Objectives

- To understand how C++ improves C with object-oriented feature.
- To learn the basic oops concepts
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the difference between top-down and bottom-up approach.
2. Apply the oops concept in the respective fields.
3. Apply the concepts of object-oriented programming in constructor and destructor.
4. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
5. Apply pointer concepts in C++
6. Use the concepts of preprocessor directives and macros.

Unit I

Principles of Object Oriented Programming: Basic concepts of object oriented programming – benefits of OOP – structure of c++ program – Declaration of variables. Control statements – Decision making statements – if ..else, jump, goto, break, continue- switch case statements – do-while – while statement, for statement. Inline functions – function overloading.

Unit II

Classes and Objects: Specifying a class – defining member functions Inside the Class – Defining member functions Outside the class - static data members – static member functions - array of objects – friendly functions. Constructors and destructors: - Constructors – multiple constructors in a class – constructors with default arguments - copy constructor – destructors.

Unit III

Operator Overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. Inheritance :- Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

Unit IV

Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual function. Managing console I/O operations: - C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

Unit V

Files: Classes for file stream operations – opening and closing a file – sequential input and output operations – updating a file random access – command line arguments. Templates: - Templates – class templates – function templates – member function templates.

Text Books

1. Ashok N. Kamthane. 2011. Object Oriented Programming with ANSI and Turbo C++, 2nd Edition, Pearson Education.

Reference Books

1. Chandra .B. 2005. Object Oriented Programming using C++, 2nd Edition, Narosa Publishing House.
2. Jesse Liberty and David B. Horvath. 2005. SAMS teach yourself C++ in 24 hours, 4th Edition, Pearson Education,
3. John R. Hubbard. 2006. Programming with C++, 2nd Edition, Tata McGraw Hill Publishers, New Delhi.

Web Sites

1. <http://www.cplusplus.com/doc/tutorial/>
2. www.cplusplus.com/
3. www.cppreference.com/

Instruction Hours / week: L: 0 T: 0 P: 5 C: 3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

- To understand how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading
- To learn how to perform inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Use the concepts of preprocessor directives and macros.
6. Apply inheritance in the programming

List of Programs:

1. Create a class to implement the data structure STACK. Write a constructor to initialize the top of the stack to zero .write a member function PUSH () to insert an element and a member function POP () to delete an element. Check for overflow and underflow conditions.
2. Create a class ARITH which consists of a FLOAT and an INTEGER variable. write member functions ADD(),SUB(),MUL(),DIV(),MOD() to perform addition, subtraction, multiplication, division and modulus respectively. Write member functions to get and display MAT () object values.
3. Create a class MAT as a 2D matrix and R, C represents rows and columns of the matrix. Overload the operators +,-,* to add, subtract, multiply two matrices. Write member functions to get and display MAT () object values.
4. Create a class STRING. Write member functions to initialize to get and display strings. overload the operator + to concatenate two strings, == to compare two strings and a member function to find the length of the strings.
5. Create a class which consist of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and write a member functions to calculate da , hra, pf depending on the grade and display the pay slip in a neat format using console I/O.
6. Create a class SHAPE which consist of two virtual functions cal_Area() and cal_Peri() to calculate area & perimeter of various figures. Derive three classes SQUARE, RECTANGLE and TRIANGLE from the class SHAPE and calculate area and perimeter of each class separately and display the result.

7. Create two classes which consist of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a FRIEND function common to both classes which takes the object of the above two classes as arguments and the integer and float values of both the objects separately and display the result.
8. Write a user-defined function USERFUN() which has the formatting commands like setw(), showpos(), precision(). Write a program which prints an multiplication table and uses userfun() for formatting using inheritance.
9. Write a program to perform insertion, deletion and updating using files.
10. Write a program which takes a file as arguments and copies into another file with line numbers using command line arguments.

Course Objectives

- To understand the fundamentals of computer organization.
- To learn about the processor and memory concept.
- To learn about the peripherals
- To learn the system architecture of a computer.
- To learn installation and preventive maintenance.
- To learn about the assembling of a system

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the concept of computer organization and hardware.
2. Able to perform installation, configuration and upgrading of hardware and software.
3. Able to install/connect associated peripherals.
4. To assemble/setup personal computers.
5. Understand and implement maintenance tasks.
6. Diagnose troubleshoot in hardware and software and other equipments of a system

Unit I

Micro Computer System: Introduction to Micro Computer System – Computer Organization – Number Systems and Codes Memory – Arithmetic and Logic Unit – Control Unit.

Unit II

Peripheral Devices: Introduction to Peripheral Devices – Keyboard – CRT Display monitor – Printer – Magnetic Storage Devices – Floppy Disk Drive – Hard Disk Drive – Peripherals Interfaces and Controller – Keyboard Interface

Unit III

Display Adapter: CRT Display — CRT Controller –Auxiliary Subsystems – Data Communication fundamentals – Serial Port in PC – Real time clock (RTC) – Magnetic Tape Subsystems – LAN – Memory Expansion Options

Unit IV

Installation and Preventive Maintenance: Pre Installation Planning – Installation Practice – Routine Checks – Special Configurations – Memory Up Gradation

Unit V

Trouble shooting: Troubleshooting – Computer faults – Nature of faults – Types of Faults Diagnostic Programs and Tools — Faults in Elimination Process – Systematic Troubleshooting – POST (Power on Self Test)

Text Book

- 1 IBM PC and Clones, B. Govindarajalu, Tata McGraw Hill Publishing Company, Second Edition, 2011. [UNIT I & II]
- 2 Introduction to PC Hardware and Troubleshooting, Michael Meyers, The Mike Meyers' Computer Skills, McGraw Hill, First Edition, 2003. [UNIT III - V]

Reference Book

- 1 Hardware and Software of Personal Computers, Sanjay K. Bose, New Age International Publishers, 1999.

Course Objectives

This course enables the students to

- understand the basic concepts of statistical methods
- develop the mathematical skills in the areas of measures.
- learn the mathematical knowledge in hypothesis testing
- gains the numerical techniques as powerful tool in scientific computing.
- understand the basic concepts of statistical correlation.
- Understand the basics of SPSS.

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. develop and apply the appropriate numerical techniques for frequency distribution and diagrammatic presentation.
2. understand the various measures such as mean, median, mode techniques.
3. understand the basics of correlation and regression methods
4. understand the concepts of probability theory and theoretical distribution
5. understand the concepts of significance tests and apply to the fields.
6. Understand SPSS and apply in the respective field.

Unit-I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

Unit – II

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion-Range, standard deviation, Coefficient of variation.

Unit – III

Correlation – Meaning and definition - Scatter diagram –Karl pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

Unit – IV

Probability theory : Axioms of Probability–Addition theorem – Multiplication theorem– conditional Probability.

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

Unit – V

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit.

Text Book:

1. R.S.N.Pillai , Bagavathy. “Statistics”, S. Chand & Company Ltd. New Delhi, 2002.

References:

1. Jerrold H.Zar, 2003, Bio-Statistical Analysis, Fourth Edition, Pearson Education, (Pte) .Ltd, New Delhi.
2. PA.Navnitham. 2006. Business Mathematics and Statistics, Jai Publishers, Trichy - 21,
3. S.P. Gupta . “Statistical methods”. Sultan Chand & Sons, New Delhi,2001.

Course objectives:

- To make the students learn the basic concepts, conventions, nature of accounting
- To know about the income and assets over time.
- To understand the financial performance.
- To understand the concepts of tax strategies.
- To learn about the quality management activities.
- To learn about to post ledger and prepare trial balance.

Course outcomes:

- Comprehend the accounting concepts, principles and to comply the accounting standards.
- Understand the role of accounting and its limitations.
- Compute the economic information conveyed in financial statements.
- Understand the links among the economic characteristics and strategies of a business.
- Compute the assessments of its profitability and market valuation.
- Able to prepare trial balance, profit and loss account and balance sheet.

Unit I

Accounting – Definition- Fundamentals of Book Keeping – Branches of Accounting – Nature of Accounts - Accounting Concepts and Conventions – Journal – Ledger.

Unit II

Subsidiary books – Introduction – Types of subsidiary books - purchases book - sales book- returns book - cash book - single column cash book – Two column cash book - Three column Cash book - petty cash book

Unit III

Trial balance - Errors and their rectification - Final accounts of a sole trader with adjustments - Trading and Profit and Loss Account - Balance Sheet – Difference between Profit and Loss Account and Balance Sheet.

Unit IV

Depreciation- Definition- Methods of depreciation- straight line method- written down value method- annuity value method- sinking fund method- provisions and reserves

Unit V

Accounts for Non Profit organization- Receipts and Payments and income and expenditure account and Balance sheet – Difference between Receipts and Payments and income and expenditure account and Balance sheet.

Note: Distribution of Marks between problems and theory shall be 75% and 25%.

TEXT BOOK:

1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2012)Principles of Accountancy New Delhi .S.Chand & Company Ltd

REFERENCES:

1. S. P. Jain & K. L. Narang, 2010, Advanced Accountancy, Sultan Chand & Sons. New Delhi
2. T.S.Grewal,(2011)Introduction to Accountancy, New Delhi S.Chand & Company Ltd.
3. R.L.Gupta, V.K.Gupta and M.C.Shukla,2010, New Delhi Financial Accounting,Sultan Chand .
4. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
5. K.L.Narang and S.N.Maheswari ,2010, New Delhi Advanced Accountancy-Kalyani Publishers.

Instruction Hours / week: L: 0 T: 0 P: 3 C: 2
Total: 100

Marks: Internal: 40 External: 60

End Semester Exam: 3 Hours

Course Objectives

- To understand the fundamentals of computer organization.
- To learn about the processor and memory concept.
- To learn about the peripherals
- To learn the system architecture of a computer.
- To learn installation and preventive maintenance.
- To learn about the assembling of a system

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the concept of computer organization and hardware.
2. Able to perform installation, configuration and upgrading of hardware and software.
3. Able to install/connect associated peripherals.
4. To assemble/setup personal computers.
5. Understand and implement maintenance tasks.
6. Diagnose troubleshoot in hardware and software and other equipments of a system

List of Programs:

1. Identifying External Ports and Interfacing
2. Identifying PC cards and Interfacing.
3. Assembling of PC
4. Preventive Maintenance of a PC
5. Trouble Shooting of SMPS
6. Keyboard Servicing
7. Study of CRT
8. Communication and Bus Interfacing
9. Partitioning and Formatting Hard disks.
10. Installing System And Application Software

Instruction Hours / week: L: 0 T: 0 P: 3 C: 2**Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours****Course Objectives**

This course enables the students to

- understand the basic concepts of statistical methods
- develop the mathematical skills in the areas of measures.
- learn the mathematical knowledge in hypothesis testing
- gains the numerical techniques as powerful tool in scientific computing.
- understand the basic concepts of statistical correlation.
- Understand the basics of SPSS.

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. develop and apply the appropriate numerical techniques for frequency distribution and diagrammatic presentation.
2. understand the various measures such as mean, median, mode techniques.
3. understand the basics of correlation and regression methods
4. understand the concepts of probability theory and theoretical distribution
5. understand the concepts of significance tests and apply to the fields.
6. Understand SPSS and apply in the respective field.

List of Programs:

1. Using SPSS Package, to draw bar diagram and pie diagram for discrete series.
2. Using SPSS Package, to draw mutable bar diagram for discrete series.
3. Using SPSS Package, to calculate the Mean for individual, discrete.
4. Using SPSS Package, to calculate the Mean for continuous series.
5. Using SPSS Package, to calculate the Median for individual and discrete series.
6. Using SPSS Package, to calculate the Mode for individual and discrete series.
7. Using SPSS Package, to calculate the Standard deviation.
8. Using SPSS Package, to calculate the Karl Pearson's Correlation.
9. Using SPSS Package, to calculate the Rank Correlation Coefficient for Untied Rank.
10. Using SPSS Package, to calculate the Rank Correlation Coefficient for Tied Rank.

Instruction Hours / week: L: 0 T: 0 P: 3 C: 2**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course Objectives:**

- To make the students learn the basic concepts, conventions, nature of accounting
- To know about the accounting process and preparation of final accounts of a sole trader.
- To understand the cost concepts, types of costing and preparation of cost sheet.
- To understand the concepts of management accounting
- To compute financial statement analysis
- To learn about to create a company and prepare all accounting reports

Course Outcomes:

1. Comprehend the accounting concepts, principles and to comply the accounting standards.
2. Prepare the final accounts of a sole trader.
3. Know the cost concepts, types of costing and preparation of cost sheet.
4. Understand the concepts of management accounting
5. Compute financial statement analysis
6. Apply the concepts in the respective field.

List of Programs:

1. Create a new company in integrate accounts mode and account with inventory mode
2. Create a primary and sub groups using single or multiple ledger mode
3. Create minimum 10 ledgers using single or multiple ledger, and alter and delete any 2 ledger
4. Create a new company, ledger and record minimum 10 transactions without adjustment
5. Create a new company, ledger and record minimum 10 transactions with any five adjustments and display the relevant results
6. Enter the following voucher
 - Payment vouchers
 - Receipt
 - Purchase
 - Sales
 - Credit note
 - Debit note
 - Journals
 - Memo
 - Optional

7. Prepare trail balance for the company
8. Prepare profit & loss a/c and balance sheet

Course Objectives

- To create the awareness about environmental problems among people.
- To create the awareness about renewable and non renewable resources of the region.
- To understand the environmental acts, rights, rules legislation.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand forestation and deforestation.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the ecological and physical sciences and apply in environmental problem solving.
2. Understand the concepts of the design and evaluation of environmental policies and institutions.
3. Known to appreciate the ethical, cross-cultural, and historical context of environmental issues.
4. Motivating public to participate in environment protection and improvement.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Understand the values of global warming and how to save our environment.

Unit - I: Eco system and natural resources: Environment – Definition – components - Ecosystem - Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

Unit - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

Unit - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

Text Books

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

References

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Course Objective:

- To train students to understand the basic concepts of Quantitative Ability
- To understand the number series, analysis problems.
- To acquire knowledge about the analytical, verbal and logical reasoning.
- To practice to evaluate various real-life situations
- To develop the knowledge on communication
- To develop the presentation skills.

Course Outcome:

After the completion of this course, a successful student will be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning skills
3. Acquire satisfactory competency in use of verbal reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
5. Compete in various competitive exams like TNPSC, UPSC.etc.
6. Improve the communication skill

Unit - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

Unit - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

Unit – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

Unit – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

Unit - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Course Objectives:

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcomes:

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and
6. Student will be able to handle their day to day affairs well with their knowledge of language skills.

Unit I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

Unit II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

Unit III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

Unit IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

Unit V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

REFERENCE BOOKS:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr.Francis M.Peter S.J. “Lets Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Course Objectives

- To understand the fundamental concepts of data structures
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms
- To develop application using data structures.
- To learn about the space and time complexity.

Course Outcomes (COs)

Upon completion of this course, the student will be able to:

1. Implement abstract data types for linear data structures.
2. Apply the different linear and non-linear data structures to problem solutions.
3. Analyze the applications of tree.
4. Implement graph theory over various data structures.
5. Critically analyze the various sorting algorithms.
6. Understand the concepts of data structure and implement them.

Unit I

Introduction: Introduction to Algorithms- Analyzing Algorithms- Creating the Algorithms; Arrays: Representation of Arrays- Stacks and Queues- Multiple Stacks and Circular Queue- Sparse Matrices- Polynomial Addition; Infix to Postfix Conversions- Evaluation of Expression

Internal Sorting: Insertion sort – Quick sort- Selection sort – Shell sort – 2-Way Merge sort

Searching: Linear Search

Unit II

Linked list: Singly Linked List: Insertion and Deletion in Singly Linked List- Linked Stacks and Queues;

Doubly Linked List: Insertion and Deletion in Doubly Linked List - Sparse Matrices- Polynomial Addition;

Dynamic Storage Management: Allocating blocks- Freeing Blocks.

Unit III

Non Linear Structures: Trees: Basic Terminology; Binary Trees: Binary Tree Representations- Binary Tree Traversals - Threaded Binary Trees

Searching and Sorting: Binary Search- Heap sort

Application of Trees: B Trees- Tree indexing.

Unit IV

Non Linear Structures: Graphs: Basic Terminology– Graph Representation- Traversals- Spanning Tree- Kruskal's Algorithm

Applications of Graph: Shortest Path: Single Source All Destinations- All Pairs Shortest

Unit V

Sorting: External Sorting: K-Way Merge Sort- Sorting with tapes: Balanced Merge sort, Polyphase Merge .Static Tree – Dynamic Tree. Hash Tables: Hashing Functions – Overflow handling.

TEXT BOOK

- 1.Ellis Horowitz and Sartaj S Shani. .2010. Fundamentals of Data Structures, 2nd Edition ,Galgotia Publications, , New Delhi.

REFERENCE BOOKS

1. Kirshnamoorthy. 2008. Data Structures Using C, Tata Mcgraw Hill Publishing Company Limited, New Delhi.
2. Kruse R. 2007. Data Structures & Program Design In C, 2nd Edition, Prentice-hall Of India Pvt Ltd, New Delhi.
3. Murugan .M. Graph Theory and Algorithms,1st Edition, Muthali Publications house, Chennai.
4. Robert L. Kruse.2000. Data Structures and Program Design, 3rd Edition, Printice- Hall of India, Delhi.
5. Seymour Lipschutz.1986. Theory and Problems of Data Structures, 2nd Edition, McGraw Hill, New Delhi.

WEB SITES

1. http://en.wikipedia.org/wiki/Data_structure
2. <http://www.cs.sunysb.edu/~skiena/214/lectures/>
3. www.amazon.com/Teach-Yourself-Structures-Algorithms

Course Objectives

- To describe a good introduction to the discipline of database management systems.
- To give a good formal foundation on the data models and E-R model.
- To demonstrate the principles database constraints behind systematic database design by covering normalization concept.
- To introduce the concepts of basic SQL as a universal Database language.
- To have an introductory knowledge about the PL/SQL concept.
- To learn about the URL concept

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Demonstrate an understanding of the elementary features of RDBMS
2. Design conceptual models of a database using ER modeling for real life applications
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database
5. Design efficient PL/SQL programs to access Oracle databases
6. Understand and apply the database normalization concepts.

Unit I

Databases and Database Users --Characteristics of the Database Approach - Actors on the Scene- Workers behind the Scene- Advantages of Using the DBMS Approach- A Brief History of Database Applications- Database System Concepts and Architecture : Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence- Database Languages and Interfaces- The Database System Environment- Centralized and Client/Server Architectures for DBMSs- Classification of Database Management Systems.

Unit II

Data Modeling Using the Entity-Relationship (ER) :Conceptual Data Models for Database Design -A Sample Database Application -Entity Types, Entity Sets, Attributes, and Keys -Relationship Types, Relationship Sets, Roles,and Structural Constraints -Weak Entity Types -ER Diagrams, Naming Conventions, and Design Issues. The Enhanced Entity-Relationship: Subclasses, Superclasses, and Inheritance - Specialization and Generalization - Constraints and Characteristics of Specialization and

Generalization Hierarchies -Modeling of UNION Types Using Categories- Data Abstraction, Knowledge Representation.

Unit III

Relational Algebra: Relational Algebraic Operations-Aggregate Function-Update Operations.SQL: Characteristics-Advantages& Action-Data types and Literals-Types of SQL Commands:DDL,DML,DQL,DCL,DAS,TCS-SQL Operators-Arithmetic, Comparison, Logical& Set Operator-Operator Precedence. Tables, view and Indexes: Introduction-View-Indexes. Queries and subqueries: Introduction-Subqueries-Aggregate Function-Insert, update and Delete Operations.

Unit IV

Overview – declaration section – executable command section: conditional logic, loops, CASE statements – exception handling section. Triggers: definition – types: row level, statement level, before and after, instead of – syntax – enabling and disabling triggers - replacing and dropping triggers. Cursors – definition – open – fetch – close – cursor attributes- select for update – types : implicit, explicit. Procedures, Functions, and Packages: Local and global – procedures vs. functions – stored procedures, functions – create procedure syntax - create function syntax – package header – package body – calling procedures, functions, package members. Replacing and dropping procedures, functions, packages.

Unit V

Database Design Theory and Normalization: Basics of Functional Dependencies and Normalization for Relational Databases-Informal Design Guidelines for Relation Schemas-Functional Dependencies-Normal Forms Based on Primary Keys-General Definitions of Second and Third Normal Forms-Boyce-Codd Normal Form-Multivalued Dependency and Fourth Normal Form-Join Dependencies and Fifth Normal Form.

Text Books

1. Ramez Elmasri and Shamkant B. Navathe.2011. Fundamental of Database Systems.6th edition.Pearson India.[Unit I to V]
2. Kevin Loney and George Koch. 2009. Oracle 11g The Complete Reference, 1st Edition, Tata Mcgraw-Hill, New Delhi.[Unit IV]

Reference Books

1. Ramez Elmasri.2013. Fundamentals of Database Systems: Models, Languages, Design and Application Programming , 6th edition Pearson India.
2. Bipin C. Desai. 2008. An Introduction to Database Systems, Galgotia Publications, New Delhi.
3. Gerald V. Post. Database Management Systems Designing and Building Business Applications, 2nd Edition, Tata McGraw-Hill, New Delhi.
4. Rajesh Narang. 2006. Database Management Systems. Prentice Hall of India, New Delhi
5. Alexix and Mathews Leon, 2006. Fundamentals of Database Management System, 1st Edition Vijay Nicole imprints private Limited

Web Sites

1. <http://en.wikipedia.org/wiki/RDBMS>
2. http://aspalliance.com/1211_Relational_Database_Management_Systems_Concepts
3. www.compinfo-center.com/apps/rdbms.html

Instruction Hours / week: L: 0 T: 0 P:4 C:2

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

- To describe a good introduction to the discipline of database management systems.
- To give a good formal foundation on the data models and E-R model.
- To demonstrate the principles database constraints behind systematic database design by covering normalization concept.
- To introduce the concepts of basic SQL as a universal Database language.
- To have an introductory knowledge about the PL/SQL concept.
- To learn about the URL concept

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Demonstrate an understanding of the elementary features of RDBMS
2. Design conceptual models of a database using ER modeling for real life applications
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database
5. Design efficient PL/SQL programs to access Oracle databases
6. Understand and apply the database normalization concepts.

List of Programs:

1. Create a table with following fields:
Staff table:

Field name	Constraint	Type	Size
Staff_no	Primary key	Character	6
Staff_name	Not Null	Character	30
Gender	Check	Character	1
Dob		Date	
Dept_code	Foreign key	Character	4
Designation		Character	15
Basic		Number	7,2

Department table:

Field name	constraint	Type	Size
Dept_code	Primary key	Character	4
Dept_name		Character	30

Execute the following queries:

- Insert records for all the staff.
 - Select the records for male staff.
 - Select the staff whose name start with S.
 - Update the records.
 - To list the staff who joined 2 years back.
 - To list the staff in computer science dept.
 - To list the staff_name and the dept_name in which he/she works.
 - To list the maximum and minimum salary in each dept.
 - To list the dept along with the total amount spent on salary
 - To list the name of the staff who draw the salary more than the average salary.
2. Perform queries using string functions.
 3. Perform queries using mathematical functions.
 4. Perform queries using date functions.
 5. Perform queries using aggregate and set functions.
 6. Creation the following
 - Views
 - Objects
 - Sequence
 - Synonyms.
 7. Create a table with the following fields:

Book table:

Field name	Constraint	Type	Size
Access_no	Primary key	Character	6
Title		Character	30
Author		Character	30
Publisher		Character	30
Subject		Character	10
Price		Number	6,2

Execute the following queries:

- List the C and C++ books.
- List the books written by a particular author.
- List the books which costs between Rs.300/- and Rs.500/-

- List the no of books available in each subject.
- List the books in the decreasing order of the cost.
- Calculate the total cost and average cost of the available books
- List the books of minimum cost and maximum cost.

8. Perform different types of join operations between the two tables.
9. Create a table to store the salary details of the employees in a company. Use Cursor to update the employee salary.
10. Write a PL/SQL program to calculate the Fibonacci series, factorial, Palindrome string on user choice.
11. Create a table master book to contain the information of magazine_code, magazine_name, and publisher, Weekly/biweekly/monthly, price. Write PL/SQL block to perform insert, update and delete operations on the above table.
12. Create a table to contain phone number, user name, address of the phone user. Write a function to search for a address using phone numbers.
13. Create a table with the following fields:

Account table:

Field name	Constraint	Type	Size
Acc_no	Primary key	Character	4
Cust_name		Character	30
Branch_name		Character	30
Cust_city		Character	30

Borrower table:

Field name	Constraint	Type	Size
Acc_no	Foreign key	Character	30
Branch_name		Character	30
Amount		Number	8,2

Write the procedure to update the records of the tables.

14. Write a package to perform arithmetic operations.
15. Creating triggers.

Course Objectives

This course enables the students to

- Understand the basic concepts of numerical methods
- Develop the mathematical skills in the areas of numerical methods.
- The numerical techniques as powerful tool in scientific computing.
- To develop the mathematical skills of the students in the areas of numerical methods.
- To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, finding eigen values, eigenvectors, interpolation and applications, solving ODEs, PDEs and dealing with statistical problems like testing of hypotheses.
- To lay foundation of computational mathematics for post-graduate courses, specialized studies and research.

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.
2. Understand the basics of Numerical Differentiation & Integration and numerical solutions of ordinary differential equations.
3. Understand the concepts of difference operators and the use of Interpolation.
4. Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations
5. Apply various interpolation methods and finite difference concepts.
6. Work numerically on the partial differential equations using different methods through the theory of finite differences.

Unit I

Solution of algebraic and transcendental equations: Bisection method –Regula Falsi method – Newton Raphson method. Polynomoial Equations – Graeffe's root squaring method.

Unit II

Solution of simultaneous linear algebraic equations: Gauss elimination method – Gauss Jordan method – Method of triangularization – Gauss-Jacobi method – Gauss-seidel method.

Unit III

Interpolation: Gregory Newton Forward and Newton Backward interpolation formula –Interpolation with unequal intervals — Lagrange’s interpolation formula – Inverse interpolation formula.

Unit IV

Numerical Differentiation and Integration: Newton’s Forward and backward differences to compute derivatives – Trapezoidal rule, Simpson’s 1/3 & 3/8 rule.

Unit-V

Numerical methods for solving ordinary differential equations – Taylor series(I order) – Euler and Modified Euler method – Runge kutta methods (II order , III order and IV order).

Text Book

1. Venkataraman .M.K., Fifth Edition,2001. Numerical Methods in Science and Engineering, National publishing Company ,Madras. (Unit I – V)

References

1. Kandaswamy. P., Thilagavathy K., and K.Gunavathy., 2013 .Numerical Methods, S. Chand & Company Ltd., New Delhi.
2. Vedamurthy V.N.,N.CH.S.N.Iyenger., 1999. Numerical Methods,Vikas Publishing House Pvt Ltd, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 C: 4**Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours****Course Objectives:**

- To learn about the basics of Open Source Technology
- To know the importance of Open source in the development of software
- To know the role of open source in development and distribution of higher quality, better reliability, more flexibility, and lower cost software.
- learn the open source ideals in order to apply those principles
- learn about the open source software and hardware and free software
- learn about the open source database mysql.

Course Outcome:**The student should able to**

1. Gain knowledge about common open source licenses and the impact of choosing a license
2. Able to explain open source project structure and how to successfully setup a project
3. install open source server and handle open source database package
4. Be competent with distributed software engineering tools and processes such as test-driven
5. Development, issues tracking, unit testing, code review, distributed version control, and continuous integration
6. Apply the knowledge and manage the database in mysql

Unit I

Why open source, what is Open source, open source principles, open standards requirements for software, open source successes, free software, what is free software?, what are some example of free software?, free software license provider, free software Vs Open source software, Public Domain , FOSS DOES not Mean any cost, proprietary Vs Open Source Licensing Model.

Principles and Open Source Methodology: History, open source initiatives, open standards principles-methodologies, philosophy, software freedom, open source software, development, Licenses, copyright.

Unit II

Open source projects: Starting and maintaining an open source project, open source hardware- open source design-open source teaching (OST).Open Source Ethics: Open Source Vs Closed Source-Open source Government-The ethics of open source-social and financial impacts of open source technology-shared software, shared source.

Unit III

Apache Web Server: Introduction-Starting, Stopping, and Restarting Apache-Configuration-Securing Apache Create the Web Site-Apache Log Files

Unit IV

MySQL: Introduction-Tutorial-Database Independent Interface-Table Joins-Loading and Dumping a Database

Unit V

Perl: Introduction-Perl Documentation-Perl Syntax Rules-A Quick Introduction To Object-Oriented Programming-What We Didn't Talk About

Text Book:

1. Open source Technologies, Kailashvadera, Vhavyesh Gandhi, Published by University Science Press, Lakshmi Publications, 1st Edition 2009. [UNIT I – III]
2. Open Source Web Development with LAMP: Using Linux, Apache, MySQL, Perl, and PHP, James Lee, Brent Ware, Publisher: Addison Wesley Date Published: December 17, 2002. [UNIT IV – V]

Reference Books:

1. Fadi P. Deek and James A. M. McHugh, Open Source Technology and Policy, 2007, Cambridge University Press.
2. Nick Wells, The Complete Guide to Linux System Administration, 2012, Delmar Cengage Learning.
3. Andrew M. St. Laurent, Understanding Open Source and Free Software Licensing, 2004, O'Reilly Media.
4. Dan Woods, Gautam Guliani, Open Source for the Enterprise, 2005, O'Reilly Media.

Course Objectives:

- To expand the knowledge of network.
- To know the importance of Web and Mobile security.
- To identify the threats and vulnerabilities.
- To learn about the commercial-grade hacking tools, techniques, and methodologies used by hackers and information.
- To learn the offensive penetration remedial technique.
- To learn Cryptography and Information Security.

Course Outcome:**The student should able to**

1. Demonstrate the ability to attack and defend network.
2. To plan a vulnerability assessment and penetration test for a network.
3. To execute a penetration test using standard **hacking** tools in an **ethical** manner.
4. To report on the strengths and vulnerabilities of the tested network.
5. To identify legal and ethical issues related to vulnerability and penetration testing.
6. Understand ethical hacking methodologies and apply cyber security concepts to discover and report vulnerabilities in a network.

Unit I

Ethical Overview – TCP/IP concepts overview – Network and Counter Attacks – Footprint and Social engineering – Port Scanning

Unit II

Linux Hacking: Basics – Vulnerabilities – Firewall in Linux – Linux operating system defense – Linux Loadable Kernel Modules; Linux Tools: Application Security – Encryption – Log and Traffic Managers – Security countermeasures; Hacking: Routers – Cable Modems – Firewalls – Tools

Unit III

Hacking Mobiles Devices: Types of Handheld Devices – Common OS in handheld devices – Vulnerabilities in Handheld devices – Defending Handheld devices; Bluetooth Hacking: Introduction – Attacks against Bluetooth – Blue Hacking Tools – Bluetooth Security Tools

Unit IV

Hacking Web Servers – Hacking Wireless Networks – Network protection system

Unit V

Penetration Testing – Reconnaissance – Scanning – Exploitation – Web-Based exploitation

Text Books

1. Michael T. Simpson, Kent Backman, and James E. Corley, 2013, “Hands-On Ethical Hacking and Network Defense”, Course Technology, Boston USA (Unit I & IV)
2. EC Council, “Ethical Hacking and Countermeasures: Linux, Macintosh and Mobile Systems” (Unit II & III)
3. Patrick Engebretson, 2013, “The Basics of Hacking and Penetration Testing: Ethical Hacking: Ethical Hacking and Penetration Testing made easy”, 2nd Edition, Elsevier. (Unit V)

Reference Book

1. Ankit Fadia, 2006, “An unofficial Guide to Ethical Hacking”, Second Edition, Macmillan Publishers India Ltd.
2. Michale T.Simpson, Kent Backman and James E.Corley, 2013, “Hands-on Ethical Hacking and network defence”, Course Technology cengage learning.
3. Patrick Engebretson, 2013, “The basics of Hacking and Penetration Testing”, Second Edition, Elsevier Inc.

Websites

1. <http://www.hacking-tutorial.com>
2. <http://www.hackingloops.com/>
3. <https://evilzone.org/>

Instruction Hours / week: L: 4 T: 0 P: 0 C: 4**Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours****Course Objectives**

Enable the student

- To get knowledge and skills to master the NoSQL database mongoDB.
- To write programs using MongoDB
- To design an e-commerce data model
- To gain the knowledge on replication
- To know about Query language
- To know about query optimization

Course Outcomes(COs)

Upon completion of this course, the students will be able to:

1. Gain the right skills and knowledge needed to develop Applications on mongoDB
2. Run Applications on MongoDB
3. Do the query operation in MongoDB
4. Manipulate aggregate function
5. Design an e-commerce data model
6. Gain the knowledge on replication

Unit I

Getting Started: A database for the modern web – MongoDB through the JavaScript shell – Writing programs using MongoDB.

Unit II

Application Development: Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB's query language – Aggregating orders – Aggregation in detail.

Unit III

Updates, atomic operations, and deletes: A brief tour of document updates – E-commerce updates – Atomic document processing – MongoDB updates and deletes. Indexing and query optimization: Indexing theory – Indexing in practice – Query optimization.

Unit IV

Replication: Overview – Replica sets – Master-slave replication – Drivers and replication. Sharding: Overview – A sample shard cluster – Querying and indexing a shard cluster – Choosing a shard key – sharding in production.

Unit V

Deployment and administration: Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting.

TEXT BOOK

1. Kyle Banker, 2012, “MongoDB in Action”, Manning Publications Co.

REFERENCE BOOKS

1. Rick Copeland, 2013, “MongoDB Applied Design Patterns”, First Edition, O’Reilly Media Inc.
2. Gautam Rege, 2012, “Ruby and MongoDB Web Development Beginner’s Guide”, Packt Publishing Ltd
3. Mike Wilson, 2013, “Building Node Applications with MongoDB and Backbone”, O’Reilly Media Inc.

WEBSITES

1. <http://www.mongodb.org/about/production-deployments/>
2. <http://docs.mongodb.org/ecosystem/drivers/>
3. <http://www.mongodb.org/about/applications/>
4. <http://www.mongodb.org/>

Course Objective:

- To train students to understand the basic concepts of Quantitative Ability
- To understand the number series, analysis problems.
- To acquire knowledge about the analytical, verbal and logical reasoning.
- To practice to evaluate various real-life situations
- To develop the knowledge on communication
- To develop the presentation skills.

Course Outcome:

After the completion of this course, a successful student will be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning skills
3. Acquire satisfactory competency in use of verbal reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
5. Compete in various competitive exams like TNPSC, UPSC.etc.
6. Improve the communication skill

Unit - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

Unit – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

Unit – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

Unit – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

Unit - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives:

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

Unit I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

Unit II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

Unit III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

Unit IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

Unit V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

TEXT BOOKS:

Juneja. P. Om and Aarati Mujumdar, "*Business Communication -Techniques and Methods*", Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCE:

Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Instruction Hours / week: L: 6 T: 0 P: 0 C: 6**Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours****Course Objectives:**

Enable the student

- To Study the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To Learn about Processes, Threads and Scheduling algorithms.
- To Understand the principles of concurrency, Deadlocks and Memory Management
- To Learn about the Protection and Security Concepts.
- Understand basic resource management techniques.

Course Outcome (COs):

Upon completion of this course the students will be able to:

1. Design various Scheduling algorithms.
2. Apply the principles of concurrency.
3. Design deadlock, prevention and avoidance algorithms.
4. Compare and contrast various memory management schemes.
5. Apply the Security Concepts based on Authentication.
6. Appreciate the role of operating system as System software.

Unit I

Introduction -Mainframe systems Desktop Systems – Multiprocessor systems – distributed systems – real time systems. Process: - Process concepts – Operation on process – cooperation process - Inter process Communication - Mutual Exclusion - Critical sections- primitives – Semaphores – Deadlock: System Model, Deadlock characterization, Deadlock prevention, avoidance, detection, recovery from deadlock.

Unit II

Storage management: Memory Management - swapping- Contiguous memory allocation – paging, segmentation – segmentation with paging – Virtual memory :Virtual storage organization – Demand Paging, Process Creation – Page replacement – Thrashing.

Unit III

Processor Scheduling : preemptive scheduling : - Scheduling Criteria – Scheduling Algorithms – FCFS- SJF- Priority – RoundRobin –Multilevel Queue – Multilevel Feedback Queue . Multiprocess schedule: Real time schedule, Algorithm evaluation: Deterministic Modeling, Queue Model, Simulation

Unit IV

File systems: Introduction – File System Concepts – Access Methods – Directory structure – File Sharing – Allocation Methods – Free space management –Efficiency and performance – Recovery
Disk Performance Optimization: Introduction – Disk structure – Disk scheduling – Disk management.

Unit V

Case studies: LINUX, Windows 7, Mobile OS: History- Design principles- File systems- Memory.

TEXT BOOK

1. Silberschatz Galvin Gagne. 2012. Operating system concepts, 9th Edition, Wiley India (pvt), Ltd, New Delhi.

REFERENCE BOOKS

1. Deitel H.M. 2005. Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.
2. Pramod Chandra P. Bhatt. 2007. An Introduction to Operating Systems, 2nd Edition, Prentice Hall India, New Delhi.
3. Tanenbaum Woodhull. 2005. Operating Systems 2nd Edition, Pearson Education (LPE) , New Delhi.
4. William Stallings. 2010. Operating Systems internals and Design Principles, 6th Edition, Prentice Hall India, New Delhi.

WEBSITES

www.cs.columbia.edu/~nieh/teaching/e6118_s00/
www.clarkson.edu/~jnm/cs644
pages.cs.wisc.edu/~remzi/Courses/736/Fall2002/

Course Objectives

Enable the student

- To Create windows forms using arrays and flow control statements.
- To Learn to use Basic windows controls using Visual Basic.Net
- To Learn to use the classes and namespaces in the .NET Framework class library.
- To Develop Web Applications using Microsoft ASP.NET programming.
- To Understand the concept of Multiple Document Interface and the architecture of .NET
- To handle string operations

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Develop Windows based applications using Visual Basic.Net
2. Learn various tools in .net applications
3. Implement ADO.Net concept in VB.Net and ASP.Net applications
4. Create server side web applications using ASP.NET
5. Understand the concept of data sources and data bound controls in VB.NET
6. Learn the concept of data sources and data bound controls ASP.NET

Unit-I

Getting Started With VB.NET: The Integrated Development Environment-IDE Components-Environment Options. Visual Basic: The Language -Variables-Constants-Arrays – Variables as Objects-Flow Control Statements.

Unit-II

Writing and Using Procedures: Module Coding – Arguments. Working with Forms:Appearance of Forms- Loading and Showing Forms -Designing Menus. Multiple Document Interface

Unit- III

Basic Windows Controls: Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls. More Windows Control: The common Dialog Controls-The Rich TextBox Control.The TreeView and ListView Controls: Examining the Advanced Controls-The TreeView Control-The ListView Control-Content Page Holder.

Unit IV

Handling Strings, characters and Dates: Handling Strings and Characters – Handling Dates. Working with Folders and Files: Accessing Folders and Files – Accessing Files. Drawing and Painting with Visual Basic: Displaying Images – Drawing with GDI – Co-ordinate Transformation – Bitmaps.

Unit V

Databases: Architecture and Basic Concepts: What is database? - Server Explorer – Structured Query Language – The Query Builder – Building database Application with ADO.Net: The Architecture of ADO.Net-Creating the dataset – Data Binding – Programming the Data Adapter Objects – The Command and Data Reader Object. Programming the ADO.Net objects: The Structure of the dataset – The DataForm Wizard – Transactions – Performing Update Operations.

TEXT BOOK

1. Evangelos Petroustos, 2002, Mastering Vb.Net , SYBEX Inc.

REFERENCE BOOKS

1. Steven Holzner, 2003, Vb.Net Programming Black Book , Dreamtech Publications
2. Bill Evjen, Scott Hanselman, Farhan Mohammed, Srinivasa Siva Kumar and Devin Rader. 2006. Asp.Net 2.0, Wiley Publication , USA.
3. Burrowss W.E and D. Langford. 2003. Learning Programming using Visual Basic .Net, 1st Edition, McGraw Hill, New Delhi:
4. Jeffrey R. Shapiro. 2008. The Complete Reference Visual Basic.Net, 1st Edition, Tata -McGraw-Hill Edition, New Delhi.
5. Richard Bowman. 2002. Visual Basic.Net, Hungry Minds Inc. Publication, Canada

WEB SITES

1. www.microsoft.com/net/
2. www.en.wikipedia.org/wiki/.net
3. www.w3schools.com/ngws/default.asp
4. www.gotdotnet.com

Instruction Hours / week: L: 0 T: 0 P: 6 C: 3**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course Objectives**

Enable the student

- To Create windows forms using arrays and flow control statements.
- To Learn to use Basic windows controls using Visual Basic.Net
- To Learn to use the classes and namespaces in the .NET Framework class library.
- To Develop Web Applications using Microsoft ASP.NET programming.
- To Understand the concept of Multiple Document Interface and the architecture of .NET
- To handle string operations

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Develop Windows based applications using Visual Basic.Net
2. Learn various tools in .net applications
3. Implement ADO.Net concept in VB.Net and ASP.Net applications
4. Create server side web applications using ASP.NET
5. Understand the concept of data sources and data bound controls in VB.NET
6. Learn the concept of data sources and data bound controls ASP.NET

List of Programs:

1. Write a VB.NET program to calculate Simple interest and compound Interest.
2. Write a VB.NET program to find mouse events and coordinates where the mouse is clicked.
3. Write a VB.NET program to implement Calculator.
4. Write a VB.NET program to implement Notepad
5. Write a VB.NET program to draw several shapes and fill with color.
6. Write a VB.NET program to perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
7. Write a VB.NET program to calculate the days elapsed between the given two dates.
8. Write a VB.NET program to create Menu and link multiple forms with different colors.
9. Write a VB.NET program to animate the picture using animation control.
10. Write a VB.NET program to check whether given string is a Palindrome or not.
11. Write a VB.NET program to generate Fibonacci series for the input given using Input box.
12. Write a program to calculate the total marks of the student and print the grade.
13. Write a VB.NET Program to maintain details of students. Use Crystal Report to generate report.
14. Write a VB.NET Program to implement Employee Payroll.
15. Write a VB.NET program to create and manipulate a File.

Course Objectives

Enable the students

- To learn about the individual communication network.
- To Learn transmission systems, relay stations.
- To Learn about Tributary stations and data terminal equipments.
- To learn the basic concepts of various modulation and demodulation techniques.
- To learn about the electronics circuits used in communication systems.
- To learn about the Analog and Digital modulation circuits.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the communication network.
2. Gain the knowledge about the transmission and relay systems.
3. Implement antenna theory in the respective field.
4. Implement receiver and tracking
5. Gain the knowledge about modulation and demodulation techniques.
6. Able to construct analog and digital circuits.

Unit I

Modulation Techniques: Introduction to Communication Systems - Information - Transmitter - Channel - Noise - Receiver - Amplitude Modulation: AM Theory- Frequency Spectrum of AM Wave - Representation of AM - Power Relations in AM wave -AM Transmitter Block Diagram - Frequency Modulation

Unit II

Wave Propagation: EM waves - Free Space Propagation - Surface Wave Propagation - Sky Wave Propagation - Space Wave Propagation - Tropospheric Scatter Propagation - Structure of Atmosphere - Virtual Height

Unit III

Antenna Theory: Electro Magnetic Radiations - Elementary Doublet - Current and Voltage Distribution - Resonant Antennas, Radiation Patterns and Length Calculations - Non Resonant Antennas - Antenna Gain and Effective Radiated Power - Bandwidth, Beam Width and Polarization .

Unit IV

Receiver: Introduction - Super Heterodyne Receiver - Choice of IF and Oscillator Frequencies - Image Rejection - Adjacent Channel Selectivity - Spurious Response - Tracking - AGC - Double Conversion Receiver

Unit V

Analog and Digital Modulation: Introduction to PAM, PPM, PWM and PCM-Binary Phase Shift Keying - Differential Phase Shift Keying - Quadrature Phase Shift Keying - Binary Frequency Shift Keying – Similarity of BFSK and BPSK.

TEXT BOOKS

- 1 Electronic Communication Systems, Kennedy and Davis, Tata McGraw Hill, Fifth Edition, 2012 [UNIT- I]
- 2 Antenna Wave Propagation, K.D. Prasad and Satyaprakahan, Pearson Education, Indian Reprint, 2012. [UNIT II & III]
- 3 Electronic Communications, Dennis Roddy and John Coolen, Pearson Education, Fourth Edition, 2008.[UNIT IV - V]

REFERENCE BOOKS

- 1 Principles of Communication Engineering, Anok Singh & A K Chhabra , S.chand Publications, Seventh Edition, 2010.

Course Objectives

Enable the student

- To solve LPP using computer language.
- To learn to enhance in optimal use of resources
- To learn performance measures of queues
- To learn about the optimal use of Inventory
- To learn about the Network scheduling with various applications in the problems of real times.
- to know problem- solving through (computer language) programming.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Familiarize with the programming environment for operations research.
2. Understand the mathematical concepts using in computer programming techniques.
3. To apply the knowledge in optimal use of resources like LPP, TP, Assignment problems etc.
4. To impart knowledge in concepts and tools of operation research.
5. To understand mathematical models
6. To apply the techniques to the business decisions.

Unit I

Linear Programming: Formulation of LPP – Graphical solution to LPP –Simplex method – Big M method and Duality in LPP.

Unit II

Transportation model: Introduction – Mathematical Formulation –Finding initial Basic Feasible solutions – Optimum solution for non degeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem

Unit III

The Assignment problem - Mathematical formulation of the problem – Hungarian method –Unbalanced Assignment problem- Maximization case in Assignment problem.

Queuing theory : Introduction – Characteristics of queuing system.Problems in (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) models .

Unit IV

Inventory Control: Introduction – Costs involved in inventory – Deterministic EOQ models – Purchasing Model without and with shortage, Manufacturing Model without and with shortage -Price break.

Unit V

PERT and CPM: Network representation – Calculation of Earliest expected time, latest allowable occurrence time.CPM - various floats for activities – critical path.

PERT –Time estimates in PERT- Probability of meeting scheduled date of completion of projects .

TEXT BOOK

1. Kanthi Swarup, Gupta P.K., Man Mohan., 2006. Operations Research, Sultan Chand & Sons, New Delhi. (For Unit I – V)

REFERENCES

1. Sharma J.K., 2009.Operations Research: Theory and Applications, Macmillan publishers India Ltd, New Delhi.
2. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2005(III edition), Resource Management Techniques, A. R. Publications, Nagapatinam.

Course Objectives

Enable the student

- To solve LPP using computer language.
- To learn to enhance in optimal use of resources
- To learn performance measures of queues
- To learn about the optimal use of Inventory
- To learn about the Network scheduling with various applications in the problems of real times.
- To know problem- solving through (computer language) programming.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. describe the functions of banking.
2. Functions of central banking.
3. Describe the policy reforms in banking industry
4. Describe the recent developments in banking
5. To state the various social banking initiatives.
6. Understand the relationship between banker and customers.

Unit I

Banks: Origin of Banks – Definition of Bank – Classification of Banks – Banking system – UNIT Banking – Branch Banking – Functions of Modern Commercial Banks – Credit Creation by Commercial Banks.

Unit II

Central Banking: Functions – Credit Control Measures – Qualitative and quantitative credit control measures – Role of RBI in regulating and controlling banks.

Unit III

Development Banks: Functions, State Bank of India – Commercial banks and rural financing – Regional Rural Banks – Co-operative banks - NBFC-- IDBI – ICICI.-NBFC-NHB- IFCI

Unit IV

Services Banking: Automated Teller Machine – Merchant Banking – Mutual Fund – Factoring service – Privatization of commercial.

Unit V

E-Banking: E-Banking Services- ATM Card- Debit Card- Credit Card- Master Card-Visa Card- NEFT- RTGS-ECS.

Text Book

1. Natarajan, Parameswaran. (2013), Indian Banking,: S. Chand and sons, New Delhi

Reference Books

1. Santhanam.(2001) Banking and Financial System Margham Publications, Chennai.
2. Sundaram K.P.M. and Sundaram E.N. (1996) Modern Banking, Sultan Chand and Sons, New Delhi.

Instruction Hours / week: L: 2 T: 0 P: 0 C:1

Marks: Internal: 100 External: Nil Total: 100

Course Objective:

Enable the student

- To train students to understand the basic concepts of Quantitative Ability
- To understand the number series, analysis problems.
- To acquire knowledge about the analytical, verbal and logical reasoning.
- To practice to evaluate various real-life situations
- To develop the knowledge on communication and
- To develop the presentation skills.

Course Outcome:

After the completion of this course, a successful student will be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning skills
3. Acquire satisfactory competency in use of verbal reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
5. Compete in various competitive exams like TNPSC, UPSC.etc.
6. Reinforcing competencies in soft skills which are crucial in a social setting

Unit - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

Unit – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

Unit – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

Unit – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

Unit - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Instruction Hours / week: L: 5 T: 0 P: 0 C:5**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam : 3 Hours**Course Objectives**

Enable the student

- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To learn the function of switching concepts.
- To read the fundamentals and basics concepts of Physical layer with real time examples
- To study data link layer concepts, design issues, and protocols.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer and Application layer.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the functions of each layer in OSI and TCP/IP model.
2. Understand the knowledge of data transmission.
3. Explain the multiplexing, switching concept and types of transmission media with real time examples.
4. Understand the error detection and correction methods and can implement the data link layer protocols
5. Learn different medium access method to avoid collision and to learn about routing table.
6. Learn basic functionalities of transport layer and application layer.

Unit I

Data Communication: An Overview – Networks – Protocols and Standards. Network Models: The OSI Model and Layers – TCP/IP Protocol Suite – Addressing.

Unit II

Physical Layer: Multiplexing – Transmission Media – Switching – Circuit switched networks – Datagram Networks – Virtual circuit networks

Unit III

Data Link Layer: Error Detection and Correction – Framing – Flow and Error Control – Protocols

Unit IV

Network Layer: Ipv4 addresses – Internetworking – Ipv4 – Delivery and Forwarding – Unicast Routing Protocols.

Transport Layer: Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol.

Unit V

Transport Layer: Data Traffic – Congestion Control – Quality of Service and Techniques. Application Layer: Electronic Mail – File Transfer – WWW and HTTP – Symmetric Key and Asymmetric Key Cryptography.

TEXT BOOK

1. Andrew S Tanenbaum. 2014. Computer Networks, 5th Edition, Prentice Hall of India, New Delhi.

REFERENCE BOOKS

1. Behrouz A. Forouzan. 2006. Data Communication and Networking, 4th Edition, McGraw Hill, New Delhi.
2. Douglas E. Comer. 2000. Computer Networks and Internets, 2nd Edition. Pearson Education Asia, New Delhi.
3. Stanford H. Rowe and Marsha L. Schuh. 2005. Computer Networking, 1st Edition, Pearson Education.
4. William Stallings. 2007. Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. www.mhhe.com/engcs/compsci/forouzan/
2. www.amazon.com/Data-Communications-Networking
3. highered.mcgraw-hill.com/sites/0072515848/information_center_view0/

Course Objectives

Enable the student

- This course presents an introduction to computer graphics designed to give the student an overview of fundamental principles.
- The course makes the student to understand about the video and raster scan displays and their storage
- Methods for modeling objects as polygonal meshes or smooth surfaces, and as rendering such as hidden-surface removal, shading, illumination, and shadows will be investigated.
- To make the student to understand the usage of input devices and its working
- The course objective relies on the student to understand the line algorithm and 2D,3D Geometrical transformation.
- To make solutions to challenging problems in different application domains.

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components.
2. Have a knowledge and understanding of geometrical transformations and 2D viewing.
3. Be able to create interactive graphics applications.
4. Have a knowledge and understanding of techniques for representing 3D geometrical objects.
5. Have a knowledge and understanding of the various clipping algorithms and visible surface detection algorithm.
6. Learn knowledge to provide students with distinguished knowledge in the field of two- and three-dimensional computer graphics for Animation

Unit I

A Survey of Computer Graphics - Video Display Devices - Refresh Cathode Ray Tubes -Raster Scan Displays - Random Scan Displays - Color CRT Monitors - Direct –View Storage Tubes - Flat Panel Displays - Raster Scan Systems - Three Dimensional Viewing Devices - Random Scan Systems.

Unit II

Input Devices: Keyboards - Mouse –Track Ball and Space ball – Joysticks - Data Glove – Digitizers - Image Scanners - Touch Panels - Light Pens - Voice Systems. Hard Copy Devices: Printers and Plotters.

Point and Lines - Line Drawing Algorithms: DDA Algorithm - Bresenham's Line Algorithm. Circle Generating Algorithms: Mid Point Circle Algorithm.

Unit III

Two Dimensional Geometric Transformations: Basic Transformations: Translation –Rotation – Scaling - Composite Transformations: Translations – Rotations - Scalings. General Pivot Point Rotation - General Fixed Point Scaling. Two – Dimensional Viewing: The Viewing Pipeline - Window to viewport Transformation - Clipping Operations: Point Clipping - Line Clipping - Cohen Sutherland Line Clipping - Polygon Clipping: Sutherland – Hodgeman Polygon Clipping - Text Clipping.

Unit IV

Three – Dimensional Display methods, Three – Dimensional Transformations : Translation –Rotation – Scaling, Three Dimensional viewing : Viewing pipeline - Viewing coordinates - Parallel Projection – . Perspective Projections.

Unit V

Visible Surface Detection Methods: Classification of Visible Surface Detection Algorithms - Back Face Detection - Depth Buffer Method - Area Sub division Method.

Computer Animation : Design of Animation Sequences-General Computer Animation functions – Raster Animations – Computer animation Languages – Key Frame Systems – Motion Specifications

TEXT BOOK

1. Donald Hearn and M. Pauline Baker, 2010, “Computer Graphics - C Version”, 2nd Edition, Pearson Education, New Delhi.

REFERENCE BOOKS

1. Amarendra N. Sinha, 2008, “Computer Graphics”, 1st Edition, Tata McGraw Hill, New Delhi.
2. Foley, Vandam, Feiner and Hughes, 1999, “Computer Graphics Principles and Practices”, 2nd Edition, Addison Wesley, Singapore.
3. Zhigang Xiang and Roy A. Plastock, 2002, “Theory and Problems of Computer Graphics”, 2nd Edition, Tata McGraw-Hill publishers, New Delhi.
4. William M. Newman and Robert F. Sproull, 2007, “Principles of Interactive Computer Graphics”, 2nd Edition, Tata McGraw-Hill Publishers, New Delhi.

WEBSITES

1. http://www.fileformat.info/mirror/egff/ch02_01.html
2. <http://www.rw-designer.com/how-to>
3. http://en.wikipedia.org/wiki/3D_computer_graphics

Instruction Hours / week: L: 5 T: 0 P: 0 C: 5**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3Hours****Course Objectives**

Enable the student

- To design components, systems and/or processes to meet required specifications for a web presence.
- To introduce at student level the technologies, concepts and principles of ERP and various users and their role,.
- To learn the development of electronic business from its origins in electronic data interchange to its current growing importance.
- To secure & work as an effective member or leader of diverse teams within a multi-level, multi-disciplinary and multi-cultural setting for the Group Website Research Project.
- Be aware of global perspectives of M-Commerce(needs, rules/regulations, and specifications)
- Demonstrate effective and integrative team-work through mobile technology.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Discuss electronic commerce and the stakeholders and their capabilities and limitations in the strategic convergence of technology and business.
2. Gain the global nature and issues of electronic commerce as well as understand the rapid technological changes taking place and electronic payment options.
3. Identify advantages and disadvantages of E-security technology.
4. Demonstrate awareness of ethical, social and legal aspects of ERP
5. Analyse features of existing SAP businesses, and propose future directions or innovations for specific businesses
6. Identify the recent tools of SAP applications.

Unit I

ERP AND TECHNOLOGY: Introduction – Related Technologies – Business Intelligence – E-Commerce and EBusiness – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life Cycle management – SCM – CRM.

Unit II

ERP IMPLEMENTATION: Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

Unit III

ERP IN ACTION & BUSINESS MODULES: Operation and Maintenance – Performance – maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources – Plant maintenance – Materials Management – Quality management – Marketing – Sales, Distribution and service.

Unit IV

ERP MARKET: Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc – SSA Global – Lawson Software – Epicor – Intuitive.

Unit V

Enterprise Application Integration – ERP and E-Business – ERP II – Total quality management – future Directions – Trends in ERP.

TEXT BOOKS:

1. Alexis Leon, 2008. ERP DEMYSTIFIED, Second Edition, Tata McGraw Hill.

REFERENCES:

1. Alexis Leon, 2011 .ERP DEMYSTIFIED, third Edition, Tata McGraw Hill.
2. Mary Sumner, 2007. Enterprise Resource Planning, Pearson Education,
3. Biao Fu, 2003. SAP BW: A Step-by-Step Guide, First Edition, Pearson Education.

WEBSITES:

1. en.wikipedia.org/wiki/Enterprise_resource_planning
2. www.sap.com/india/pc/bp/erp/software/overview.html

Course Objectives

Enable the students

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

Upon completion of this course the student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

Unit I

Introduction to Object Oriented Programming: Object Oriented Paradigm and Concepts-Structured versus Object Oriented Approach. Java Language: Features of Java -Environment-Java Architecture-Java Development Kit-Types of Java Program. Variable Declaration and Arrays: Data Types-Java Tokens –Variable Declaration – Type Casting and Conversion – Arrays, Operators, And Control Statements: Selection Constructs – Iteration Constructs –Jump Statements.

Unit II

Introduction to classes: Instance variables, Class variables, Instance Methods, Constructors, Class methods, Declaring Objects, Garbage Collection, Method Overloading - Constructor Overloading - This Reference. Inheritance: Super class variables- Method Overriding - final Keyword, Abstract Classes and Interfaces.

Unit III

Packages and Access Modifiers: Package Declaration – import statement - Access Protection. Strings: Creation – Operation on strings - Character Extraction Methods – Comparison –Searching and Modifying –String Buffer Class. Collection and Utilities: Collection of Objects – Interfaces and Classes –Iterators – List, Set, Map Implementations.

Unit IV

Input Output Classes: I/O Operations –Hierarchy of Classes – File class – Input Stream, Output Stream, FilterInputStream, FilterOutputStream, Reader and Writer classes – Random Access File class –Stream Tokenizer. Applets: Basics – Life Cycle –Methods –Graphics Class- Color, Font, and Font Metrics Class.

Unit V

Exception Handling: Fundamentals – Hierarchy of Classes – Types of Exception. Multithreaded Programming: Thread Model – Runnable Interface - Thread Class – Synchronization and Deadlock. AWT Components: AWT Classes – Basic Component and Container Classes – Frame Window in an Applet.

TEXT BOOK

1. ISRD Group. 2012. Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi.

REFERENCE BOOKS

1. Deitel H.M. and P.J.Deitel . 2014. Java, How to Program, 10th Edition, Pearson Education.
2. Herbert Schildt. 2014. Java Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.
3. Somasundaram Dr.S. 2004. Java Programming, 1st Edition. Techmedia. New Delhi.

WEB SITES

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java

Instruction Hours / week: L: 0T: 0 P: 5 C: 3**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

Enable the students

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

Upon completion of this course the student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

List of Programs:

1. Write a program to find the sum of series $1+x+x^2+x^3+\dots$
2. Write a program to get a number using command line argument and find its factorial using recursion.
3. Write a program to find maximum and sum of an array.
4. Define a class for Employee with name and date of appointment. Create employee objects and sort them as per their date of appointment.
5. Write a program to perform string operations.
6. Write a program to accept more strings and arrange them in alphabetical order.
7. Write a program to create an applet and draw the shapes.
8. Write a program for multiplication tables by multithreading.
9. Write a program to create an exception for marks out of bounds. If mark is greater than 100 throw an exception.

10. Write an applet program to create menus.
11. Write a java code to generate key event when input is received from the keyboard.
12. Write a Java Program to design a registration Form using Applet with all the AWT controls.

Instruction Hours / week: L: 5 T: 0 P: 0 C: 5**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

Enable the student

- To Understand Data Mining fundamentals and Characterize the kinds of patterns that can be discovered by association rule mining
- Understand the basic principles, concepts and applications of data warehousing and data mining
- To Compare and evaluate different data mining techniques like classification, prediction.
- To Cluster the high dimensional data for better organization of the data
- To describe complex data types with respect to spatial and web mining
- To Design data warehouse with dimensional modelling and apply OLAP operations.

Course Outcomes(COs)

Upon completion of this course the students will be able to:

1. Extract knowledge using data mining techniques and Implement Preprocess the data for mining applications and apply the association rules for mining the data
2. Design and deploy appropriate classification techniques and decision trees.
3. Understand the concept of clustering and its real time applications
4. Understand the design concept of data mining and its management.
5. Explore recent trends in data mining such as web mining, spatial-temporal mining
6. Able to know the basic concepts of data warehouse and OLAP operations

Unit I

Introduction : Fundamentals of data mining – Data Mining Functionalities – Classification of Data Mining systems – Major issues in Data Mining.

Data Warehouse and OLAP Technology: An Overview – Data Warehouse – Multidimensional Data Model – Data Warehouse Architecture

Unit II

Data Preprocessing: Needs Preprocessing the Data – Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and Concept Hierarchy Generation – Online Data Storage.

Preparing Data for Mining: Variable Measures.

Unit III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts – Efficient and Scalable Frequent item set Mining Methods – From Association Mining to Correlation Analysis.

Unit IV

Classification and Prediction: Issues Regarding Classification and Prediction –Classification by Decision Tree Induction – Rule-based Classification – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a classifier or Predictor.

Unit V

Cluster Analysis Introduction :Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Model-Based Clustering Methods – Constraint-Based Cluster Analysis – Outlier Analysis. Applications and Trends in Data mining – Text Mining – Web Mining – Multimedia Mining-Spatial Mining – Visual data mining.

TEXT BOOKS

1. Jiawei Han & Micheline Kamber. 2012. Data Mining – Concepts and Techniques, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS

1. Arun K Pujari. 2001. Data Mining Techniques, University Press.
2. Michael J. A.Berry, Gordon S.Linoff. 2011. Data mining Techniques, 3rd Edition, Wiley Publishing Inc,
3. K.P.Soman, Shyam Diwakar, V.Ajay. 2006. Insight into Data Mining Theory and Practice, Prentice Hall of India.
4. Paulraj Ponnaiah, Data Warehousing Fundamentals –Wiley Student Edition.

WEB SITES

1. www.thedacs.com
2. www.dwreview.com
3. www.ecai.com
4. www.eruditionhome.com
5. www.anderson.Ucla.com

Course Objectives

Enable the student

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.

Course Outcomes (COs)

Upon completion of this course, the students will be able to:

1. Work with big data tools and its analysis techniques
2. Analyze data by utilizing clustering and classification algorithms
3. Learn and apply different mining algorithms and recommendation systems for large volumes of data
4. Perform analytics on data streams
5. Learn NoSQL databases and management.
6. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

Unit-I

Fundamentals of Big Data - The Evolution of Data Management Understanding the Waves of Managing Data- Defining Big Data - Big Data Management Architecture- The Big Data Journey -Big Data Types-Defining Structured Data-Defining Unstructured Data-Putting Big Data Together.

Unit-II

Big Data Stack- Basics of Virtualization - The importance of virtualization to big data -Server virtualization - Application virtualization - Network virtualization -Processor and memory virtualization - Data and storage virtualization-Abstraction and Virtualization-Implementing Virtualization to Work with Big Data.

Unit-III

Hadoop - Hadoop Distributed File System - Hadoop MapReduce- The Hadoop foundation and Ecosystem.

Unit-IV

Big Data Analytics-Text Analytics and Big Data-Customized Approaches for Analysis of Big Data

Unit-V

Integrating Data Sources-Real-Time Data Streams and Complex Event Processing-Operationalizing Big Data.

TEXT BOOK

1. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman. 2013. Big Data For Dummies, Wiley India, New Delhi.

REFERENCES

1. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan. 2012. Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, New Delhi.
2. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author). 2013. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, New Delhi.
3. Zikopoulos, Paul, Chris Eaton. 2011 .Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, New Delhi.

WEB SITES

1. www.oracle.com/BigData
2. www.planet-data.eu/sites/default/files/Big_Data_Tutorial_part4.pdf
3. www.ibm.com/developerworks/data
4. www.solacesystems.com
5. en.wikipedia.org/wiki/Big_data
6. www.sap.com/solution/big-data.html

Instruction Hours / week: L: 5 T: 0 P: 0 C: 5

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours

Course Objectives

Enable the student

- To understand the concept of cloud computing.
- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.

Course Outcomes (COs)

Upon completion of this course, the students will be able to:

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
2. Learn the key and enabling technologies that help in the development of cloud.
3. Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
4. Explain the core issues of cloud computing such as resource management and security.
5. Be able to install and use current cloud technologies.
6. Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

Unit I

Introduction to Cloud Computing -Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

Unit II

Virtualization Technologies -Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

Unit III

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

Unit IV

Cloud Information Security Objectives -Confidentiality, Integrity, and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations General Issues- Trusted Cloud Computing -Identity Management and Access Control

Unit V

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2-Google Web services.

TEXT BOOKS

1. Dr Kumar Saurabh.2012. Cloud Computing, 2nd Edition, Wiley India.

Reference Book

1. Barrie Sosinsky .2010. Cloud Computing Bible, Wiley- India [UNIT
2. Rajkumar Buyya, James Broberg, Andrzej M Goscinski. 2011. Tata Mc-Graw Hill, New Delhi.
3. Ronald L. Krutz, Russell Dean Vines. 2010. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley –India
4. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. 2010. Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
5. Nikos Antonopoulos, Lee Gillam. 2012. Cloud Computing: Principles, Systems and Applications, Springer.

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx

Instruction Hours / week: L: 0 T: 0 P: 0 C: 3**Marks: Internal: External: 100 Total: 100
End Semester Exam: 3 Hours****Course Objectives:**

To help students to

- To Learn the E-Commerce Platform and its concepts
- To Understand the Technology, infrastructure and Business in E-Commerce
- To Understand the Security and Challenges in E-Commerce
- To Build an Own E-Commerce using Open Source Frameworks
- To Able to Understand the TCP/IP network, Electronic payment systems
- To able to understand E-Security principles

Course Outcome:

Upon completion of the course, the students will be able to:

1. Design Website using HTML CSS and JS
2. Design Responsive Sites
3. Manage, Maintain and Support Web Apps
4. Able to create XML and Web Databases
5. Implement Electronic payment systems
6. Implement E-Security systems

Unit I

E-business opportunities and risks-e-commerce vs e-business-significance of e-business and e-commerce- digital technologies for e-business and e-commerce-B2B and B2C companies-Management responses to e-business and e-commerce- e-commerce environment – portals – auctions – business models and revenue models – dot-com

Unit II

e-Business strategy strategic analysis – strategic objectivities – strategy definition – Strategy implementation - information system and e-business strategy

Unit III

Supply chain management – value chain – e-business to restructure supply chain – supply chain management implementations – procurement – risks and impact of e-procurement – electronic B2B market

Unit IV

Management issues in e-marketing – e-marketing – e-marketing planning – situation analysis – strategy – tactics

Unit V

Management issues in CRM – CRM – characteristics of interactive marketing communications – assessing marketing communications effectiveness – customer retention management – improving online service quality – customer extension – technology solutions for CRM

TEXTBOOK

1. Dave Chaffey, E-Business and E-Commerce Management, Pearson Publications India, 5th Impression 2012

REFERENCE BOOKS:

1. Ken Laudon, E-Commerce 2012, Course Smart eTextbook, 8/E, Prentice Hall
2. Henry Chan, Raymond Lee, Tharam Dillon, Elizabeth Chang, E-Commerce: Fundamentals and Applications, 2001, Paperback

Course Objectives

Enable the students

- To understand the methods used to evaluate and select projects for investment of funds .
- primary aim of thist concepts of project management related to managing software development projects.
- To gain knowledge on the principles and techniques of software project management
- To introduce organization behavior and general management techniques used for project Management.
- To implement a software project management activity
- To complete a specific project in time with the available budget

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Apply the process to be followed in the software development life-cycle models.
2. Implement communication, modeling, construction & deployment practices in software development.
3. Analyze & design the software models using unified modeling language (UML).
4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
5. Explain the quality management & different types of metrics used in software development.
6. Apply the concepts of project management & planning.

Unit I

Introduction to Software Engineering: The Evolving Role of Software-Software-Software Myths- A Generic View of process: Software Engineering –A Layered Technology- Process Models: Prescriptive Models- Waterfall Model- Incremental process Models. Evolutionary Process Models: Prototyping, The Spiral Model. Specialized process Models- An agile view of Process-What is an Agile Process – Agile Process Models.

Unit II

Requirements engineering: requirements engineering tasks. Building the Analysis Model: Requirements Analysis-Analysis Modeling Approaches-Data Modeling Concepts: Data Objects-Data attributes-Relationships Cardinality and Modality-Flow Oriented Modeling: Creating Data Flow Model-Creating a Control Flow Model-The Control Specification-The Process Specification- Creating a Behavioral Model.

Unit III

Design Engineering: Design with the Context of Software Engineering-Design Process and Design Quality-Design Concepts-Creating An Architectural Design: Software Architecture-Data Design-Architectural Design- Assessing Alternative Architectural Designs-Mapping Data Flow into Software Architecture.

Unit IV

Performing User Interface Design: The Golden Rules- User Interface Analysis and Design- The Process- Interface Analysis: User Analysis - Task analysis and Modeling. Testing Tactics: Software Testing Fundamentals- Black –Box and White-Box Testing- White Box Testing-Basis Path Testing- Control Structure Testing: Condition Testing- Data Flow Testing-Loop Testing- Black Box Testing- Quality Concepts: Quality- Quality Control –Quality Assurance –Cost Of Quality.

Unit V

Project Evaluation: Strategic Assessment, Technical Assessment, cost-benefit analysis, Cash flow forecasting, cost-benefit evaluation techniques, Risk Evaluation. Risk Management: Nature of Risk, Managing Risk, Risk Identification and Analysis, Reducing the Risk. Resource Allocation: Scheduling resources, Critical Paths, Cost scheduling, Monitoring and Control: Creating Framework, cost monitoring, prioritizing monitoring.

TEXT BOOK

1. Roger S. Pressman. 2006. Software Engineering – A Practitioner’s Approach, 6th Edition, McGraw Hill International Edition, New Delhi. [UNIT I – IV]
2. Bob Hughes & Mike Cotterell, 2012. Software Project Management, 5th Edition, Tata McGraw-Hill Publications, New Delhi. [UNIT V]

REFERENCE BOOKS

1. Ian Sommerville. 2005. Software Engineering 5th Edition, Pearson Education Publication, New Delhi.
2. Daniel Hoffman and Paul Strooner Software Design Automated Testing and Maintenance, Thomson Publications, Asia.
3. Kalkar S.A. 2007. Software Engineering a Concise Study, 1st edition, Prentice Hall India, New Delhi.
4. Richard Fairley. 1998. Software Engineering Concepts, 1st Edition, Tata McGraw Hill Publishing, New Delhi.
5. Stephen Schach. 2007. Software Engineering , 7th Edition, Tata McGraw Hill, New Delhi.
6. Roger S. Pressman. 2010. Software Engineering – A Practitioner’s Approach, 10th Edition, McGraw Hill International Edition, New Delhi.
7. Kelkar. S. A. 2013. Software Project Management, 3rd Edition , Prentice Hall India, New Delhi.

WEB SITES

1. http://en.wikipedia.org/wiki/Software_engineering
2. <http://www.onesmartclick.com/engineering/software-engineering.html>
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall

Instruction Hours / week: L: 5 T: 0 P: 0 C: 5**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course Objectives**

- The principles of scripting languages.
- Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.
- Scripting languages such as PERL, TCL/TK, python and BASH.
- Creation of programs in the Linux environment.
- Usage of scripting languages in IC design flow.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Ability to create and run scripts using PERL/TCL/Python in IC design flow.
2. Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow
3. Construct web scraping scripts to programmatically obtain data and content from web pages.
4. Demonstrate the use of Python to manage applications using networking.
5. Control the keyboard and mouse with GUI automation.
6. Use Python to process Excel spreadsheets, PDF and CSV files, Word documents, and JSON data.

Unit I

HTML: Introduction - SGML - Outline of HTML Document - Head section-Body section - HTML forms.

Unit II

Introduction - Language elements - Object of java script - Other objects - Arrays.

Unit III

DHTML: Cascading style sheets - DHTML Document object model and collections - Event Handling - Filters and Transitions - Data binding

Unit IV

XML: Syntax of XML Document - XML Attributes - XML Validation - XML DTD - XML -DTD Elements - DTD Attributes - DTD Entities - DTD Validation

Unit V

PHP: Introduction to PHP - Syntax - Saving PHP files - Variables - Constants - If and Switch Statements - Operators - Loops and Strings.

TEXT BOOKS

1. Gopalan. N.P & J.Akilandeswari. 2007. Web Technology : A Developer's Perspective ,2nd Edition , Prentice Hall of India. New Delhi. [UNIT I – II]
2. Ivan Bayross.2009. Web Enabled Commercial Application Development using HTML, DHTML ,JavaScript, Perl CGI 2nd Edition, BPB Publications, New Delhi. [UNIT III – V]

REFERENCE BOOKS

1. Ashok Lodha. 2007. Guide to PHP, 1st Edition. LawPoint, Kolkata.
2. Dave W.Mercer, Allan Kent, Steven D.Nowicki, Davd Mercer, Dan Squie, Wankyu Choi. 2006. Beginning PHP5, Wiley India (P) Ltd. New Delhi.
3. Tim Converse & Joyce Park with Clark Morgan. 2006. PHP5 & MySQL Bible, 1st Edition, John Wily, India.

WEB SITES

1. <http://www.mvps.org/scripting/languages>
2. [Http://en.wikipedia.org/wiki/script_language](http://en.wikipedia.org/wiki/script_language)
3. <http://www.mvps.org/scripting/languages>

Instruction Hours / week: L: 0 T: 0 P: 5 C: 3**Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam : 3 Hours**Course Objectives**

Enable the student

- To write basic PHP syntax using various operators.
- To write PHP scripts to handle HTML forms.
- To analyze different tasks using PHP functions.
- To understand the regular expressions in PHP.
- To learn concept of extended markup language
- To learn array data structure using PHP scripts.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Write PHP scripts using operators to perform various functions
2. Design PHP scripts to handle HTML forms.
3. Implement different types of PHP functions.
4. Write regular expressions including modifiers, operators, and metacharacters.
5. Create webpage using different techniques.
6. Create PHP scripts using array.

List of Programs :

1. Create a form to reserve a ticket in the railways if the source and destination place is given.
2. Create a web page to display student mark statement.
3. Design an home page for a company
4. Develop DHTML Script to illustrate Color and Background attribute.
5. Create a DHTML page using various filters on images, mask image, mask Text.
6. Design a PHP program to find greatest of three numbers.
7. Design an student application form using PHP program.
8. Write a java script program design a calculator
9. Develop a Java script program for display greetings based on Time
10. Create an XML document for student information with relevant attributes and validation.
11. Develop a program to copy the content of one file to another file using PHP program.
12. Develop an E-mail application using PHP program.

Course Objectives

Enable the student

- To understand the Object-based view of Systems
- Explain the principles and requirements of OOA and Design
- Describe the object-oriented approach to system development, modeling objects, relationships and interactions.
- Discuss software design in an object-oriented manner.
- Use the UML (Unified Modeling Language)
- Use case studies and tool for OOA and Design.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.
2. Apply systematic procedure for software design and deployment.
3. Analyze a problem and identify and define the computing requirements to the problem.
4. Formulate appropriate testing strategy for the given software system.
5. Develop software projects based on current technology,
6. Test the software using testing tools.

Unit-I

The Object Model: The evolution of the object model – Elements of the object model – Applying object model. Classes and Objects: The nature of an object – Relationships among objects.

Unit-II

Classes and Objects: The nature of the class – Relationship among classes – The Interplay of Classes and Objects – On building quality classes and objects. Classification: The Importance of proper classification – Identifying proper classes and objects – Key abstraction mechanism.

Unit-III

The notation: Elements of the notation – class diagrams –state transition diagrams – object diagrams.

Unit-IV

The Process: First principles – The micro development process – The macro development process.

Unit-V

UML Overview: UML History – Goals of UML – UML concept areas – Syntax of Expressions and Diagrams.

Nature and purpose of Models: A Model – Levels of Models – Meaning of Model. UML Walkthrough: UML views – Static views – use case view – interaction views – state machine view – activity view – physical view – model management view- extensibility constructs.

TEXT BOOK

1. Grady Booch. 2007. Object Oriented Analysis and Design, 3rd Edition, Addison Wesley, New Delhi.

REFERENCES

1. James Rumbaugh, Ivar Jacobson and Grady Booch. 2003. The Unified Modeling Language Reference Manual, 1st Edition, Addison Wesley, New Delhi.
2. Martin Fowler, Kendall Scott. 2004. UML Distilled, 2nd Edition, Pearson Education, New Delhi.

WEB SITES

1. uml-tutorials.trireme.com/
2. <http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysis-and-Design/>
3. <http://community.sparxsystems.com/tutorials/object-oriented-analysis-and-design>

Course Objectives

Enable the student

- To introduce the fundamental concepts of software engineering.
- To Analyze, specify and document software requirements for a software system.
- To understand different techniques and tools used in this area of software testing.
- To Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
- Expose the criteria for test cases.
- Be familiar with test management and test automation techniques

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Identify suitable life cycle models to be used and translate a requirement specification to a design using an appropriate software engineering methodology.
2. Apply systematic procedure for software design and deployment.
3. Analyze a problem and identify and define the computing requirements to the problem.
4. Formulate appropriate testing strategy for the given software system.
5. Enable to understanding the techniques, and tools in the area of software testing and its practice in the industry
6. Develop software projects based on current technology, and test the software using testing tools.

UNIT I

Procedures to build software testing organization – Minimizing risks – writing policy for software testing – Economics of testing – Building structured approach to software testing – Developing test strategy - Guidelines for software testing.

UNIT II

Customizing the software testing process -Integrating tools into the Tester's work processes – selecting and using test tools – Appointing tool managers – Building software tester competency – overview of the software testing process.

UNIT III

Organizing for testing: Do procedures – Reporting process; Developing test plan: Do procedures – check procedures.

UNIT IV

Verification testing: Do procedures – check procedures; Validating testing: Do procedures.

UNIT V

Analyzing and reporting test results: Input – Do procedures; Acceptance and operational testing; Post implementation analysis.

TEXT BOOK

1. William E. Perry, Effective Methods for Software Testing, 3rd Edition, Wiley Publications.

REFERENCE BOOKS:

1. Nageshwar Rao Pusuluri ,Software Testing Concepts and Tools , 2006,Paperback , Dreamtech Press
2. Dorothy Graham, Foundations of Software Testing ISTQB 2012, Paperback .

Course Objectives

Enable the student

- To understand multimedia in respect to many application including business, schools, home, education, and virtual reality.
- To understand the hardware and software needed to create projects using creativity and organization to create them.
- To develop multimedia skills understanding the principal players of individual players in multimedia teams in developing projects.
- Know the importance of images, sound.
- To understand working principles of video and learn copyright laws associated with multimedia.

Course Outcomes (COs)

Upon Completion of the course, the students will be able to

1. Students will be able to analyze various components of the multimedia systems.
2. Use technologies of different multimedia software
3. Able to know multimedia skills understanding the principal players of individual players in multimedia teams in developing projects.
4. Students will be able to design a multimedia system with the encoding and decoding techniques which they have been trained through this course.
5. Able to know clear know about animation software.
6. Design new real time applications

UNIT-I

Definition of multimedia – Introduction to making multimedia: the stages of a project –Basic software tools-Using Text in multimedia - font editing and design tools – hypermedia and hypertext.

UNIT-II

Introduction to Photoshop 6: Interfaces and Navigation-Tools-Text-Working in Photoshop-Creating new documents-Saving Files.

UNIT-III

Displaying the Images- Using Rulers, Guides and Grids – Making Selections- Layers and Types-Choosing Colors-Creating Brushes- painting & editing Tools- Making and Applying Gradients.

UNIT-IV

Introduction to Flash: Variables & data types- Data types in Action Script-Creating and placing variables – Buttons with text fields.

UNIT-V

Basic Actions: Play, stop, Back & forth- Between frames and scenes – Timelines – External scripts-Loops.

TEXT BOOKS

1. Tay Vaughan. 2008. Multimedia making it Work, 7th Edition, Tata McGraw-Hill, New Delhi.(UNIT I)
2. Steve Romaniello. 2001. Mastering Photoshop 6, 1st Edition, BPB Publications, New Delhi. (UNIT II and UNIT III)
3. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, DreamTech Press, New Delhi. (Unit IV and UNIT V)

REFERENCES

1. Dinesh Maidasani. 2006. Flash 8, 1st Edition, Firewall Media Publications, New Delhi.
2. Russal chan 2010. Adobe Flash Professional CS5 Classroom 2010 Adobe Creative Team, Adobe Systems.
3. Robert Shufflebotham. 2004. Photoshop CS in Easy Steps, 1st Edition, DreamTech Pess, New Delhi.
4. Ze-Nian Li and Mark S. Drew. 2004. Fundamentals of Multimedia, Pearson Eduction, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Multimedia
2. www.arena-multimedia.com/ -
3. www.nextwavemultimedia.com/

Course Objectives

Enable the student

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

Upon completion of this course the student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

UNIT I

Introduction to Java Applications and Applets: Printing a line of text – Displaying text in a Dialog Box – Adding integers – Arithmetic – Decision Making – Drawing a String – Adding Floating Point Numbers. Control Statements: Pseudocode – Control Structures - if, if/else, while – Formulating Algorithms: Case studies: 1, 2 & 3 – Compound Assignment – Increment and Decrement Operators – Primitive types – for, do/while – switch –break and continue statements (simple & labeled) – Logical Operators - selection statements. Methods: Program Modules in Java – Method Declarations – Argument Promotion - Java API Packages – Scope of Declarations – Method Overloading – Recursion. Arrays: Declaring and Creating Arrays – REFERENCE BOOKS and Reference Parameters – Passing Arrays to Methods – Multidimensional Arrays.

UNIT II

Object-Based Programming: Implementing a Time Abstract Data Type with a Class – Class Scope – Controlling Access to members –‘this’- Constructors – Overloaded Constructors – set and get methods – Composition – Static Class Members – Creating Packages – Package Access. Object-Oriented Programming: Superclasses and Subclasses – protected Members – Constructors and Finalizers in Subclasses – Invoking Superclass Method from Subclass Objects - Using Superclass REFERENCE BOOKS with Subclass-Type Variables – Subclass Method Calls via Superclass-Type Variables – Inheriting Interface and Implementation – final Methods and classes Nested Classes – Type-Wrapper

Classes for Primitive Types. String and Characters: Fundamentals – Class String – Class StringBuffer – class Character – class StringTokenizer – Regular Expressions, Class Pattern and Class Matcher.

UNIT III

Graphics and Java2D: Graphics Contexts and graphics Objects – Color Control – Font Control – Drawing Lines, Rectangles, Ovals, Arcs, Polygons and Polylines – Java2D API. Graphical User Interface Components: Overview of Swing Components- JLabel – EventHandling – Textfields – How event handling works – JButton – JCheckBox and JRadioButton – JComboBox – JList – Multiple-Selection Lists – Mouse Event Handling – Adapter classes – Key Event Handling – Layout Managers – Panels – JTextArea – JPanel – JSlider – Using Menus with Frames – JPopupMenu – Pluggable Look-and-Feel. Exception Handling: Java Exception Hierarchy – Rethrowing and Exception – finally Clause – printStackTrace, getStackTrace and getMessage – Chained Exceptions.

UNIT IV

Multithreading: Life Cycle of a Thread – Thread Priorities and Thread Scheduling – Creating and Executing Thread – Thread Synchronization – Daemon Threads – Runnable Interface. Files and Streams: Data Hierarchy – Files and Streams – Class File – Creating a Sequential-Access File – Reading Data from a Sequential-Access File – Random-Access Files – Creating/Writing/Reading Random-Access Files – New I/O APIs for the Java Platform. Networking: Manipulating URLs – Reading a File on a Web Server –Client/Server Interaction with Stream Socket Connections. Multimedia: Loading, Displaying and Scaling Images – Animating a series of Images – Image Maps – Loading and Playing Audio Clips.

UNIT V

Java Utilities Package and Bit Manipulation: Vector Class and Enumeration Interface – Stack Class of Package java.util – Hashtable Class – Properties Class – Bit Manipulation and the Bitwise Operators – BitSet Class. Collections: Collections Overview – Class Arrays – Interface Collection and Class Collections – Lists – Sets – Maps. Java Database Connectivity with JDBC: Relational Database Overview – SQL – Manipulating Databases with JDBC – Stored Procedures. Servlets: Servlet Overview and Architecture – Handling HTTP get /post Requests – Redirecting Requests to other Resources – Multi-Tier Applications. JavaServer Pages: JavaServer Pages Overview – Implicit Objects – Scripting – Standard Actions – Directives.

TEXT BOOK

1. Deitel & Deitel. 2011. Java How to Program, 9th Edition, Pearson Education Asia, New Delhi.

REFERENCE BOOKS

1. Aaron walsh, Justin couch & Daniel H.Steinberg. 2000. Java 2 Programming, IDG Books India (P) Ltd., New Delhi
2. Balagurusamy.E . 2000.Programming with Java, Tata Mc-Graw Hill, New Delhi.
3. Herbert Schildt, 2000.Java Complete Reference, Tata McGraw Hill,New Delhi.
4. ISRD Group. 2007. Introduction to Object Oriented Programming through Java, 1st Edition, Tata Mc- Graw Hill, New Delhi.

WEB SITES

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Objectives

Enable the student

- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To read the fundamentals and basics concepts of Physical layer with real time examples
- To study data link layer concepts, design issues, and protocols.
- To learn the functions of network layer and the various routing protocols.
- To read the concepts of protocol on DHCP
- To familiarize the functions and protocols of the Transport layer and Application layer.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the functions of each layer in OSI and TCP/IP model.
2. Explain the multiplexing, switching concept and types of transmission media with real time examples.
3. Understand the error detection and correction methods and can implement the data link layer protocols
4. Apply the clear knowledge of different types of protocol.
5. Learn different medium access method to avoid collision and to learn about routing table.
6. Learn basic functionalities of transport layer and application layer.

UNIT I

Introduction: WAN, WAN technologies - Internetworking concepts - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum - ICMP Package

UNIT III

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.

UNIT V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets. Mobile IP : Addressing – Agents – Agent discovery – Registration – Data Transfer - VPN

TEXT BOOK

1. Behrouz A. Forouzan.2003. TCP/IP Protocol Suite, 3rd Edition, Tata McGraw Hill Publication, New Delhi.

REFERENCE BOOKS

1. Andrews S Tanenbaum. 2014.Computer Networks. 5th Edition, Prentice Hall of India Private Ltd, New Delhi.
2. Buck Graham.2007. TCP/IP Addressing, 2nd Edition, Harcount India Private Limited, New Delhi.
3. Douglas E Comer.2000. Computer Networks and Internets, 4th Edition, Pearson Education Asia, New Delhi .
4. William Stallings. 2007. Data and Computer Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

WEB SITES :

1. en.wikipedia.org/wiki/Internet_protocol_suite
2. www.yale.edu/pclt/COMM/TCPIP.HTM
3. www.w3schools.com/tcpip/default.asp

Course Objectives

Enable the student

- Design good performing distributed database schemas.
- Create optimized query execution plan.
- Efficiently distribute and manage the data.
- manage distributed access control
- To understand the concepts of query processing
- Know how to make security to the databases.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Explain the architecture of a system based on distributed databases.
2. Develop a system to support distributed transactions in such databases.
3. Provide for competitive access to data in systems using distributed databases.
4. Propose solutions for increasing reliability and security of distributed database system.
5. Compare different systems for managing distributed databases (DDBMS).
6. Develop a real time project using different database tools.

UNIT - I

Database concepts : Data Models- Database Operations- Database Management-DB Clients, Servers, and Environments. **DBE Architecture :** Services- Components and Subsystems- Sites - Expected Services-Expected Subsystems- Typical DBMS Services– **DBE Taxonomy:** COS Distribution and Deployment- COS Closedness or Openness-Schema and Data Visibility- Schema and Data Control.

UNIT - II

Data Distribution Alternatives : Design Alternatives- Localized Data- Distributed Data. **Fragmentation:** Vertical Fragmentation- Horizontal Fragmentation. **Distribution Transparency:** Location Transparency-Fragmentation Transparency-Replication Transparency-Location, Fragmentation, and Replication Transparencies.

UNIT - III

Query Optimization: Sample Database- Query Processing in Centralized Systems: Query Parsing and Translation - Query Optimization- Query Processing in Distributed Systems- Heterogeneous Database Systems - Concurrency Control in Distributed Database Systems.

UNIT - IV

Deadlock Handling: Deadlock Definition- Deadlocks in Centralized Systems- Deadlocks in Distributed Systems- Distributed Deadlock Detection. **Replication Control:** Replication Control Scenarios. **Failure and Commit Protocols:** Terminology- Commit Protocols.

UNIT - V

DDBE Security: Cryptography- Securing Data . Traditional DDBE Architectures: Classifying the Traditional DDBMS Architecture- The MDBS Architecture Classifications- Approaches for Developing A DDBE- Deployment of DDBE Software.

TEXT BOOK

1. Saeed K. Rahimi And Frank S. Haug. 2010. Distributed Database Management Systems :A Practical Approach. 1st Edition, A John Wiley & Sons, Inc., Publication.

REFERENCES

1. Ceri.1985.Distributed Databases Principles and Systems , 1st Edition Mchraw Hill Pub.
2. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition , Pearson Education.
3. William M.NewMan, Robort F.Sproull, 2004, Principles of Interactive Computer Graphics, 1st Edition , Pearson Education.

WEB SITES

1. en.wikipedia.org/wiki/Distributed_computing
2. www.webopedia.com/TERM/D/distributed_computing.html
3. www.tech-faq.com/distributed-computing.shtml

Course Objectives

Enable the student

- To Study the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To Learn about Processes, Threads and Scheduling algorithms.
- To Understand the principles of concurrency, Deadlocks and Memory Management
- To Learn about the Protection and Security Concepts.
- To understand the concepts of authentication.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Design various Scheduling algorithms.
2. Apply the principles of concurrency.
3. Apply the memory management process.
4. Design deadlock, prevention and avoidance algorithms.
5. Compare and contrast various memory management schemes.
6. Apply the Security Concepts based on Authentication.

UNIT I

OS Design and Implementation: Introduction-Operating System Definition-Function-History of Operating System-Types of Operating System- Operating System Concepts- Operating System Structure-The nature of the Design problem-Interface Design-Implementation-Trends in Operating System Design.

UNIT II

Process and Threads: Process-Threads-Inter process communication-classical IPC Problems-Scheduling –Deadlocks: Detection and Recovery, Avoidance and Prevention.

UNIT III

File systems-Files-Directories-File System Implementation. Case Studies: Design of UNIX/LINUX, Windows 2000 and MSDOS.

UNIT IV

Distributed Operating System Concepts and Design: Fundamentals-Remote Procedure Calls-The RPC model-Transparency of RPC-Implementing RPC mechanism-Stub Generation-RPC Messages-Marshalling Arguments and Results-Server Management-Parameter-Passing Semantics-Call Semantics-Communication Protocol for RPCs. Distributed File System: Introduction-Desirable Features-File models-File Accessing-Models-Files-Sharing Semantics-File Caching Schemes-File Replication-Fault Tolerance-Atomic Transaction

UNIT V

Real Time Operating System and Micro Kernels: Characteristics of Real Time Systems-Micro kernel's and RTOS-Scheduling for real-time Systems.

TEXT BOOK

1. Andrew S Tannenbauml,"Modern Operating System",2nd Edition. Prentice Hall of India. New Delhi.2002.

REFERENCES

1. Pradeep K Sinha,"Distributed Operating Systems Concepts and Design", 2nd Edition. Prentice Hall of India. New Delhi.2002.
2. Promod Chandra P Bhat,"An Introduction to Operating Systems Concept and Practice", 1st Edition. Prentice Hall of India. New Delhi. 2004.

Instruction Hours / week: L: 3 T: 1 P: 0 C : 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours

Course Objectives:

To make students

- understand the fundamental number system with its conversions
- gain knowledge about different codes, digital logic gates and Boolean operations
- acquire basic understanding about the Instruction Set Architecture
- understand the architecture of the basic functional units of the computer such as the input output system. memory systems and secondary storage systems.
- Learn the function of each element of a memory hierarchy.
- Study various data transfer techniques in digital computer.

Course Outcomes (Cos)

Upon completion of this Course, student will be able to:

1. Interpret the functional architecture of computing systems.
2. Identify, compare and assess issues related to ISA, memory, control and I/O functions.
3. Design and analyze solutions in the area of computer architecture.
4. Design an instruction encoding scheme for an ISA.
5. Build large memories using small memories for better performance.
6. Examine various inter connection structures of multi processors.

Unit I

Number System and Operations: Decimal, Binary, Octal and Hexadecimal numbers – Conversion – Floating point representation – Binary addition, subtraction, multiplication and division – 1's and 2's complements. Codes: Binary Coded Decimal (BCD) - Excess-3 – Gray Code – Error detection codes – Hamming codes – ASCII codes. Logic gates: OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR gates. Boolean Logic Operations: Boolean functions - Basic laws – DeMorgans theorem – Sum of Products and Products of Sum – Karnaugh Map .

Unit II

Combinational Logic Circuit Design: Half adder – Full adder – Half Subtractor – Full Subtractor – Parallel binary adder – 4-bit binary adder/subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders .

Flip-flops: RS- D- JK Flip flops. Registers: Shift Registers. Counters: Ripple counters - Synchronous counters.

Unit III

Basic Structure of Computers: Functional units - basic operational concepts - bus structures. Machine instructions and Programs: Memory locations and addresses – Memory operations – Instructions and Instruction Sequencing – Addressing modes.

Unit IV

Input/Output Organisation: Accessing I/O Devices- Interrupts- Direct Memory Access – Interface Circuits – Standard I/O Interfaces. Computer Peripherals: Input devices – Output devices – Data transfer mechanism.

Unit V

The Memory System: Some Basic Concepts – Semiconductor RAM memories – Read-only memories – Cache memories – Virtual Memories – Secondary Storage.

Basic Processing Unit: Some fundamentals concepts – Execution of a complete Instruction – Multiple-Bus organization – Hardwired control – Microprogrammed control.

Text Books

1. Vijayendran.V, 2011, Digital fundamentals , 1st Edition, SV Printers and Publishers. (Unit 1 & 2)
2. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 2013, Computer Organization, 5th Edition, Tata McGraw Hill. New Delhi. (Unit 3,4 & 5)

References

1. Albert Paul Malvino, P. Donald Leach and Goutam Saha, 2011, Digital Principles and Applications, 7th Edition, Tata McGraw Hill, New Delhi.
2. Pankaj Agarwal, 2009, Computer Organization, 1st Edition, Vayu Education of India. (Unit 4 & 5).
3. Thomas .L. Floyd, 2008, Digital Fundamentals,; 10th Edition Prentice Hall. (Unit 1 & 2)
4. M.V.L.N Raja Roa, 2004, Fundamentals of Computer Organization, 1st Edition ,Scitech Publications Pvt Ltd., Chennai.(Unit 3, 4 & 5).

Web sites

1. <http://williamstallings.com>
2. <http://www.stat.auckland.ac.nz/~dscott/782/Computers.pdf>
3. <http://www.vocw.edu.vn/content/m10708/latest>

**Instruction Hours / week: L: 3 T: 1 P: 0 C : 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours**

Course Objectives:

To enhance students with the knowledge of

- The behavior and flow of the software
- Planning, designing, developing, validating, and evaluating of software using contemporary practices.
- Software analyzing, coding, and Testing.
- To understand the nature of software development and software life cycle models
- To understand methods of capturing, specifying, visualizing and analyzing software requirements.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Describe software engineering layered technology and process framework.
2. Introduces theories, models, and techniques that provide a basis for the software development life cycle.
3. Introduces software testing approaches including verification and validation, static analysis, reviews, inspections, and audits.
4. Understanding of the role of project management including planning, scheduling, risk management, etc.
5. Work as an individual and/or in team to develop and deliver quality software.
6. Justify role of SDLC in Software Project Development.

Unit I

The Evolving role of software: - software - software crisis - software process model. Component based development: - The formal methods model – fourth generation techniques. Software Project Planning – Project Planning Objectives - Software Scope – Resources.

Unit II

Analysis concepts and Principles: Requirement analysis principles – The Information domain – modeling – partitioning – Essential and implementation views. Software prototyping methods and tools. Specification: Specification principles – representation – software requirements specification.

Unit III

Design concepts and principles: The Design process: design and software quality – The Evolution of Software Design. Design principles:- Design concepts – effective modular design – the design model – design documentation – Software Architecture.

Unit IV

The Golden rules: user interface design – task analysis and modeling – interface design activities – Implementation tools – design evaluation. Component level Design: - structured programming – comparison of design notation.

Unit V

Software testing techniques: software testing fundamentals – White box testing – basis path testing – control structure testing – Black box testing. Software testing strategies:- Unit testing – Validation testing.

Text Book

1. Roger. S. Pressman. 2010 Software Engineering: A Practioner's Approach, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi.

References

1. Lan Sommerville. 2015. Software Engineering, 10th Edition, Pearson, New Delhi.
2. Bruce R. Maxim, Roger S. Pressman, 2014, Software Engineering: A Practioner's Approach, 8th Edition, onlybooks.org
3. Carlos Otero , 2012, Software Engineering Design: Theory and Practice, Auerbach Publications, New Delhi.
4. Stephen Schach. 2010. Object oriented and classical software engineering, 8th Edition, McGraw-Hill Higher Education, New Delhi.

Web Sites

1. http://en.wikipedia.org/wiki/Software_engineering
1. <http://www.onesmartclick.com/engineering/software-engineering.html>
2. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Instruction Hours / week: L: 3 T: 1 P: 0 C:4 Marks: Internal: 40 External: 60 Total:100**End Semester Exam: 3Hours****Course Objectives:**

To provide students with

- Extensive knowledge of principles and modules of operating systems
- Fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.
- The principles of concurrency and synchronization, and apply them to write correct concurrent programs/software
- Basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness Objectives, avoiding deadlocks, as well as security and protection.
- To introduce the architecture of Linux operating system.
- To learn basic Unix commands and to write shell scripts

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Learn various types of OS and also understand various functions of OS.
2. Learn operating system structures and processor management.
3. Understand how the operating system shares hardware resources between processes, tasks, threads, and users
4. Learn the process management and its storage in memory and disk.
5. Implement various memory management schemes, file system and I/O schemes.
6. Write and execute shell programs.

Unit I

OS Design and Implementation: Introduction-Operating System Definition-Function-History of Operating System-Types of Operating System- Operating System Concepts- Operating System Structure-The nature of the Design problem-Implementation-Trends in Operating System Design.

Unit II

Process and Threads: Process-Threads-Inter process communication-classical IPC Problems-Scheduling –Deadlocks: Introduction to Deadlocks, Detection and Recovery, Avoidance and Prevention.

Unit III

Memory Management: Basic Memory Management, Swapping, Virtual Memory, Page Replacement Algorithms, Segmentation. File systems-Files-Directories-File System Implementation.

Unit IV

Distributed Operating System: Distributed Operating Concepts and Design Fundamentals-Remote Procedure Calls-The RPC model-Transparency of RPC-Implementing RPC mechanism-Stub Generation-RPC Messages-Marshalling Arguments and Results-Server Management-Parameter-Passing Semantics-Call Semantics-Communication Protocol for RPCs

Unit V

Real Time Operating System and Micro Kernels: Characteristics of Real Time Systems-Micro kernel's and RTOS-Scheduling for real-time Systems.

Text Books

1. Andrew S Tannenbaum, Herbert Bos . 2014. Modern Operating System, 4rd Edition, Prentice Hall of India, New Delhi. [Unit 1 to 4]
2. Pradeep K Sinha. 2009. Distributed Operating Systems Concepts and Design, Prentice Hall of India, New Delhi. [Unit 5]

References

1. Pramod Chandra P.Bhatt . 2010. An Introduction to Operating Systems , 2nd Edition, Prentice Hall India (pvt) Ltd, New Delhi
2. Andrew S Tannenbaum. 2008. Modern Operating System, 3rd Edition, Prentice Hall of India, New Delhi
3. Deitel.H.M. 2005. Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.

Web Sites

1. www.cs.columbia.edu/~nieh/teaching/e6118_s00/
2. www.clarkson.edu/~jnm/cs644
3. pages.cs.wisc.edu/~remzi/Courses/736/Fall2002/

Instruction Hours / week: L: 4 T: 0 P: 0 C:4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours

Course Objectives:

- To understand the major components of computer system, the types and functions of OS.
- To know about different programming languages and their corresponding Translators and to learn about the basic concepts of Networking.
- To understand the building blocks of C language like variables, data types, managing I/O etc.
- To understand the different statements like sequential, decision making, iterative such as if-else, loops.
- To understand derived data types like arrays and structures.
- Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Acquire knowledge about components of a computer system and fundamentals of Operating Systems and Networking.
2. Acquire knowledge about building blocks of C language like variables, data types, managing I/O etc.
3. Solve basic problems using different statements like sequential, decision making, iterative such as if-else, loops and derived data types like arrays and structures.
4. Apply Pointers, functions, file handling and dynamic memory allocation schemes for efficient programming.
5. Understand the dynamics of memory by the use of pointers.
6. Develop solutions to problems using derived data types and files.

Unit I

Introduction to Programming Languages- Introduction to C- Advantage of C- Identifier- Constants-Variable- Data Types- Variable declaration- Assignment operation- Expressions- Operators-Evaluation of Expression- Library functions- Mathematical- Character functions; Formatted and Unformatted Input and Output statements: Scanf(), Printf()- Character based functions.

Unit II

Decision Making and Branching: Simple IF statement- If Else statement- Nesting of If Else statements- Switch statement- Break- Conditional operator (?:) operator- GOTO statement; Looping statements: WHILE- DO-WHILE statement- FOR statement- Jumps in loops- Continue and Nested Looping Statements.

Unit III

Arrays: Single, Two and Multidirectional arrays- Strings and related library functions; Functions: Need of function-Types of functions-User-defined functions-Return values and their types-Calling a function-Category of functions-Recursion-functions with arrays-Storage classes.

Unit IV

Pointers: Pointer Arithmetic- Declaring and initializing pointers- Pointers and arrays- Pointers and Strings- Pointers and functions- Pointers and Multidimensional Arrays; Structures: Declaration- Array of structures- Nested structures- Structures and Functions- Unions- Typedef statement- Enumeration.

Unit V

Files: Types of Files- Functions related for FILE- Read/Write operations- Character, Word, Line and Structure based Read/Write operations- Random Files. Random access to files- Command line arguments-the preprocessor; Advanced Topics: Interrupts-BIOS/DOS function handling- Video RAM- TSR Programme.

Text Books

1. Balagurusamy. E. 2012 . Programming in ANSI C, 4th Edition ,Tata McGraw-Hill, New Delhi. [Unit 1 to 5]
2. Y.P.Kanetkar. 2013 .Let Us C, Thirteen revised Updated Edition, BPB Publications, New Delhi.[Unit 5]

References

1. Richard M. Reese, 2013, Understanding and Using C Pointers, 1st Edition, O'Reilly Media, India
2. Jeri R. Hanly, 2013, Problem Solving & Program design in C, 7th Edition, Pearson Education
3. Yashavant Kanetkar, 2013, Let Us C , 13th Edition, BPB Publications, New Delhi, India.
4. Reema Thareja, 2011, Programming in C, 1st Edition, Oxford Publications, New Delhi, India

Web Sites

1. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
2. <http://www2.its.strath.ac.uk/courses/c/>
3. <http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Instruction Hours / week: L: 4 T: 0 P: 0 C:4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3Hours

Course Objectives:

- Understand the fundamental concepts of logic.
- Analyze the four types of normal forms.
- Understand the fundamental concepts of formal languages and graph theory.
- To learn Algebraic Structures and their types and understand Cosets and Lagrange's theorem.
- To understand Graphs, their types and different algorithms based on Graph Theory.
- To provide the necessary back ground of discrete structures with particular reference to the relationships between discrete structures and their data structure counterparts including algorithm development.

Course Outcomes (COs)

Upon completion of this Course, student will be able to:

1. Apply set theory, functions, relations and lattices to solve computational problem.
2. Apply basic operation in propositions, validate the arguments and formalize the arguments in propositional logic.
3. Apply algebraic structure to prove theorems like Lagrange's theorem
4. Apply the core ideas of graph theory, trees and various algorithms to solve the problems based on the same.
5. Implement finite state machine, equivalent regular expression, and conversion of various machines like Moore, mealy etc.
6. Use of K-Maps and Truth Tables to construct and verify correctness of a Boolean expression .

Unit I

Mathematical Logic: Connectives – Statement formulas and truth tables - well formed formulas, tautologies, equivalence of formulas, tautological implications – Normal forms- Theory of inference for statement calculus - Validity using Truth Tables – Rules of Inference – Consistency of premises

Unit II

Predicate Calculus: Predicates - The statement functions, Variables and Quantifiers – Predicate Formulas - Free and bound variables.

Inference Theory of the Predicate Calculus: Valid formulas and equivalences – Special Valid formulas involving quantifiers –Theory of inference for Predicate calculus – Formulas involving more than one quantifiers.

Unit III

Relations and functions: Relations – Properties of relations – Equivalence relations - composition of relations, Closure of relations, Binary relations – Recurrence relations – Order relations – Partial order relations – Partitions – Functions - one-to-one, onto, one-to-one-onto functions – composition of functions, Inverse functions.

Unit IV

Formal languages and Automata: grammars- phrase – structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata- Deterministic finite automata and Non deterministic finite automata-conversion of non deterministic finite automata to deterministic finite automata.

Unit-V

Graph Theory: Directed and undirected graphs, connected graph, path, reachability, circuits. Matrix representation- adjacency matrix, incidence matrix, path matrix. Trees- binary tree Theorems - statement only (No Proof).

Text Book

1. Trembly J,P and R.Manohar. 2002. Discrete Mathematical structures with applications to Computer Science. Tata Macgraw Hill Book Company,New Delhi.

Reference

1. Sundaresan .V, K.S.Ganapathy Subramanian and K.Ganesan. 2002. Discrete Mathematics, A.R.Publications, Nagapatinam.

Instruction Hours / week: L: 0 T: 0 P: 5 C:2 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

Enable the student

- To Learn the basics of OO analysis and design skills.
- To Be exposed to the UML design diagrams.
- To Learn to map design to code.
- To Be familiar with the various testing techniques
- To apply the knowledge of mathematics, basic science and engineering solving the real world computing problems to succeed higher education and professional careers.
- To develop the skills required to comprehend, analyze, design and create innovative computing products and solutions for real life problems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Write test suites for a given software.
2. Demonstrate testing process in Selenium IDE.
3. Test websites using eclipse.
4. Draw different UML diagrams.
5. Develop models using UML tools.
6. To Write the Simple applications with technologies like HTML,JavaScript,AJAX,PHP,Servlets and JSPs

List of Programs:**1. CASE tools**

Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams. use of tools for relational database design such as relational Designer.

2. Application Development Tools:

Use of toots such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens, transaction processing, report generations, etc.

3. Management Tools:

Use of tools for managing the process of software development such as Source Code Control System (SCCS), Revision Control System (RCS), Make etc.

4. Program Using Selenium Tool: [web: <http://docs.seleniumhq.org>]

- i. Using seleniumhq tool perform single webpage test case
- ii. Using seleniumhq tool perform testing for multiple webpage

Course Objectives:

To provide students with

- Extensive knowledge of principles and modules of operating systems
- Fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.
- The principles of concurrency and synchronization, and apply them to write correct concurrent programs/software
- Basic resource management techniques (scheduling or time management, space management) and principles and how they can be implemented. These also include issues of performance and fairness Objectives, avoiding deadlocks, as well as security and protection.
- To introduce the architecture of Linux operating system.
- To learn basic Unix commands and to write shell scripts

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Learn various types of OS and also understand various functions of OS.
2. Learn operating system structures and processor management.
3. Understand how the operating system shares hardware resources between processes, tasks, threads, and users
4. Learn the process management and its storage in memory and disk.
5. Implement various memory management schemes, file system and I/O schemes.
6. Write and execute shell programs.

List of Programs:

1. To write a Linux program to display process deadlock state.
2. To write a program to implement signal handling.
3. Write a Shell program to handle student data base with options given below:
 - a. Create data base. b) View Data Base. c) Insert a record d) Delete a record.
 4. e) Modify a record. f) Result of a particular student. g) Exit.
5. To write a simple Linux program using thread.
6. Deadlock avoidance using Banker's Algorithm.
7. To write a program to display the date & time using TCP Sockets.
8. To write a program to display the date & time using UDP Sockets.
9. Simulation of following CPU scheduling algorithms:
 - i. FCFS

- ii. SJF (preemptive and non-preemptive)
 - iii. Priority scheduling (preemptive and non-preemptive)
 - iv. Round Robin Scheduling
10. To write a Linux program to create a lock file.
11. To write a program to display the user information

Text Books

1. Andrew S Tannenbaum, Herbert Bos . 2014. Modern Operating System, 4rd Edition, Prentice Hall of India, New Delhi. [Unit 1 to 4]
2. Pradeep K Sinha. 2009. Distributed Operating Systems Concepts and Design, Prentice Hall of India, New Delhi. [Unit 5]

References

1. Pramod Chandra P.Bhatt . 2010. An Introduction to Operating Systems , 2nd Edition, Prentice Hall India (pvt) Ltd, New Delhi
2. Andrew S Tannenbaum. 2008. Modern Operating System, 3rd Edition, Prentice Hall of India, New Delhi
3. Deitel.H.M. 2005. Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.

Web Sites

1. www.cs.columbia.edu/~nieh/teaching/e6118_s00/
2. www.clarkson.edu/~jnm/cs644
3. pages.cs.wisc.edu/~remzi/Classes/736/Fall2002/

Course Objectives:

Enable the student

- To understand the major components of computer system, the types and functions of OS.
- To know about different programming languages and their corresponding Translators and to learn about the basic concepts of Networking.
- To understand the building blocks of C language like variables, data types, managing I/O etc.
- To understand the different statements like sequential, decision making, iterative such as if-else, loops.
- To understand derived data types like arrays and structures.
- Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Acquire knowledge about components of a computer system and fundamentals of Operating Systems and Networking.
2. Acquire knowledge about building blocks of C language like variables, data types, managing I/O etc.
3. Solve basic problems using different statements like sequential, decision making, iterative such as if-else, loops and derived data types like arrays and structures.
4. Apply Pointers, functions, file handling and dynamic memory allocation schemes for efficient programming.
5. Understand the dynamics of memory by the use of pointers.
6. Develop solutions to problems using derived data types and files.

List of Programs:

1. SIN and COS Series
2. Array Operations (Insert, Delete and Display)
3. Bubble Sorting .
4. Stack
5. Queue.
6. Implement String functions
7. Pointers and Arrays, Pointers and function
8. Recursive function
9. Dynamic Memory Allocation
10. Matrix Operations (Addition, Subtraction and Multiplication)
11. Linked List Operations.
12. Mark sheet preparation using array of structures

13. Electricity Bill Preparation using Files (Use structures)
14. Implement TWO Dos commands using Command line arguments
15. Design an application using VRAM
16. Display a message every 5 minutes using TSR programming

Text Books

1. Balagurusamy. E. 2012 . Programming in ANSI C, 4th Edition ,Tata McGraw-Hill, New Delhi. [Unit 1 to 5]
2. Y.P.Kanetkar. 2013 .Let Us C, Thirteen revised Updated Edition, BPB Publications, New Delhi.[Unit 5]

References

1. Richard M. Reese, 2013, Understanding and Using C Pointers, 1st Edition, O'Reilly Media, India
2. Jeri R. Hanly, 2013, Problem Solving & Program design in C, 7th Edition, Pearson Education
3. Yashavant Kanetkar, 2013, Let Us C , 13th Edition, BPB Publications, New Delhi, India.
4. Reema Thareja, 2011, Programming in C, 1st Edition, Oxford Publications, New Delhi, India

Web Sites

1. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
2. <http://www2.its.strath.ac.uk/courses/c/>
3. <http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Course Objectives:

- To prepare object-oriented design for small/medium scale problems
- To demonstrate the differences between traditional imperative design and object-oriented design
- To explain class structures as fundamental, modular building blocks
- To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.
- To learn the object oriented programming concepts.
- To introduce the principles of inheritance and polymorphism and demonstrate how they are related to the design of abstract classes

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Compare OOPS with other programming techniques
2. Implement C++ programs with constructors and destructors
3. Develop OOP involving polymorphism using operator overloading and method overloading
4. Implement programs with code reusability using inheritance
5. Develop Programs with file handling and templates
6. Apply OOP concepts to solve real world problems

Unit I

Introduction to Computers and C++ Programming: Computer Organization – History of C and C++ - C++ standard Library – Arithmetic- Decision making: Equality and Relational Operators.

Control Structures: Pseudocode- if, if/else selection structures – while, for, do while repetition structure- Assignment, Increment, Decrement operators – switch Multiple selection structure – break and continue statements – Logical, Equality, Assignment operators.

Functions: Function Definitions, Prototypes – Storage classes- Recursion- Functions with Empty Parameter Lists – Inline functions- REFERENCES and Reference Parameters – Default Arguments – Unary Scope Resolution Operator- Function overloading – Function Templates.

Unit II

Arrays: Declaring Arrays – Passing Arrays to Functions – Sorting Arrays – Linear Search and Binary Search.

Pointers and Strings : Pointer variable declaration and initialization- Pointer Operators- Calling functions by reference –Pointer expression and Pointer arithmetic- relationships between Pointer and Arrays – Arrays of Pointers – Function Pointers – Introduction to character and String Processing.

Classes and Data Abstraction : Structure Definitions- Class Scope and Accessing Class Members – Access Functions and Utility Functions- Constructors- Destructors.

Unit III

Classes : Part II : Introduction- friend functions and friend classes- this pointer- new, delete operator- static class members- Data abstraction and Information hiding- Container Classes and Iterators.

Operator Overloading : Fundamentals and restriction of operator overloading –Overloading Stream Insertion, Stream Extraction, Unary, Binary, ++ and – operators. Inheritance : Base Classes and derived Classes – Protected Members- casting base class pointers to derived class pointers- Using member Functions- public, protected, private inheritance – Direct Base classes and Indirect Base classes- Using constructors and Destructors in Derived Classes.

Unit IV

Virtual Functions and Polymorphism : Type Fields and switch statement – virtual functions- abstract base classes and concrete classes- polymorphism- New classes and Dynamic binding – virtual destructors. C++ Stream Input/Output : Introduction- Streams- Stream Output- Stream Input- Stream Manipulators- Stream Format states- Stream error states.

Templates : Function, Class templates – Overloading template functions- Templates and Inheritance, friends, static members.

Unit V

Exception Handling : Basics of C++ Exception handling: try, throw, and catch – Throwing, catching, and rethrowing an exception, Exception specifications.

File Processing: Data Hierarchy- files and streams- Creating, Reading, Updating sequential Access files and Random Access files.

The Preprocessor : #include, # define, #error, # pragma preprocessor directives.

Standard C++ Language Additions : Boolean data type- static_cast, const_cast, reinterpret_cast operator, namespaces.

Text Book

1. Deitel. H.M and P.J.Deitel. 2013. C++ How to Program, 9th Edition, Prentice Hall India, New Delhi, India

References

1. Y. Daniel Liang 2014, Introduction to Programming with C++, 3rd Edition, Pearson Publications, New Delhi, India.
2. Bjarne Stroustrup., 2013. 13th Impression, The C++ Programming Language, Addison Wesley, New Delhi
3. Diane Zak, 2012, Introduction to Programming with C++ , 7th Edition, Cengage Learning India Private Limited, New Delhi, India

Web Sites

1. <http://www.cplusplus.com/doc/tutorial/>
2. www.cplusplus.com/
3. www.cppreference.com/

Course Objectives:

Enable the student

- Understand the role and nature of relational database management systems (RDBMS) in IT environment.
- Translate written business requirements into conceptual entity-relationship data models.
- Convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL).
- Query and manipulate databases using the SQL Data Manipulation Language (DML).
- to provide students with comprehensive and in-depth knowledge of architecture and functioning of database management systems.
- To design and build a database system and use computer and database management skills to implement a solution to a business case using database management systems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Introduces how to apply logical database design principles, including E-R/EE-R diagrams, conversion of ER diagrams to relations.
2. Familiarize students with the concepts of integrity constraints, relational algebra, relational domain & tuple calculus, data normalization.
3. Construct simple and moderately advanced database queries using Structured Query Language (SQL).
4. Familiarize students with the concept of a database transaction including concurrency control, backup and recovery, and data object locking.
5. Design and implementation of a small database project using Oracle.
6. Improve the database design by applying normalization techniques.

Unit I

Overview of Database Systems: Managing Data – A historical Perspective systems Vs DBMS-Advantages of DBMS- Describing and storing data in DBMS- Queries in DBMS- Transaction Management- Structure of DBMS; Database Design & ER Diagram: Entities-Attributes- Entity Sets-Relationship & Relationship set- Additional features of ER Model- Conceptual Design with ER Model.

Unit II

Relational Model: Integrity Constraints over relations- Enforcing integrity constraints- Querying relational data- Logical Database Design- ER to relation- Introduction to views- Destroying & Altering Tables & Views; Relational Algebra Calculus: relational algebra-relational calculus.

Unit III

SQL Queries Programming: The form of Basic SQL Query- UNION, INTERSECT and EXCEPT-Nested queries- Aggregate operations- Null values Complex integrity constraints in SQL- Triggers & Active databases; Transaction Management Overview: The ACID Properties- Transactions & Schedules- Concurrent Execution of Transactions- Lock Based Concurrency Control- Performance of Locking Transaction support in SQL.

Unit IV

An Introduction to PL/SQL: PL/SQL Overview- Declaration section- Executable Commands Section – Exception Handling Section; Triggers: Types of Triggers – Trigger Syntax – Enabling & Disabling Triggers – Replacing & Dropping Triggers; Procedures, Functions, and Packages- Required System & Table privileges – Procedures vs. Functions- Procedures vs. Packages – Create Function syntax – Create Package syntax - Compiling, Replacing, Dropping Procedures, Functions and packages.

Unit V

Schema Refinement and Normal Forms: Introduction to Scheme refinement- Functional Dependencies - Reasoning about functional dependencies- Normal form properties of decomposition –Normalization- Scheme refinement in database designing- other kinds of dependencies; Security: Introduction to database security- Access control- Mandatory access control- Additional issues security; Concurrent control: 2PI, serializability and Recoverability- Introduction to lock Management- Lock conversions- Specialized Locking Techniques- Concurrency control without locking.

Text Books

1. Raghu Rama Krishnan and Johnnas Gehrke.2009. Database Management System, 3rd Edition, Tata McGraw-Hill. (Unit I, II, III & V)
2. Kevin Lonewy. 2014. Oracle Database 11g, the Complete Reference, Tata Mc Graw-Hill, New Delhi. (Unit IV)

References

1. Elmaseri and Navathe. 2013. Database Systems-Models, Languages, Design and Application Programming, 1st Edition,Pearson Education. Delhi.
2. Bipin C. Desai. 2008. *An Introduction to Database Systems*, Galgotia Publications, New Delhi
3. Nilesh Shah. 2002 .Database system using Oracle,1st Edition, Prentice Hall of India. Delhi.
4. Rajesh Narang. 2002. Database Management Systems, 1st Edition,Prentice Hall of India, New Delhi.
5. Silberschartz ,Korth and Sudarsan. 2002. Database System Concepts, 4th Edition, Tata Mc Graw-Hill, New Delhi.

Web Sites

1. <http://en.wikipedia.org/wiki/RDBMS>
2. http://aspalliance.com/1211_Relational_Database_Management_Systems__Concepts_and_Terminologies
3. www.compinfo-center.com/apps/rdbms.html

Course Objectives:

Enable the student

- Use forms and controls to create a user interface.
- Create and use Sub and Function procedures, including predefined functions.
- Implement decision structures and loops by using conditional expressions.
- Enhance the user interface by adding menus, status bars, and toolbars.
- Access and manipulate data in a Microsoft Access or Microsoft SQL Server database by using Microsoft ADO
- Build, package, and deploy an application.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Design, create, build, and debug Visual Basic applications .
2. Implement syntax rules in Visual Basic programs. And explain variables and data types used in program development and apply arithmetic operations for displaying numeric output.
3. Write and apply decision structures for determining different operations, loop structures to perform repetitive tasks, procedures, sub-procedures, and functions to create manageable code.
4. Create one and two-dimensional arrays for sorting, calculating, and displaying of data and to write Visual Basic programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism.
5. Students will be able to design Windows applications using forms, controls, and events.
6. Explore Visual Basic's Integrated Development Environment (IDE).

Unit I

Introduction-Visual Basic Environment-Element of Visual Basic-Statements and Expressions-Functions-String Functions-Literals-Constants-Variables-Operators-Arrays-Control Arrays-Subroutines and Functions-Looping and decision control structure-If/Then/Else, Select For Next, Do/Loop, While/Wend Structures.

Unit II

Intrinsic Controls: Pointer, Label, Frame, Checkbox, combo Box, Hscroll Bar, Timer, DirList Box, Shape, Image, OLE, Picture Box, List Box, Text Box, Command Button, Option Button, Vscroll Bar, Drive List Box, Line control usage and properties. Microsoft common control: Tree view control-List view control-Active X Control-Adding Control to form-SDI Forms-MDI Forms-Using Forms as Objects-Building class and collections.

Unit III

DDE-Methods, Properties, Events-Database programming: Data Tools-DAO, ADO, OLEDB and RDO Database Connections-Active X Commands.

Unit IV

Visual C++: Introduction to Windows-View Architecture-Document-GDI Components-Dialog Box-Device Context-GDI Objects-Printing and Print Preview.

Unit V

Database: Serialization-Accessing File-ODBC-DAO-MFE Database Classes-Record sets Querying - Internet Application: Using personal web server-Web browser-ISAPI Application-Active X Controls-ATL.

Text Books

1. Gray Cornell, Visual Basic 6 from the Ground Up, 2011, Tata McGraw Hill Publication. New Delhi. [Unit 1 to 3]
2. Ivor Horton's, Beginning Visual C++, 1st 2014, Wiley India Pvt. Ltd. (Wrox Beginning Guides), New Delhi, India [Unit 4 & 5]

Reference

1. Programming Microsoft Visual C++,2011, 5th Edition, Wiley India Pvt. Ltd., New Delhi, India

Course Objectives:

- Know fundamentals of computer graphics with different drawing techniques
- Relate 2D & 3D Geometric transformations, Matrices and vectors.
- Understand Scan Conversions, Hidden Surface Elimination
- Discusses about Curves and Surfaces
- Analyze Shading, Colour, Anti-aliasing, Texture Mapping
- To know the different algorithms for performing clipping process, scan conversions and hidden surface elimination.

Course Outcomes (Cos)

Upon completion of this Course, student will be able to:

1. Introduces core concepts of computer graphics.
2. Familiarize the students with graphics concepts, including 2D and 3D transformation, clipping, splines, objects modeling, colour modeling, lighting, textures, visible surface detection.
3. Algorithms to design, and create computer graphics scenes.
4. Describe the 3D object representation using primitives structures, curve structures etc
5. Implement the various illumination models
6. Explore Visual Basic's Integrated Development Environment (IDE).

Unit I

Introduction: The origins of computer graphics, Computer Aided Design, Visualization, Image Processing, Graphical User Interface, General-purpose graphics software. Point-Plotting Techniques: Co-ordinate systems, Incremental methods, Line-drawing Algorithms, Circle generators. Line drawing Displays: Display device and Controllers, CRT, Inherent-Memory devices, the storage tube display, The Refresh Line-Drawing Display.

Unit II

Graphical Input Devices: Point and Positioning Devices, the mouse, Keyboard, Trackball and Special ball, Joysticks, Digitizer, Image Scanner, Tablet, Light Pen, Three-Dimension Input devices. Graphical Input Technique: Positioning Techniques, Pointing and Selection, Inking and Painting, Online character Recognition. Event Handling: Polling, Interrupts, The Event Queue, Function of Handling Events, Polling Task Design, Light pen Interrupts. Input Function: Dragging and fixing, Hit Detection.

Unit III

Two-dimensional Transformation: Transformation Principles, Concatenation, Matrix Representation. Three Dimensional Transformation and Perspective: Transformations, Transformation in Modeling, Transformation in Viewing, Perspective Transformation. Clipping and Windowing: Line Clipping Algorithm, Midpoint subdivision, Clipping other

Graphic Entities, Polygon Clipping, Viewing Transformations, the Windowing Transformation.

Unit IV

Raster Graphics Fundamentals: Introduction to Random Scan Monitor and Raster Scan Monitor, Generating a Raster Image Frame Buffer Display, Representing a Raster Image, Scan converting Line drawings, Displaying characters, Speed of Scan Conversion, Natural Image. Solid Area scan conversion: Geometric Representation of Areas, Scan Converting Polygons, Priority, The Y-X Algorithm, Properties of Scan conversion algorithms. Raster-Graphics System: Representation, Raster Manipulation functions, System Using Raster representation, System using Geometric Representation. Raster Display Hardware: Raster Access Frame Buffer, real time Scan Conversation, Other Encoding Schemes.

Unit V

Realism in three-dimensional Graphics: Techniques for Achieving Realism, Modeling three-dimensional scenes, Modeling and Realism.

Curves and surfaces: Shape Description Requirements, Displaying Curves and Surfaces. Hidden-Surface Elimination: Two Approaches, The Depth-Buffer Algorithm, Geometric Computations, Scan-Line Coherence Algorithm, Area-Coherence Algorithm. Priority Algorithms, Sorting and Coherence. Shading: Shading Model, Applying the Shading Model, special effects.

Text Book

1. Donald Hearn, M.Pauline Baker, 2000, "Computer Graphics", 2nd Edition, Prentice-Hall of India Private Ltd., New Delhi.

References

1. William M.NewMan, Robert F.Sproull, 2004, Principles of Interactive Computer Graphics, 2nd Edition, Tata McGraw-Hill Publishers, New Delhi.
2. Angel, Edward, 2005, "InterActive Computer Graphics", 1st Edition, Addition-Wesly, New Delhi.
3. Donald Hearn, M.Pauline Baker, 2000, Computer Graphics, 2nd Edition, Prentice-Hall of India Private Ltd., New Delhi.
4. Egerton Paricia, 1998, "A computer Graphics", 1st Edition, Prentice Hall, New Delhi:

Web Sites

1. [www.microsoft.com/computer graphics/](http://www.microsoft.com/computer%20graphics/)
2. [www.en.wikipedia.org/wiki/computer graphics](http://www.en.wikipedia.org/wiki/computer_graphics)
3. www.w3schools.com/ngws/default.asp

Course Objectives:

Enable the students

- Form and solve linear programming problems
- To solve transportation and assignment problems.
- Understand the meaning of queueing and inventory problems.
- Constructing network for the projects.
- applied decision theory.
- To know the Inventory control, Replacement models, Queuing models and Network Scheduling.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand how to translate a real-world problem, given in words, into a Mathematical formulation.
2. Demonstrate the ability to optimize with tools from Linear Programming, Probability, Statistics, Simulation, Game Theory, Queuing Theory etc. in contexts involving uncertainty and scarce or expensive resources.
3. Formulate and solve Mathematical models (Linear programming problems) by applying the concept of Simplex method and its extensions.
4. Identify the resources required for a project and generate a plan and work schedule.
5. Learn to apply project management tools like CPM/PERT that ensures successful completion of projects.
6. Learn the comprehensive introduction of Linear Programming Problem.

Unit - I

Linear Programming : Formulation of LPP – Graphical solutions to LPP –Simplex method – Big M method -Duality in Linear programming Problem.

Unit - II

Transportation model: Mathematical formulation of the problem-Initial Basic Feasible solution - Optimum solution for nondegeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem

The Assignment problem : Mathematical formulation of the problem – Hungarian method – Unbalanced Assignment problem-Maximization case in Assignment problem Travelling Salesman Problem.

Unit - III

Inventory Control: Introduction – Costs involved in inventory, Deterministic models.EOQ models without and with shortage. Buffer stocks and Reorder level – Price Breaks models

Unit - IV

Replacement model: Introduction – Replacement of items that deteriorates gradually. Value of money does not change with time –value of money changes with time –Replacement of item that fails suddenly – Individual Replacement – Group replacement

Queuing theory : Introduction – Characteristics of queuing system-Markovian queuing models – Problems of single server with finite / infinite population model.

Unit - V

PERT and CPM: Network representation – Earliest expected time, latest allowable occurrence time - slack-critical path –Time estimates in PERT- Probability of meeting scheduled date of completion of projects – Calculations on CPM networks – various floats for activities – critical path.

Text Book

1. Kanthi Swarup., P.K. Gupta., and Man Mohan., 2000. Operations Research,Sultan Chand & Sons, New Delhi.

References

1. Sharma.J.K., 2004. Operations Research and Applications, Macmillan Ltd, New Delhi.
2. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2005. Operations Research (Resource Management Techniques), A. R. Publications,Nagapatinam.

Course Objectives:

- To prepare object-oriented design for small/medium scale problems
- To demonstrate the differences between traditional imperative design and object-oriented design
- To explain class structures as fundamental, modular building blocks
- To understand the role of inheritance, polymorphism, dynamic binding and generic structures in building reusable code.
- To learn the object oriented programming concepts.
- To introduce the principles of inheritance and polymorphism and demonstrate how they are related to the design of abstract classes

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Compare OOPS with other programming techniques
2. Implement C++ programs with constructors and destructors
3. Develop OOP involving polymorphism using operator overloading and method overloading
4. Implement programs with code reusability using inheritance
5. Develop Programs with file handling and templates
6. Apply OOP concepts to solve real world problems

List of Programs:

1. Create a class Date whose data members are Day, month, and Year. Write necessary member functions and perform the following operations using overload operators
Increment a date by a day
2. Compares two dates
3. Create a class String that has a character array as a data member and perform the following operations using overloaded operators.
 - '+' To add two strings
 - '+=' To concatenate one string with the other
 - '==' To compare two strings
4. Create a class Computer and derive two classes Client and Server from it. Have the data members of the classes as follows.
In the main () program, get the data about n clients and servers and print it back in a neat format.
5. Create four classes with the relationship and data members as in shown in the diagram.
In the main () program, have the facility to
 - Store the details of n inpatients and outpatients
 - Display the details in a neat format
6. Create a class staff that contains the name, designation, and years of experience of a staff member of a college. Using containership, create two more classes Teaching Staff and NonTeachingStaff according to the following specifications.

In addition to the properties of the staff class, the Teaching Staff class should contain the highest qualification the staff member possesses and the departments he belongs to. The NonTeachingStaff class needs to contain the properties of Staff only. In the main (), get data about some of the teaching and NonTeachingStaff members of your college and print the details in neat format.

7. Create a class Address as whose data members are Name, Street, City, Pincode and Phone Number of a person. In the main () program, using array of pointers, get addresses of n persons, sort it in alphabetical order of names and display it back in a neat format.
8. Create a class Shape that contains two data members of type double to hold the two dimensions of the shape.
Derive 3 more classes' circle, rectangle, And Triangle from the class Shape. Using appropriate member functions, get the values, calculate and print the area of different shapes using dynamic binding.
Hint:- write 2 member functions in all the derived classes: one to set the data and the other to calculate and display the area.
9. Create two classes British and Metric to store the measurements of distance in the British (feet and inches) and Metric (meters and centimeters) systems respectively.
In the main () program, perform the following:
 - Get two measurements: one in British and the other in Metric
 - Ask the user in which system (British or Metric) (s) he wants the output.
 - Add two input measurements and print the result according to the user's choice.
10. Create a class that copies the content of a text file into another file. Write the program in such a way that the program accepts command line arguments and make the program to execute in a way exactly the copy command in Dos works.
11. Create a class Student that could the name, register number and marks in the subjects of the semester. Have the program perform the following operations:
 - Store the data about n students in a data file.
 - Print the mark list of each student whenever requested.
 - Add details about some more students at any time.
12. Sort an integer and a floating –point array using function template.
13. Create a class template stack that accepts a generic data type as a parameter and performs the basic operations of a stack. Using the above class in the main () program, implement stacks for integer and floating point data types separately and perform the operations on the stack.

Text Book

1. Deitel. H.M and P.J.Deitel. 2013. C++ How to Program, 9th Edition, Prentice Hall India, New Delhi, India

References

3. Y. Daniel Liang 2014, Introduction to Programming with C++, 3rd Edition, Pearson Publications, New Delhi, India.
4. Bjarne Stroustrup., 2013. 13th Impression, The C++ Programming Language, Addison Wesley, New Delhi
3. Diane Zak, 2012, Introduction to Programming with C++ , 7th Edition, Cengage Learning India Private Limited, New Delhi, India

Web Sites

1. <http://www.cplusplus.com/doc/tutorial/>
2. www.cplusplus.com/
3. www.cppreference.com/

Course Objectives:

To help students to

- Understand the role and nature of relational database management systems (RDBMS) in IT environment.
- Translate written business requirements into conceptual entity-relationship data models.
- Convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL).
- Query and manipulate databases using the SQL Data Manipulation Language (DML).
- To provide students with comprehensive and in-depth knowledge of architecture and functioning of database management systems.
- To design and built a database system and use computer and database management skills to implement a solution to a business case using database management systems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Introduces how to apply logical database design principles, including E-R/EE-R diagrams, conversion of ER diagrams to relations.
2. Familiarize students with the concepts of integrity constraints, relational algebra, relational domain & tuple calculus, data normalization.
3. Construct simple and moderately advanced database queries using Structured Query Language (SQL).
4. Familiarize students with the concept of a database transaction including concurrency control, backup and recovery, and data object locking.
5. Design and implementation of a small database project using Oracle.
6. Improve the database design by applying normalization techniques.

List of Programs

Some sample applications which may be programmed, are given below

I Create following tables with appropriate constraints.

1. Write SQL statement for following queries.

- a. Age of employees.
- b. Employees whose take home salary is in the range Rs10,000 and 15,000
- c. Employees whose has put 10 years of service.
- d. Employees working under the department head RAGURAMAN
- e. Senior and youngest employee in each department.
- f. Employees who retires after one year.

2. Write cursors

- a. To raise the basic salaries by 25 percent
- b. To retain male employee in the existing employee table and to move female employees to a new table.

3. Create following views
 - a. For male employees of age more than 45 years.
 - b. For operator with the CHECK OPTION.
 - c. For Female employees working under the department head RAJARAMAN.
 - d. For male employees with the CHECK OPTION.
 4. Create a trigger which fires when one tries
 - a. To update records in employee table on Sundays.
 - b. To insert records in salary table with basic >30000
 5. Generate a pay slip where 40 percent, 20 percent and 15 percent of basic is given as HRA, TA and DA fro the employees.
- II Create following tables with appropriate constraints.
1. Take a stock report and list of books in circulation.
 2. Write SQL statements for following queries.
 - a. Authors of C and C++ books.
 - b. List of books issued for UG student
 - c. Title of books in computer science department.
 - d. Titles of book by the author 'DIETEL'.
 - e. Publishers of C and C++ books.
 - f. Number of book issued to each student
 - g. Publisher details of Commerce Department.
- III Write a cursor
- a. To move books costing more than Rs.1500 into a separate table, Reference table.
 - b. To move damaged books into a separate table damaged table.

Some sample PL/SQL Programs

1. Write a recursive program for finding the factorial of a given number.
2. Write a recursive program for finding the first n Fibonacci number.
3. Write a PL/SQL program for multiplication tables 3, 4, 5 and 6.
4. Write a recursive program for finding the reverse of a given number.
5. Write SQL queries to illustrate the string functions a mathematical functions.
6. Write a program for finding the reverse of a given string.

Text Books

1. Raghu Rama Krishnan and Johnnas Gehrke.2009. Database Management System, 3rd Edition, Tata McGraw-Hill. (Unit I, II, III & V)
2. Kevin Lonewy. 2014. Oracle Database 11g, the Complete Reference, Tata Mc Graw-Hill, New Delhi. (Unit IV)

References

1. Elmaseri and Navathe. 2013. Database Systems-Models, Languages, Design and Application Programming, 1st Edition, Pearson Education. Delhi.
2. Bipin C. Desai. 2008. *An Introduction to Database Systems*, Galgotia Publications, New Delhi
3. Nilesh Shah. 2002. Database system using Oracle, 1st Edition, Prentice Hall of India. Delhi.
4. Rajesh Narang. 2002. Database Management Systems, 1st Edition, Prentice Hall of India, New Delhi.
5. Silberschartz, Korth and Sudarsan. 2002. Database System Concepts, 4th Edition, Tata Mc Graw-Hill, New Delhi.

Web Sites

1. <http://en.wikipedia.org/wiki/RDBMS>
2. http://aspalliance.com/1211_Relational_Database_Management_Systems__Concepts_and_Terminologies
3. www.compinfo-center.com/apps/rdbms.html

Course Objectives:

Enable the student

- Use forms and controls to create a user interface.
- Create and use Sub and Function procedures, including predefined functions.
- Implement decision structures and loops by using conditional expressions.
- Enhance the user interface by adding menus, status bars, and toolbars.
- Access and manipulate data in a Microsoft Access or Microsoft SQL Server database by using Microsoft ADO
- Build, package, and deploy an application.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Design, create, build, and debug Visual Basic applications .
2. Implement syntax rules in Visual Basic programs. And explain variables and data types used in program development and apply arithmetic operations for displaying numeric output.
3. Write and apply decision structures for determining different operations, loop structures to perform repetitive tasks, procedures, sub-procedures, and functions to create manageable code.
4. Create one and two-dimensional arrays for sorting, calculating, and displaying of data and to write Visual Basic programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism.
5. Students will be able to design Windows applications using forms, controls, and events.
6. Explore Visual Basic's Integrated Development Environment (IDE).

List of Programs

1. Develop a Visual program to implement calculator.
2. Write a Visual basic Application for Banking using Data control
3. Write a visual basic application to implement Employee Pay Roll using Ado Data Control. Use MS Flex grid to display the Employee Details
4. Develop a Visual Basic Application to maintain the books in the library using ADO Data control. Uses Data Report to generate a report for Books availability in the library.
5. Write a Visual basic application to create a ActiveX Control for Calendar.
6. Write a Visual Basic Program to create a Screen saver application for windows,
7. Design a VC++ program to Create a window
8. Implement a Mouse Events
9. Write a VC++ program to create window with menu
10. Write a VC++ program to Store a records in the database for students.

11. Write a VC++ program to implement a mouse event using SDK
12. Write a VC++ program to transfer the file from source to destination using MFC.

Text Books

1. Gray Cornell, Visual Basic 6 from the Ground Up, 2011, Tata McGraw Hill Publication. New Delhi. [Unit 1 to 3]
2. Ivor Horton's, Beginning Visual C++, 1st 2014, Wiley India Pvt. Ltd. (Wrox Beginning Guides), New Delhi, India [Unit 4 & 5]

Reference Books

1. Programming Microsoft Visual C++, 2011, 5th Edition, Wiley India Pvt. Ltd., New Delhi, India

Course Objectives:

- To expose the students to the best object oriented programming paradigm, java and strengthen their OOP's fundamental knowledge.
- To Study the software and hardware requirement and installing the java.
- To understand Java programming constructs like variable, primitive data types, operators, type conversion, type casting etc.
- To develop program by using classes, object, nested classes, constructors etc.
- To create package, use of packages, adding a class to a package.
- To understand conversion of numbers and Strings, manipulations of strings, Unboxing and auto boxing

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Describe the features of Java
2. Design classes with object-oriented features
3. Describe advanced features of Java like exception handling, multithreading etc.
4. Write programs in JAVA featuring its core capabilities
5. Able to create objects, classes, packages and class libraries.
6. Ability to make use of members of classes found in the Java API (such as the Math class).

Unit I

Introduction to Java Applications and Applets: Printing a line of text – Displaying text in a Dialog Box – Adding integers – Arithmetic – Decision Making – Drawing a String – Adding Floating Point Numbers. Control Statements: Pseudocode – Control Structures - if, if/else, while – Formulating Algorithms: Case studies: 1, 2 & 3 – Compound Assignment – Increment and Decrement Operators – Primitive types – for, do/while – switch –break and continue statements (simple & labeled) – Logical Operators - selection statements. Methods: Program Modules in Java – Method Declarations – Argument Promotion - Java API Packages – Scope of Declarations – Method Overloading – Recursion. Arrays: Declaring and Creating Arrays – REFERENCES and Reference Parameters – Passing Arrays to Methods – Multidimensional Arrays.

Unit II

Object-Based Programming: Implementing a Time Abstract Data Type with a Class – Class Scope – Controlling Access to members –‘this’- Constructors – Overloaded Constructors – set and get methods – Composition – Static Class Members – Creating Packages – Package Access. Object-Oriented Programming: Superclasses and Subclasses – protected Members – Constructors and Finalizers in Subclasses – Invoking Superclass Method from Subclass Objects - Using Superclass REFERENCES with Subclass-Type Variables – Subclass Method Calls via Superclass-Type Variables – Inheriting Interface and Implementation – final Methods and classes Nested Classes – Type-Wrapper Classes for Primitive Types. String and Characters: Fundamentals – Class String – Class StringBuffer – class Character – class StringTokenizer – Regular Expressions, Class Pattern and Class Matcher.

Unit III

Graphics and Java2D: Graphics Contexts and graphics Objects – Color Control – Font Control – Drawing Lines, Rectangles, Ovals, Arcs, Polygons and Polylines – Java2D API. Graphical User Interface Components: Overview of Swing Components- JLabel – EventHandling – Textfields – How event handling works – JButton – JCheckBox and JRadioButton – JComboBox – JList – Multiple-Selection Lists – Mouse Event Handling – Adapter classes – Key Event Handling – Layout Managers – Panels – JTextArea – JPanel – JSlider – Using Menus with Frames – JPopupMenu – Pluggable Look-and-Feel. Exception Handling: Java Exception Hierarchy – Rethrowing and Exception – finally Clause – printStackTrace, getStackTrace and getMessage – Chained Exceptions.

Unit IV

Multithreading: Life Cycle of a Thread – Thread Priorities and Thread Scheduling – Creating and Executing Thread – Thread Synchronization – Runnable Interface. Files and Streams: Data Hierarchy – Files and Streams – Class File – Creating a Sequential-Access File – Reading Data from a Sequential-Access File – Random-Access Files – Creating/Writing/Reading Random-Access Files – New I/O APIs for the Java Platform. Networking: Manipulating URLs – Reading a File on a Web Server –Client/Server Interaction with Stream Socket Connections. Multimedia: Loading, Displaying and Scaling Images – Animating a series of Images – Image Maps – Loading and Playing Audio Clips.

Unit V

Java Utilities Package and Bit Manipulation: Vector Class and Enumeration Interface – Stack Class of Package java.util – Hashtable Class – Properties Class – Bit Manipulation and the Bitwise Operators – BitSet Class. Collections: Collections Overview – Class Arrays – Interface Collection and Class Collections – Lists – Sets – Maps. Java Database Connectivity with JDBC: Relational Database Overview – SQL – Manipulating Databases with JDBC – Stored Procedures.

Text Book

1. Deitel & Deitel. 2014. Java How to Program, 10th Edition, Pearson Education Asia, New Delhi.

References Book

1. Herbert Schildt, 2014 9th edition. Java Complete Reference, Tata McGraw Hill, New Delhi.
2. Balagurusamy. E . 2012, 3rd edition . Programming with Java, Tata Mc-Graw Hill, New Delhi.
3. ISRD Group. 2012. Introduction to Object Oriented Programming through Java, 1st Edition, Tata Mc- Graw Hill, New Delhi.
4. Aaron walsh, Justin couch & Daniel H. Steinberg. 2000. Java 2 Programming, IDG Books India (P) Ltd., New Delhi.

Web Sites

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Objectives:

Enable the student to

- Become familiar with layered communication architectures (OSI and TCP/IP).
- Understand the client/server model and key application layer protocols.
- Learn sockets programming and how to implement client/server programs.
- Understand the concepts of reliable data transfer and how TCP implements these concepts.
- Know the principles of congestion control and trade-offs in fairness and efficiency.
- Know the fundamentals of data communications networks, working of data transmission concepts

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components. Different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network. Understand and building the skills of subnetting and routing mechanisms.
5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
6. Understand the various operation of all seven layers of OSI Model and the protocols used in each layer.

Unit I

Introduction: Introduction to Computer Network-OSI Reference Models-TCP/IP Reference Model-Example of Network. Physical Network: Theoretical Basics for Data Communication-Guided Transmission Media-Wireless Transmission-Communication Satellites-Mobile Phone System.

Unit II

Data Link Layer: Data Link Layer Design Issue-Error Detection and Correction Methods-Elementary data link protocol-Sliding window protocols-Example Data Link protocol. The channel Allocation problem-Multiple Access Protocols-Ethernet-Wireless LANs-IEEE 802 standards-High Speed LANs

Unit III

Network Layer: Network Layer Design Issue-Routing Algorithms-Congestion control Algorithms-Quality of service-Inter networking-Network Layer in Internet

Unit IV

Transport Layer: Transport service-Elements of transport protocols-Internet Transport protocols: UDP and TCP-Performance Issues

Unit V

Application Layer: The Domain Name System-Electronic Mail-World Wide Web-Multimedia-Compression Methods. Network Security: Cryptography-Symmetric and Asymmetric key algorithms-Digital signature-Simple Network Management protocol.

Text Book

1. Andrew S Tanenbaum. 2014. Computer Networks, 5th Edition, Prentice Hall of India, New Delhi.

Reference Books

1. Douglas E Comer. 2014. Computer Networks and Internets, 6th Edition, Pearson Education Asia, New Delhi. India
2. William Stallings, 2013, Data and Communication Network, 10th Edition, Pearson Education, New Delhi. India
3. Behrouz A. Forouzan, 2013, Data and Communication Network, 5th Edition, Tata McGraw Hill, McGraw Hill Publications, New Delhi, India

Web Sites

1. www.en.wikipedia.org/wiki/Computer_network
2. www.amazon.com/Computer-Networks-Andrew-S-Tanenbaum/dp/0133499456
3. www.cs.rit.edu/~hpb/Lectures/98_445/all.html

Course Objectives:

To make students to

- Understand the fundamental features of web applications.
- Understand the objects and components needed for a web designing.
- To identify which technologies can be used.
- Create a webpage
- To Understand the various steps in designing a creative and dynamic website.
- To Design dynamic and interactive web pages.

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Design simple web applications and window applications.
2. Develop, implement and creating Applications with C#.
3. Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services.
4. Understand and be able to explain Security in the .NET framework and Deployment in the .NET.
5. Learn about the ADO.NET, the feature, controls and code to connect database with front end using ODBC, OLEDB, and SQL, and how to develop web form and data connectivity in ASP.NET.
6. Demonstrate technical skills required of Web Developers through use of W3C standards.

Unit I

Creating an HTML Document – creating list – creating links between document – linking to resources on the internet – working with hypertext attributes – working with fonts and text styles – tables – creating frameset – working with forms – working with cascading style sheets.

Unit II

JavaScript: Introduction to javascript – Programming fundamentals – Functions and objects – Navigator object model

Unit III

JavaScript: Form and form elements – Scripting frames and multiple windows – Event object – Functions and custom objects.

Unit IV

ASP: Client side scripting vs. Server side scripting- Variables & Constants- Procedures – Forms – Cookies – Application - #include – Global.asa - Functions-ASP object model: Response- Request- Application- Session – Server – Error – Array

Unit V

ASP: Collections & Control Structure-File system object: File System – Text Stream-Drive – File – Folder – Directory – ADO - sql & Databases for data driven applications-ASP Components: Ad Rotator – Browser Cap. – Content Linking – Content Rotator .

Text Books

1. Patrick Carey 2011, New Perspectives on HTML and XHTML, 6th Edition, Cengage Learning. (UNIT I).
2. Jeremy McPeak, 2015, Beginning Javascript, 5th Edition, Wiley India Pvt. Ltd. (Wrox Beginning Guides), New Delhi, India (Unit II)
3. Danny Goodman, 2010, “Javascript Bible”, 7th Edition, Wiley India Publications; 7th Edition (November 9, 2010) (Unit III).
4. A.Russell Jones. 2000. Mastering ActiveServerPages 3, 1st Edition, BPB Publishing, New Delhi.(Unit IV & Unit V).

Reference Books

1. Thau. 2007. The Book of JavaScript: A Practical Guide to Interactive WebPages.
2. Wendy Willard. 2007. HTML: A Beginner's Guide, Tata McGraw-Hill Professional, New Delhi.
3. Chuck Musciano and Bill Kennedy. 2006. HTML & XHTML: The Definitive *Guide, O'Reilly.
4. David Flanagan. 2006. JavaScript: The Definitive Guide, O'Reilly,
5. Nicholas C. Zakas, Inc Ebrary and Ebrary. 2005. Professional JavaScript for Web Developers, John Wiley & Sons Inc, New Delhi.
6. Jude D'Souza and Monica D'Souza. 2002. Discover ASP, 1st Edition, TATA McGraw Hill Professional, New Delhi.

Web Sites

1. www.w3schools.com/
2. www.javascriptkit.com
3. www.aspfree.com
4. www.aspnetutorials.com

Course Objectives:

To help students to

- Understand the basic concepts techniques and applications of software agents.
- Understand how agent communications between them.
- Know the applications of agent.
- Understand software agents design tools.
- Introduce the concepts, techniques and applications of software agents.
- Evaluate current software agent systems.

Course Outcomes (COs)

Upon completion of this Course, student will be able to:

1. Know the pitfalls of Agent Development
2. Implement the interaction between the agents
3. Have an idea to develop an agent application
4. Describe the various agent application
5. Understand the Multiagent planning and Synchronization
6. Know about Agent oriented programming

Unit I

Introduction – Intelligent Agents – Environments – Intelligent agents – Agents and Objects – Agents and Expert Systems – Agents as Intentional Systems – Abstract Architectures for Intelligent Agents – How to tell an agent what to do – Synthesizing Agents

Unit II

Deductive Reasoning Agents – Agents as Theorem Provers – Agent-Oriented Programming – Concurrent Mutate.

Practical Reasoning Agents – Proactical Reasoning Equals Deliberation Plus Means-Ends Reasoning – Means-Ends Reasoning – Implementing a Practical Reasoning Agent -Homer – The Procedural Reasoning System

Reactive and Hybrid Agents- Brooks and the Subsumption Architecture – The Limitations of Reactive Agents – Hybrid Agents

Unit III

Multiagent Interactions – Utilities and Preferences – Multiagent Encounters – Dominant Strategies and Nash Equilibria – Competitive and Zero-Sum Interactions – The Prisoner's Dilemma – Other Symmetric 2 x 2 Interactions – Dependence Relations in Multiagent Systems

Reaching Agreements – Mechanism Design – Auctions – Negotiation – Argumentation Communication – Speech Acts – Agent Communication Languages – Ontologies for Agent Communication – Coordination Languages

Unit IV

Cooperative Distributed Problem Solving – Task Sharing – Combining Task and Result Sharing – Handling Inconsistency – Coordination – Multiagent planning and Synchronization

Unit V

Methodologies – Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents-Applications of Agents

Text Book

1. Michael Wooldridge.2009. An Introduction to Multiagent Systems, John Wiley & Sons Ltd.

References

7. Gerhard Weiss, 2013, Multi-agent Systems, MIT Press, 2nd Edition
2. Walter Brenner et al, 2011, Intelligent Software agents: Foundations and Applications, Springer Verlag

Course Objectives:

Enable the student

- To Understand basics client/server architecture
- To Establish and use Database connectivity
- To gain the knowledge of CORBA
- This Subject deals with the C/S Computing, GUI.
- To apply the techniques and features of a client/server development language to construct a moderately complex client/server application.
- To learn the advantages of client-server systems over monolithic systems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

- Know client server computing models and can establish communication between them
- Design a dynamic remote application with RMI and JDBC Connectivity
- Develop programming using C#.net
- Differentiate homogeneous and heterogeneous language communications.
- Develop real time projects by combining CORBA and database interfacing
- Differentiate between two-tier and three-tier architectures.

Unit I

A client-server computing-What is client/server? Server classification- FAT server- FAT client - 2 Tier versus 3 Tier- client/server building blocks- the road to bandwidth heaven- Advantages of client/server computing.

Unit II

Clients, servers and operating systems- NOS- Creating the single system Image- RPC, messaging and peer-to-peer. Client/server systems development- Software- Client/server systems development- Hardware.

Unit III

SQL database servers- SQL middleware and federated databases- Data warehouse- OLAP and multidimensional data- Client/server transaction processing- The magic of transaction- TP monitors.

Unit IV

Database connectivity solutions: ODBC – The need for Database Connectivity- Design overview of ODBC- Architecture- Components- Applications- Driver Manager- Drivers- Data sources- ODBC 2.5 and ODBC 3.0.

Unit V

Client/server groupware - CORBA- Compound Documents- Web Client/Server- 3 Tier Client/Server, Web-style- HTML 2.0's Web-based forms- CGI- Web security- The Java objects. Client Server Administration – Introduction to Windows NT- Architecture- Memory Architecture- Server and workstation- Installing Windows NT.

Text Book

1. Robert Orfali, Dan Harkey, Jeri Edwards. 2000, The Essential Client/Server Survival Guide. 2nd Edition. Galgotia Publication, New Delhi.

Reference

1. Patrick Smith, Steve Quengerich. Client/Server Computing. 2nd Edition. Prentice hall of India, New Delhi

Course Objectives:

Enable the student

- The Software perspective architectural and how it differs from lower-level design.
- Understand the need for a Software Architecture.
- To exploit the software architecture environment.
- To understand software engineering layered technology and Process frame work.
- To Understand Design Engineering, Web applications and Software Project Management.
- To Understand the software design concepts and know to Maintain the quality of software project

Course Outcomes (COs)

Upon completion of this Course, student will be able to:

1. Principles and Process of software development
2. Design various software architectures with visual notations
3. Evaluate the software design methods
4. Enumerate different software estimation and project scheduling techniques
5. Identify software requirements engineering activities.
6. Able to Verify and validate the problem of software programming

Unit I

Introduction – Software Architecture – Software Design levels – An Engineering Discipline for Software – The status of Software Architecture – Architectural styles – Pipes and filters – Data Abstraction and Object-oriented organization – Event based, implicit invocation – Layered systems – Repositories – Interpreters – Process Control – Other Familiar Architecture – Heterogeneous Architectures.

Unit II

Case studies - Key word is Context – Instrumentation Software – Mobile Robotics – Cruise Control – Three Vignettes in Mixed Style

Unit III

Shared Information Systems – Database Integration – Integration in Software Development Environments – Integration in the Design of Buildings – Architectural structures for shared Information Systems

Unit IV

Guidance for User-Interface Architectures – The quantified Design Space – The value of Architectural formalism – Formalizing the Architecture of a specific system – Formalizing an Architectural Style – Formalizing an Architectural Design Space – Towards a Theory of Software Architecture – Z Notation

Unit V

Requirements for Architecture – Description Languages – First class connectors – Adding Implicit Invocation to Traditional Programming Languages – Tools for Architectural Design – UniCon – Exploiting Style in Architectural Design Environments – Beyond definition/Use: Architectural Interconnection.

Text Books

1. Mary Shaw, David Garlan, Software Architecture – Perspectives on an Emerging Discipline, Prentice Hall of India, Eastern Economy Edition.

Reference:

1. Malveau, Mowbray ,Software Architecture Bootcamp. 2011,Prentice Hall.
2. Dave Hendricksen, 2011, 12 Essential Skills for Software Architects, Addison - Wesley.

Course Objectives:

Enable the students

- Basic multimedia concepts.
- Basic knowledge of 2D animation
- The knowledge of audio and video capture and editing tools
- The skill to design different application using flash.
- interface design, content design and creation with graphics, animation, audio and video materials, and software development using Flash.
- To learn various multimedia authoring systems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Comprehend multimedia system fundamentals.
2. Design and implement a multimedia application or identify a problem in certain multimedia area and provide a reasonable solution.
3. Know various multimedia software tools.
4. Design multimedia software that are suitable to Internet applications.
5. Design flash animations
6. Design and development of a multimedia application

Unit I

Introduction to Multimedia – Usage of Multimedia- Introduction to making Multimedia: Stages of a project- Need for making multimedia- Macintosh and windows production platforms- Multimedia Building block: Text

Unit II

Sound: Digital Audio- Audio file formats-MIDI-MIDI vs Digital Audio - Images: Making images-Color-Image File Formats-Animation: Animation Techniques & file formats- video

Unit III

Storage Media & Access – Data Compression Techniques: Some basic compression techniques, JPEG, MPEG, DVI

Unit IV

Flash: Introduction to Flash – Variables & Data types: Data types in Action Script, creating and placing variables, Buttons with Text Fields – Basic Actions: Play, Stop, Back & Forth between frames and Scenes, Timelines, External Scripts – Operators- Loops: Repeater Loops, Frame Loop, Structure Loops, Nested Loops.

Unit V

Handling Events: Mouse Event, Keyboard, Key Objects, Clip Events, MovieClip Objects, Colliding Objects – Properties & Functions: setting properties, property tests, passing Property Values, Functions in Flash, using Substrings, User Defined Functions – Specialized Objects: Color, Date, Math, Number, Sound, XML & XML Socket Objects – Creating a Movie

Text Books:

1. Tay Vaughan. 2010 Multimedia making it work. 8th Edition, Tata McGraw Hill, New Delhi. (Unit I , II)
2. John .F..Koegel Buford. 2001. Multimedia Systems. 1st Edition, Pearson Education, New Delhi.(Unit I , II)
3. Ralf Steinmetz and Klara Nahrstedt. 2001 Multimedia: Computing, Communications, & Applications. 1st Edition, Pearson Education , New Delhi. (Unit III)
4. Bill Sanders. 2001 Flash5 ActionScript. 1st Edition, DreamTech Press, New Delhi (Unit IV , V)

Reference Books:

1. Ranjan Parekh. 2013 Principles of Multimedia, 2nd Edition, Tata McGraw Hill, New Delhi.
2. Bojkovic & Milovanovic Rao, 2009, Multimedia Communication Systems Techniques, Standards And Networks Paperback, Phi.

WEB SITES

- 1.en.wikipedia.org/wiki/Multimedia
- 2.www.arena-multimedia.com/ -
- 3.www.nextwavemultimedia.com/

Course Objectives:

Enable the student

- Understand basic communication systems.
- Acquire basic knowledge MAC Layer
- Wide knowledge about linux based operating systems
- Design different application on mobile based operating systems.
- Gain knowledge on mobile communication systems and depth knowledge of mobile operating systems.
- Learning about systems for mobile application distribution .

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

- Understand and identify the GSM, GPRS and Bluetooth software model for mobile computing.
- The ability to develop applications that are mobile-device specific and demonstrate current practice in mobile computing contexts.
- Understanding of the characteristics and limitations of mobile hardware devices including their user-interface modalities
- Analyze QoS over wire and wireless channels
- Able to promote the awareness of the life-long learning,business ethics, professional ethics and currentmarketing scenarios.
- Student has knowledge concerning mobile operating systems and their architecture.

Unit I

Introduction to Mobile communication-Wireless communication-How wireless started-Worldwide mobile communications market-Wireless transmission - Radio transmission – frequencies-Regulations-Signals-Antennas- Signal propagation-Multiplexing- Modulation-Spread spectrum-Cellular system.

Unit II

Medium Access control: Introduction- Introduction -Reason for specialized MAC-SDMA FDMA- TDMA-CDMA-Telecommunication systems-GSM-Satellite System-GEO-LEO-MEO.Layers of Mobile Networks: Mobile IP-Mobile node (MN)-DHCP-Mobile Ad-hoc Networks-Mobile Transport Layer-Traditional TCP- Improvements to Classical TCP-TCP over 2.5/3G wireless networks-Performance enhancing proxies

Unit III

Linux Based Operating Systems: Access Linux-Android-DSLlinux- iPod Linux-Limo (Linux Mobile)-MeeGo-Mobilinux-OpenMoko-SHR-QT Extended- Ubuntu

Unit IV

Windows Based Operating Systems: Windows Phone-Windows Mobile.Other Operating Systems: BADA- Blackberry-Blackberry Tablet-iPhone-PALM-Palm's Web-Symbian

Unit V

Symbian programming-Installing the Qt Software -Create a Simple Mobile Application.
Windows Phone 7 Programming-Installing Visual Studio 2010- Installing Windows Phone 7 SDK- Create a Simple Mobile Application.Android Programming: Installing JDK -NetBeans Installation-Create a Simple Mobile Application

Text Books

1. Arash Habibi Lashkari, Mohammadreza Moradhaseli.2011. Mobile Operating Systems and Programming: Mobile Communications, VDM Publishing.

Reference Books

1. Mischa Schwartz. 2005. Mobile Wireless Communications. Cambridge University
2. Michael J Jipping . 2007.Smartphone Operating System Concepts With Symbian Os, willey India.
3. Press.R.Roger, J Lombarddo, Z Mednieks and B. Meike, 2010, Android Applications Development, O'Reilly, Shroft Publishers & Distributors Pvt Ltd, New Delhi.

Web sites:

- en.wikipedia.org/wiki/Mobile_operating_system
- www.zdnet.com/.../beyond-android-and-ios-the-top-six-mobile-operatin..
- www.shoutmeloud.com/top-mobile-os-overview.html

Course Objectives:

Enable the students

- To give everybody a base level of finance knowledge that an MPA from a top business school should possess,
- To give everybody the ability and confidence to tackle common financial problems in practice
- To provide adequate preparation for future managers should organize their financial transactions effectively and with integrity.
- To understand and appreciate the basic Micro and Macroeconomics and their application to the business
- basics of Accounting Concepts and Principles to Prepare to Students to have the foot hold in Accounts.
- To know about ratio analysis

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Preparing financial statements in accordance with appropriate standards.
2. ledger accounts using double entry bookkeeping and record journal entries accordingly .
3. Interpreting the business implications of financial statement information
4. To understand theories of profit , profit maximization and analysis of Breack Even Point
5. To know law of diminishing proportion , product function , Economies of scale
6. To understand Pricing policy under Perfect Competition Monopoly,

Unit I

Accounting: Definition- Objectives- Advantages- Accounting Concepts- Accounting Conventions; Methods of Accounting: Single Entry and Double Entry System- Basic books of Accounts- Journal and Ledger- Preparation of Trial Balance; Final accounts: Trading and Profit and Loss Account and Balance Sheet of Sole Proprietary Concern; Depreciation- Meaning- Straight-Line Method-Diminishing Balance Method.

Unit II

Ratio Analysis: Meaning-Advantages-Limitations; Classification of Ratio: Profitability, Turnover and Solvency Ratios.

Unit III

Funds Flow Statement: Concept of funds- Funds Flow Statement- Uses and Limitations- Preparation of Fund Flow Statement- Cash Flow Statement.

Unit IV

Budget and Budgetary Control: Meaning and Definition- Objectives of Budgetary Control- Advantages and Limitation Preparation of Different Types of Budgets.

Unit V

Costing: Definition- Nature and Importance- Advantages and Limitations of Cost Accounting-Classifications of Cost - Preparation of Cost Sheet.

Marginal Costing: Meaning- Advantages- Cost-Volume Profit Analysis- Break Even analysis- Uses and assumptions- Applications of Marginal Costing.

Text Books

1. N.Vinayakam, Mani and Nagarajan, "Principles of Accountancy".
2. S.N.Maheswari, "Principles of Management Accounting".
3. S.P.Jain and Narang, "Cost Accounting".

Reference Books

1. Sharma and Sasi.K.Gupta, "Management Accounting".
2. T.S.Grewal, "Introduction to Accountancy".
3. Ramachandran and Srinivasan, "Management Accounting".

Course Objectives:

Enable the student

- To expose the students to the best object oriented programming paradigm, java and strengthen their OOP's fundamental knowledge.
- To Study the software and hardware requirement and installing the java.
- To understand Java programming constructs like variable, primitive data types, operators, type conversion, type casting etc.
- To develop program by using classes, object, nested classes, constructors etc.
- To create package, use of packages, adding a class to a package.
- To understand conversion of numbers and Strings, manipulations of strings, Unboxing and auto boxing

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

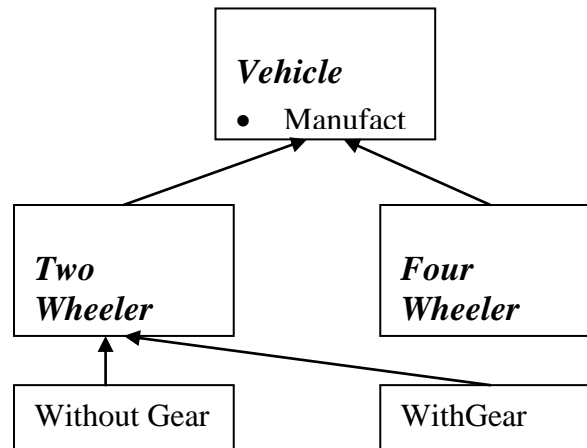
1. Describe the features of Java
2. Design classes with object-oriented features
3. Describe advanced features of Java like exception handling, multithreading etc.
4. Write programs in JAVA featuring its core capabilities
5. Able to create objects, classes, packages and class libraries.
6. Ability to make use of members of classes found in the Java API (such as the Math class).

List of Programs:

1. Create an employee package to maintain the information about the employee. Use constructors to initialize the employee number and use overloading method to set the basic pay of the employee. By using this package, create a Java program.
2. Create a set of classes with the relationship as shown in the diagram and use inheritance relationship to define the sub classes.

Get and display the details of some of the two and four wheelers and display them in a neat format. Create a frame with user specific size and position it at user specific position (use command line argument). Then different shapes with different colors (use menus).
3. Java program to handle different mouse events.
4. Create an applet for a calculator application.
5. Java program to maintain the student information in text file.
6. Animate images at different intervals by using multi-threading concepts.
7. Program to send a text message to another system and receive the text message from the system (use socket programming)
8. Java program by using JDBC concepts to access a database.

9. Java program by using to implement the tree viewer.
10. Implementation of Binary Search Tree



Text Book

1. Deitel & Deitel. 2014. Java How to Program, 10th Edition, Pearson Education Asia, New Delhi.

References Book

1. Herbert Schildt, 2014 9th edition. Java Complete Reference, Tata McGraw Hill, New Delhi.
2. Balagurusamy. E . 2012, 3rd edition . Programming with Java, Tata Mc-Graw Hill, New Delhi.
3. ISRD Group. 2012. Introduction to Object Oriented Programming through Java, 1st Edition, Tata Mc- Graw Hill, New Delhi.
4. Aaron walsh, Justin couch & Daniel H. Steinberg. 2000. Java 2 Programming, IDG Books India (P) Ltd., New Delhi.

Web Sites

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Objectives:

To make students to

- Become familiar with layered communication architectures (OSI and TCP/IP).
- Understand the client/server model and key application layer protocols.
- Learn sockets programming and how to implement client/server programs.
- Understand the concepts of reliable data transfer and how TCP implements these concepts.
- Know the principles of congestion control and trade-offs in fairness and efficiency.
- Know the fundamentals of data communications networks, working of data transmission concepts

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components. Different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network. Understand and building the skills of subnetting and routing mechanisms.
5. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.
6. Understand the various operation of all seven layers of OSI Model and the protocols used in each layer.

List of Programs:

1. Write a networking program in Java to implement a TCP server that provides services for a TCP Client.
2. Write a networking program to implement socket programming using User datagram Protocol in Java.
3. Implement an FTP server using socket programming.
4. Implement a chat server using socket programming.
5. Implement an ECHO server using socket programming.
6. Implement Address Resolution Protocol using socket programming.
7. Implement Ping server and Ping client using socket programming.
8. Using UDP to transfer a text file from one host to another.
9. Implement Remote Command Execution using network programming.
10. Simulate simple Web Browser.

11. Write a Java program to check whether the given DNS is found in the internet or not.
12. Write a network program using HTTP to print the document for the given URL.

Text Book

1. Andrew S Tanenbaum. 2014. Computer Networks, 5th Edition, Prentice Hall of India, New Delhi.

Reference Books

1. Douglas E Comer. 2014. Computer Networks and Internets, 6th Edition, Pearson Education Asia, New Delhi. India
2. William Stallings, 2013, Data and Communication Network, 10th Edition, Pearson Education, New Delhi. India
3. Behrouz A. Forouzan, 2013, Data and Communication Network, 5th Edition, Tata McGraw Hill, McGraw Hill Publications, New Delhi, India

Web Sites

1. www.en.wikipedia.org/wiki/Computer_network
2. www.amazon.com/Computer-Networks-Andrew-S-Tanenbaum/dp/0133499456
3. www.cs.rit.edu/~hpb/Lectures/98_445/all.html

Course Objectives:

Enable the students to

- Understand the fundamental features of web applications.
- Understand the objects and components needed for a web designing.
- To identify which technologies can be used.
- Create a webpage
- To Understand the various steps in designing a creative and dynamic website.
- To Design dynamic and interactive web pages.

Course Outcomes(Cos)

Upon completion of this Course, student will be able to:

1. Design simple web applications and window applications.
2. Develop, implement and creating Applications with C#.
3. Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services.
4. Understand and be able to explain Security in the .NET framework and Deployment in the .NET.
5. Learn about the ADO.NET, the feature, controls and code to connect database with front end using ODBC, OLEDB, and SQL, and how to develop web form and data connectivity in ASP.NET.
6. Demonstrate technical skills required of Web Developers through use of W3C standards.

List of Programs:

1. Develop a website for Karpagam University using HTML.
2. Write Online Quiz program (Include Style Sheets)
3. Create a simple animation using DHTML.
4. Write a program to apply Mask into an Image Using Filters in DHTML.
5. Generate web page that represents clock-every 60 see the page updated with server current time Using JavaScript.
6. Design a form and validate it using JavaScript.
7. Show the demo of AD Rotator Component
8. Write Database Access program using ASP.
9. Program to retrieve Cookies information using ASP
10. Program to count web page hits using ASP
11. Program to create Date & Time, String Manipulation using ASP
12. Write a program to find the visitor's Browser Type, IP Address and More Information.

Text Books

1. Patrick Carey 2011, New Perspectives on HTML and XHTML, 6th Edition, Cengage Learning. (UNIT I).
2. Jeremy McPeak, 2015, Beginning Javascript, 5th Edition, Wiley India Pvt. Ltd. (Wrox Beginning Guides), New Delhi, India (Unit II)
3. Danny Goodman, 2010, "Javascript Bible", 7th Edition, Wiley India Publications; 7th Edition (November 9, 2010) (Unit III).
4. A.Russell Jones. 2000. Mastering ActiveServerPages 3, 1st Edition, BPB Publishing, New Delhi.(Unit IV & Unit V).

Reference Books

1. Thau. 2007. The Book of JavaScript: A Practical Guide to Interactive WebPages.
2. Wendy Willard. 2007. HTML: A Beginner's Guide, Tata McGraw-Hill Professional, New Delhi.
3. Chuck Musciano and Bill Kennedy. 2006. HTML & XHTML: The Definitive *Guide, O'Reilly.
4. David Flanagan. 2006. JavaScript: The Definitive Guide, O'Reilly,
5. Nicholas C. Zakas, Inc Ebrary and Ebrary. 2005. Professional JavaScript for Web Developers, John Wiley & Sons Inc, New Delhi.
6. Jude D'Souza and Monica D'Souza. 2002. Discover ASP, 1st Edition, TATA McGraw Hill Professional, New Delhi.

Web Sites

1. www.w3schools.com/
2. www.javascriptkit.com
3. www.aspfree.com
4. www.aspnetutorials.com

Instruction Hours / week: L: 4 T: 0 P: 0 C: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3Hours

Course Objectives:

Enable the student

- Be able to analyze algorithms
- Understand the fundamental skills in back tracking logic, dynamic programming.
- Understand the fundamental algorithms such as searching, and sorting
- To provide an introduction to basic techniques for designing efficient algorithms, analyzing their complexity
- Applying the algorithms to broad range of applications.
- Compute the complexity of various algorithms.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Learn to analyze worst-case running times of algorithms using asymptotic analysis. Understand operations and applications of Stack and Queue.
2. Be able to analyze and use some fundamental data structures such as Binary search trees. Understand the concept of linked list.
3. Explain the major algorithms for sorting and searching.
4. Describe and synthesize the divide and conquer paradigm, dynamic programming paradigm and greedy paradigm.
5. Understand the concept of backtracking, deterministic and nondeterministic algorithms.
6. Determine and analyze the complexity of given Algorithms.

Unit I

Introduction: Algorithm - pseudo code for expressing algorithms – analysis - time complexity and space complexity - efficiency of algorithms - O-notation - Omega notation and Theta notation.

DIVIDE AND CONQUER: General method – binary search - merge sort - quick sort.

Unit II

Greedy Method: General method- Knapsack problem - job sequencing with deadlines - minimum-cost spanning trees : Prim's and Kruskal's algorithms - Single source shortest paths : Dijkstra's algorithm.

Unit III

Dynamic Programming: General method - Multistage Graphs – All pairs shortest paths, Single source shortest paths - optimal binary search trees - 0/1 Knapsack problem - Traveling sales person problem.

Unit IV

Back Tracking: General method - n-queen problem - sum of subsets problem - graph colouring - Hamiltonian cycles - Knapsack problem.

Unit V

Branch and Bound: Least Cost(LC) search, Bounding - LC branch and bound - FIFO branch and bound - Travelling sales person problem.

Text Book

1. E. Howrowitz and Sahni.2012. Fundamentals of computer algorithms, Galgotia publications.

Reference Books

1. Gilles Brassard and Paul Bratley. 1997. Fundamentals of Algorithm, Prentice Hall of India Pvt.Ltd.
2. Mark Allen Weiss. 2000. Data Structures and Algorithm Analysis in C,Addition-wesley, Third Indian Reprint.

Course Objectives:

Enable the student

- Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications
- Understand the fundamental concepts of XML and related technologies
- Acquire knowledge on how XML is currently being used in various application areas
- Know how to parse and transform XML documents via tools and through programming APIs
- Understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience
- Learn Java web programming with J2EE.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Develop Swing-based GUI
2. Update and retrieve the data from the databases
3. Develop distributed applications using RMI
4. Develop component-based Java software using JavaBeans
5. Develop server side programs in the form of servlets
6. To understand object-oriented programming with J2EE.

Unit I

J2EE Overview – Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – Client Tier, Web Tier, Enterprise Java Beans Tier, Enterprise Information Systems Tier Implementation.

Unit II

J2EE Database Concepts:Data – Database – Database Schema. JDBC Objects: Driver Types – Packages – JDBC Process – Database Connection – Statement Objects – Result Set – Meta Data.

Unit III

Java Servlets: Benefits – Anatomy – Reading Data from Client –Reading HTTP Request Headers – Sending Data to client – Working with Cookies.

Unit IV

Enterprise Java Beans – Deployment Descriptors – Session Java Bean –Entity Java Bean – Message Driven Bean.

Unit V

Java Server Pages – Java Remote Method Invocation.

Text Book

1. Jim Keogh. 2008. The Complete Reference J2EE, 1st Edition, Tata McGraw Hill Edition, New Delhi .

Reference Books

1. Joseph J Bambaraetal. 2001. J2EE Unleashed, 1st Edition, Tech Media.
2. Paul J Perrone, Venkata S R R Chaganti, S .R.Venkata Krishna, R Chaganti and Tom Schwenk. 2003. J2EE Developer's Handbook, Sams Publications.
3. Rod Johnson. 2004. J2EE Development without EJB, 1st Edition, Wiley Dream Tech India, New Delhi.
4. Rod Johnson. 2004.Expert One-On-One J2ee Design and Development , John Wiley & Sons, Incorporated.

Web Sites

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/

Course Objectives:

Enable the student

- Become a good .NET programmer.
- Know how COM components and the .NET Framework interoperate with each other.
- Identify and use the classes and namespaces in the .NET Framework class library.
- Build WEB Applications using Microsoft ASP.NET programming.
- Understanding the components of the .NET Framework and the common language runtime (CLR)
- Know how COM components. Also provides better knowledge of Architecture

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Able to analyze program requirements
2. Develop programs with GUI interfaces
3. Code programs and develop interface using Visual Basic .Net,C#.Net,ASP.Net
4. Perform tests, resolve defects and revise existing code.
5. Able to develop projects using ASP .NET
6. Able to apply all the window controls.

Unit I

Introduction: Getting Started With VB.NET: The Integrated Development Environment-IDE Components-Environment Options.Visual Basic: The Language Variables-Constants-Arrays – Variables as Objects-Flow Control Statements.Working with forms: The appearance of Forms-Loading and Showing Forms-Designing Menus.

Unit II

Basic Windows Controls: Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls-More Windows Control-The common Dialog Controls-The Rich TextBox Control - Handling Strings, characters and Dates. The TreeView and ListView Controls: Examining the Advanced Controls-The TreeView Control-The ListView Control

Unit III

The Multiple Document Interface-Databases: Architecture and Basic Concepts-Building Database Application with ADO.NET-Programming with ADO.NET

Unit IV

Goal of ASP.NET –ASP.NET Web Server Control-Validation Server Controls-Themes and Skins -Content Page Holder

Unit V

Data Binding in ASP.Net: Data source Controls – Configuring data source control caching – storing connection information-Using Bound list controls with Data Source Controls – Other Databound Controls-Data Management with ADO.Net

Text Books

1. Evangelos Petroustos, Mastering Visual Basic.Net, BPB Publications, New Delhi.
2. Bill Evjen, Scott Hanselman , Devin Rader, Farhan Muhammad and S.Srinivasa Sivakumar. 2006. Professional ASP.net 2.0, Special Edition.

Reference Books

1. Dave Mercer, ASP.Net Beginner's Guide . 2003. 2nd Edition McGraw Hill, New Delhi.
2. Duncan Mackenzie Kent Sharkey. 2006. Sams Teach yourself Visual Basic.JNet, 1st Edition, McGraw Hill, NewDelhi.
3. Shirish Chavan. 2007. Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.

Web Sites

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.w3schools.com/ngws/default.asp
4. www.vbtutot.com

Course Objectives:

Enable the student

- Install and configure database
- Create users and assign roles
- Optimize schemas, tables, indexes and views
- Manage database services and clients
- Will be able to move the data from one database to another database.
- To keep database operational

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Design a data mart or data warehouse for any organization
2. Develop skills to write queries using DMQL
3. Extract knowledge using data mining techniques
4. Adapt to new data mining tools.
5. Explore recent trends in data mining such as web mining, spatial-temporal mining
6. Knowledge of monitoring performance of tasks

Unit I

Oracle DBA's: The Oracle DBA's Role- Oracle Database 10g Architecture: Oracle Databases and instances- Oracle Logical Storage structures – Oracle Logical Database structures – Oracle Physical Storage structures- Multiplexing Database Files - Oracle Memory Structures-Oracle Backup and Recovery – Security Capabilities – Tablespace Architecture – Oracle Tablespace installation – Traditional Disk Space Storage – Automatic Storage Management

Unit II

Common Space Management Problems – Oracle Segments, Extents and Blocks – Space Management Methodologies – SYSAUX monitoring and usage – Archived Redo Log File Management – Built in Space Management Tools: Segment Advisor – Undo Advisor and the Automatic Workload Repository – Index usage – Space Usage Warning Levels – Reusable space allocation – Managing alert and Trace Files with ADR – Transaction Basics – Undo Basics – Managing Undo Tablespaces – Flashback features

Unit III

Tuning Application Design – Tuning SQL – Tuning Memory Usage – Tuning Data Access – Tuning Data Manipulation – Tuning Physical Storage – Reducing Network Security – Database Authentication Methods

Unit IV

Database Authorization Methods – Auditing: Auditing Locations – Statement Auditing – Privilege Auditing Schema Object Auditing – Auditing Related Data Dictionary Views – Logical Backups – Physical Backups – Using Data Pump Export and Import – Data Pump Import Options – Integration of Backup Procedures

Overview of Oracle Net – Using the Oracle Net Configuration Assistant – Using the Oracle Net Manager – Starting the Listener Server Process – Controlling the Listener Server Process Using Data links

Unit-V

Creating Tablespaces in a VLDB Environment: Bigfile Tablespace Basics – Creating and Modifying Bigfile Tablespace – Bigfile Tablespace ROWID format – DBMS_ROWID and Bigfile Tablespaces.- Advanced Oracle Table Types – Using Bitmap Indexes – Oracle Data Pump

Remote queries – Remote Data Manipulation: Two Phase Commit – Managing Distributed Data – Managing Distributed Transactions – Monitoring and Tuning Distributed Database

Text Book

- Bob Bryla, Kevin Loney 2008 Oracle Database 11g DBA Handbook McGraw-Hill Osborne

Reference Book

1. Saikat Basak. 2010. Oracle DBA Concise Handbook ,Ensel Software

Web Sites :

1. www.oracle.com/technology/software/products/database/oracle10g/index.html
2. www.oracle-base.com/articles/10g/
3. www.adp-gmbh.ch/ora/misc/10g.html

Course Objectives:

Enable the student

- To teach fundamental aspects of security in a modern networked environment with the focus on system design aspects and cryptography in the specific context of network.
- To build protection mechanisms in order to secure computer networks.
- Write coding to encrypt “Plain Text” into “Cipher Text” and vice versa, using different encryption algorithms.
- The ability to choose a suitable ciphering algorithm according to the required security level.
- Build cryptosystems by applying encryption algorithms,
- Build secure authentication systems by use of message authentication techniques.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Demonstrate the basic concepts of system level security
6. understand the goals, issues, technologies, algorithms, protocols and design criteria used in cryptography and data security and solution.

Unit I

Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm – Stream cipher and Block cipher – Symmetric and Asymmetric – Key Cryptosystem; Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

Unit II

Public Key Cryptosystem: Introduction to Number Theory – RSA Algorithm – Key Management – Diffie-Hellman key exchange – Introduction to Elliptic Curve Cryptography; Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

Unit III

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication Services and Encryption Techniques;; E-mail security – PGP – s/MIME – IP Security.

Unit IV

Web Security – Secure Socket Layer – Secure Electronic Transaction; System Security – Intruders and Viruses – Firewalls – Password Security.

Unit V

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit; Other Security Mechanism: Introduction to Stenography – Quantum Cryptography – Water Marking – DNA Cryptography.

Text Book

1. William Stallings. 2013. Cryptography and Network Security, 6th Edition. Pearson Education, New Delhi.

Reference Books

1. Bruce Schneir. 2006. Applied Crptography, 2nd Edition. CRC Press, New Delhi.
2. A.Menezes, P.Van Oorschot and S.Vanstone.2010.Hand Book of Applied Cryptography, 2nd Edition. CRC Press, NewDelhi.
3. Ankit Fadia.2010. Network Security, 2nd Edition. McMillan India Ltd, New Delhi:2003.

Web Sites

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. www.flipkart.com/search-books/cryptography+and+network+security+William+stallings+ebook

Course Objectives:

- To perform test each time they are run, thereby eliminating human error.
- To test how the software reacts under repeated execution of the same operations.
- To program sophisticated tests which bring out hidden information from the application.
- To reuse tests on different versions of an application, even if the user interfaces changes.
- to provide stakeholders with information about the quality of the product or service under test.
- To know the Types of errors and fault models

Course Outcomes(COs):

Upon completion of this Course, student will be able to:

1. Test the software by applying testing techniques to deliver a product free from bugs
2. Evaluate the web applications using bug tracking tools.
3. Investigate the scenario and the able to select the proper testing technique
4. Explore the test automation concepts and tools
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
6. Various test processes and continuous quality improvement

Unit I

Introduction: Purpose of Testing – Dichotomies - Model for Testing – consequences of bugs- Taxonomy for bugs

Unit II

Flow/Graphs and Path Testing : Path testing basics-predicates, path predicates and Achievable paths – Path sensitizing– path instrumentation-implementation and application of path testing

Unit III

Transaction flow testing: – Transaction flow - Transaction flow testing techniques – implementation comments – testability tips -Data flow testing basics- Data flow testing strategies.

Unit IV

Domains and paths-Nice Domains and Ugly Domains-Domain testing-Domains and interface testing-Domains and testability-Metrics-Linguistic metrics-structural metrics-Hybrid metrics-metrics implementations-Testability tips

Unit V

Risk Analysis : Benefits of Risk analysis – Project Management Strategies and Risk – MITs risk Analysis – MITs Ranking Criteria - Using Risk Ranking in Forensics –Test estimation process-MIT totals worksheet-Sizing worksheet

Text Books

1. Boris Beizer , 2003, Software Testing Techniques, II Edn., DreamTech India, New Delhi. (Unit – I, II, III, IV)
2. Marnie L Hutcheson , 2003 software testing fundamentals I Edn, Wiley, DreamTech India, New Delhi. (Unit – V)

Reference Books

1. Burnstein, 2003, Practical Software Testing, Springer International Edn.
2. E. Kit, 1995, Software Testing in the Real World: Improving the Process, Pearson Education, Delhi.
3. R.Rajani, and P.P.Oak, 2004, Software Testing, Tata Mcgraw Hill, New Delhi.

Web sites

1. <http://my.safaribooksonline.com>
2. <http://www2.sas.com>
3. <http://www.softwaretesting fundamentals.com>
4. www.cs.cmu.edu
5. www.softwaretesting management.con

Course Objectives:

Enable the students to

- Be aware of a range of XML tools (Many of them are free).
- Know how to set out an XML document
- Define custom markup language
- Understand the purpose of using DTDs and Schemas to validate XML
- Use XSLT to write a style sheet for XML document to produce multiple output
- Combine XML with existing web technologies.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand the use of web services in B2C and B2B applications.
2. Understand the design principles and application of SOAP and REST based web services.
3. Design collaborating web services according to a specification.
4. Implement an application that uses multiple web services in a realistic business scenario.
5. Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them.
6. To learn how to create websites using XML, understand the essentials of the XML standards.

Unit I

World Wide Web: Introduction to the Internet and World Wide Web: W3C – History of Internet- World Wide Web- SGML – XML Resources – Internet and World Wide Web resources. Creating Mark up with XML: Introduction – Parsers and well formed XML Documents – Parsing an XML Document - Characters – Mark up – CDATA Sections – XML Namespaces

Unit II

Document Type Definition – Parsers, Well formed and valid XML documents – Element type declarations – Attribute declarations- Attributes Types. Schemas:- Schemas VS DTD's – MSXML Schemas, W3C XML Schema –Declaring Types and Elements –Attribute constraints and Defaults - Simple type - Empty elements -Mixed content elements – Creating Attribute Groups

Unit III

Document Object Model: DOM implementations – DOM with JavaScript – Components- Creating nodes – Traversing the DOM. Simple API for XML: DOM vs SAX – SAX based Parsers.

Unit IV

XML Path Language: Nodes – Location Paths; XSLT: Templates - Creating Elements and attributes – Iteration and Sorting – Conditional Processing – Copying Nodes – Combining style sheets – variables. XLink, XPointer, XInclude and XBase.

Unit V

XML Technologies and Applications: XML Query Language – Directory Services Markup Language – Resources Definition Framework – XML topic Maps – Virtual Hyper Glossary – Channel Definition Format – Information and Content Exchange Protocol – Platform for Privacy preferences – XML Metadata Interchange.

Text Book

1. Deitel & Deitel. 2008. XML How to Program . 1st Edition, Pearson Education, New Delhi.

Reference Books

1. Ann Novarro, Chuck white, Linda Burman. 2000. Mastering XML, 1st Edition, BPB Publi, New Delhi.
2. Steve Holzner. 2001. Inside XML, 1st Edition, TechMedia, New Delhi.

Web Sites

1. en.wikipedia.org/wiki/XML
2. www.w3.org/XML/
3. www.w3schools.com/xml/default.asp

Course Objectives:

Enable the student

- Understand general concepts of transmission and wireless communication.
- Understand how mobility affects all layers of the Internet protocol stack, from the MAC layer up through the application layer.
- Understand the emerging applications enabled by wireless networks, and ad hoc mobile wireless networks.
- Work in groups to design and implement wireless applications.
- Routing protocols in WSN.
- Data centric and content-based networking.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand and explain common wireless sensor node architectures.
2. Be able to carry out simple analysis and planning of WSNs.
3. Demonstrate knowledge of MAC protocols developed for WSN.
4. Demonstrate knowledge of routing protocols developed for WSN.
5. Understand and explain mobile data-centric networking principles.
6. Be familiar with WSN standards.

Unit I

Mobile Data Introduction: The Rise of Mobile Data-Key Services for the Mobile Internet- Overview of the WAP-The origins of the WAP- WAP architecture-WAP Internal Structure- Components of the WAP Standards- WAP Gateways-Network Infrastructure Services Supporting WAP Clients-WAP Architecture Design Principles –Relationship with other standards.

Unit II

The Wireless Markup Language: Overview-The WML Document Model-WML Authoring-URLS Identity Content-Mark Up Basics- WML Basics-Basic Content-Events, Tasks and Binding.

Unit III

Variables –Other Content you can include-Controls-Miscellaneous Markup- Sending Information-Application Security-Other Data; The Meta element- Document Type Declarations- Errors and browsers Limitations-Content generation- WML Version Negotiation.

Unit IV

User Interface Design: Making Wireless Applications, Easy to Use- Website Design- Computer Terminals Vs Mobile Terminals-Designing a usable WAP site-structured usability method-user interface design guidelines- Design guidelines for selected WML Elements.

Unit V

Wireless Telephony Applications: Overview of the WTA Architecture- WTA Client Framework –WTA Server and Security- Design Considerations- Application Creation Tool Box- Future of WTA Enhancements.

The Mobile Internet Future: Better Content- Easier Access-Beyond Browsing – Beyond Cellular- Mobile Data Unleashed.

Text Book

1. Sandeep Singhal et al, 2007.The Wireless Application Protocol, 1st Edition. Pearson Education, New Delhi.
2. Charles Arehart-Nirmal Chidambarametal.Professional WAP, 1st Edition. Shroff Publishers & Distributers Pvt Ltd, New Delhi.

References

1. Dale BulBrook. 2004. WAP –A Beginner's Guide, 1st Edition. TMH Publication, New Delhi.
2. Ruseyev S. 2003. WAP Technology &Applications ,1st Edition. Eswar Publications, New Delhi.

Web Sites:

1. www.en.wikipedia.org/wiki/Wireless_Application_Protocol
2. www.wap.com
3. www.w3schools.com/wap/

Course Objectives:

Enable the students

- To design good performing distributed database schemas.
- To create optimized query execution plan.
- To efficiently distribute and manage the data.
- To manage distributed access control
- To know how to make secure the databases.
- To expose the students to the architecture, design, and implementation of massive-scale data systems.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Analyze the physical structure of the database to handle data
2. Apply the knowledge of design alternatives and fragmentation for data distribution
3. Demonstrate the concept of normalization of the database
4. Characterize the concepts of deadlock handling in real time transactions of database
5. Apply the knowledge of database security for protecting data security.
6. Apply concepts of distributed database theory including design and architecture, security, integrity, query processing.

Unit - I

Database concepts : Data Models- Database Operations- Database Management-DB Clients, COS Distribution and Deployment- COS Closedness or Openness-Schema and Data Visibility- Schema and Data Control.

Unit - II

Data Distribution Alternatives : Design Alternatives- Localized Data- Distributed Data. Fragmentation: Vertical Fragmentation- Horizontal Fragmentation. Distribution Transparency: Location Transparency-Fragmentation Transparency-Replication Transparency-Location, Fragmentation, and Replication Transparencies.

Unit - III

Query Optimization : Sample Database- Query Processing in Centralized Systems: Query Parsing and Translation - Query Optimization- Query Processing in Distributed Systems- Heterogeneous Database Systems - Concurrency Control in Distributed Database Systems.

Unit - IV

Deadlock Handling: Deadlock Definition- Deadlocks in Centralized Systems- Deadlocks in Distributed Systems- Distributed Deadlock Detection. Replication Control: Replication Control Scenarios. Failure and Commit Protocols: Terminology- Commit Protocols.

Unit - V

DDBE Security: Cryptography- Securing Data . Traditional DDBE Architectures: Classifying the Traditional DDBMS Architecture- The MDBS Architecture Classifications- Approaches for Developing A DDBE- Deployment of DDBE Software.

Text Book

1. Saeed K. Rahimi And Frank S. Haug. 2010. Distributed Database Management Systems :A Practical Approach. 1st Edition, A John Wiley & Sons, Inc., Publication.

References

1. Ceri.1985.Distributed Databases Principles and Systems , 1st Edition Mchraw Hill Pub.
2. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition , Pearson Education.
3. William M.NewMan, Robert F.Sproull, 2004, Principles of Interactive Computer Graphics, 1st Edition , Pearson Education.

Web Sites

1. en.wikipedia.org/wiki/Distributed_computing
2. www.webopedia.com/TERM/D/distributed_computing.html
3. www.tech-faq.com/distributed-computing.shtml

Course Objectives:

Enable the students

- Learn about IPv4 forwarding and routing.
- Learn about host name resolution and the Domain Name System (DNS).
- Learn about IPv6 addresses.
- know Architectural Overview of the TCP/IP Protocol Suite
- Learn the basics of the layered TCP/IP stack architecture for IPv4
- Learn the key protocols in the TCP/IP suite

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Explain TCP/IP protocols, ports, sockets, and data encapsulation
2. Demonstrate the process of packet fragmentation and reassembly
3. Explain the key features and functions of TCP and UDP
4. Apply the knowledge of DNS queries, name resolution, zone data transfers and reverse DNS queries
5. Analyze the knowledge of TCP/IP routing for the working of routing protocols
6. Knowledge of IPv6 address auto configuration works for stateless address auto configuration

Unit I

Introduction: WAN, WAN technologies - Internetworking concepts - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

Unit II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP : Types of Messages - Message Format – Error Reporting – Query – Checksum - ICMP Package

Unit III

Routing and Routed Protocols - Autonomous Systems – Routing Table - Interior Gateway Protocols – Exterior Gateway Protocols – Routing in Internet. Group Management – IGMP Message – IGMP Operation – Process to Process Communication.

Unit IV

UDP Operation – TCP Services - Flow Control – Multicast Routing – Multicast Routing Protocols. BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.

Unit V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells. Mobile IP : Addressing – Agents – Agent discovery – Registration – Data Transfer – VPN.

Text Books

1. Behrouz A. Forouzan. 2010. TCP/IP Protocol Suite. 4th Edition. New Delhi: Tata McGraw Hill Publication.

Reference Books

1. Douglas E. Comer. 2000. Internetworking With TCP/IP, Vol 1: Principles Protocols and Architecture. 4th Edition. New Delhi: Pearson Education.
2. William Stallings. 1997. Data and Computer Communication. 5th Edition. New Delhi: Prentice Hall of India.

Web Sites

1. en.wikipedia.org/wiki/Internet_protocol_suite
2. http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
3. www.yale.edu/pclt/COMM/TCPIP.HTM
4. www.w3schools.com/tcpip/default.asp

Course Objectives:

- Use object-oriented technologies
- Use Unified Modeling Language 2.2
- Perform object-oriented analysis and design
- Explain how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views.
- Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation
- Concepts of Object Oriented Analysis and Design to solve problems

Course Outcomes(COs):

Upon completion of this Course, student will be able to:

1. Understand of programming language concepts;
2. Demonstrate the software engineering principles and the ability to apply them to software design;
3. Apply the knowledge of OOAD to complete large software project
4. Analyze the deployment of UML diagrams for software design
5. Apply the principles of software engineering quality principles for developing quality software
6. Apply the process of Object Oriented Analysis and Design documents for a given problem using Unified Modelling Language

Unit-I

Complexity: The structure of complex systems-the inherent complexity of software-The five attributes of a complex system-Organized and Disorganized complexity-Bringing order to Chaos-On Designing complex systems. The Object model: The evolution of the object model-Foundations of the object model-Elements of the object model-Appling the object model.

Unit II

Classes and Objects: The nature of an object-Relationship among objects-The nature of a class- Relationships among classes-The interplay of classes and objects-On building quality classes and objects. Classification: The importance of proper classification-Identifying classes and objects-Key abstraction and mechanisms.

Unit III

Notation: The unified modeling language-Package diagrams-Component diagrams-Deployment diagrams-Use case diagrams-Activity diagrams-Class diagrams-Sequence diagrams-Interaction overview diagrams-Composite structure diagrams -State machine diagrams-Timing diagrams-Object diagrams-communication diagrams.

Unit IV

Process: First principles-The Macro Process: The software development lifestyle- The Micro Process: The analysis and design process. Pragmatics: Management and planning-Staffing-Release management-Reuse-Quality assurance and metrics-Documentation-Tools-Special Topics- The benefits and risks of Object Oriented development.

Unit V

Introduction: Development Process –Class diagrams: The Essentials-Sequence Diagrams-Class Diagrams: Advanced Concepts-Object Diagrams-Package Diagrams-Deployment Diagrams-Use Cases-State machine Diagrams-Activity Diagrams-Communication Diagrams.

Text Book

1. Grady Booch. 2001. Object Oriented Analysis and Design, 2nd Edition, Addison Wesley, New Delhi. [Unit 1 to 4]
2. Martin Fowler, Kendall Scott. 2004. UML Distilled, 2nd Edition, Pearson Education, New Delhi. [Unit 5]

Reference Books

1. James Rumbaugh, Ivar Jacobson and Grady Booch. 2003. The Unified Modeling Language Reference Manual, 1st Edition, Addison Wesley, New Delhi.

Web Sites

1. uml-tutorials.trireme.com/
2. <http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysis-and-Design/>
3. <http://community.sparxsystems.com/tutorials/object-oriented-analysis-and-design>

Course Objectives:

Enable the student

- Be able to describe the interoperable web services architecture
- Able to know the roles of SOAP and WSDL.
- Use lower-level SOAP and XML APIs for services and/or clients.
- Build and Host Web Services.
- Able to understand the web services architectures
- Learn the standard APIs

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand the use of web services in B2C and B2B applications.
2. Understand the design principles and application of SOAP and REST based web services.
3. Design collaborating web services according to a specification.
4. Implement an application that uses multiple web services in a realistic business scenario.
5. Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse
6. Develop , test, deploy and execute web services and web applications .

Unit I

Introduction: What are Web Services – Importance of web services – Web services and enterprises; XML Fundamentals:: XML Documents - Namespaces – Schema – Processing XML.

Unit II

SOAP: SOAP Model – messages – Encoding – RPC – Alternative SOAP encodings – Document, RPC, Literal, Encoded – SOAP, Web Services and the REST Architecture
WSDL: Structure – Using SOAP and WSDL. UDDI- UDDI Business Registry – Specification – Data Structures – Life cycle Management – Dynamic Access Point Management.

Unit III

Advanced Web Services Technologies and Standards: Conversation – Overview – Web Services Conversation Language – WSCL Interface Components- Workflow-Business Process Management – Workflow and Workflow Management systems – BPEL. Transaction –ACID transaction – Distributed Transaction – OASIS Business Transaction Protocol.

Unit IV

Security – Security Basics – Security Issues – Types of Security Attacks – WS –Security.
Mobile and Wireless – Mobile Web Services – Challenges with mobile – Proxy Based
Mobile Systems -Direct Mobile Web service access - J2ME Web Services.

Unit V

Building Real World Enterprise Web Service and Applications: Real World Web Service
Application Development – Development of Web services and Applications onto Tomcat
application Server and Axis Soap Server.

Text Book

1. Sandeep Chatterjee, James Webber. 2009. Developing Enterprise Web Services: An Architect's Guide, 4th Edition, Pearson Education, New Delhi.

Reference Books

1. Martin Kalin, 2013, 2nd Edition Java Web Services: Up and Running, O'Reilly Media, USA.
2. Vikram Ramchand, Sonal Mukhi, 1st Edition, 2008, XML WebServices and SOAP , BPB Publications, New Delhi.
3. Eric A Marks and Mark J Werrell. 1st Edition, 2003. Executive Guide to Web Services, John Wiley and Sons, New Delhi.

Web Sites

1. www.w3schools.com/webservices/default.asp
2. en.wikipedia.org/wiki/Web_service
3. www.webservices.org/

Course Objectives:

Enable the students

- To understand sensor network architectures
- Select appropriate routing algorithms for different network environments
- The various security practices and protocols of Ad-hoc and Sensor Networks.
- Deploy security mechanisms in the wireless ad-hoc and sensor networks
- To teach students the various fundamental layers in ad-hoc network, the issues pertaining to major obstacles in establishment
- To understand efficient, management of ad-hoc and sensor networks and applications of ad-hoc and sensor networks.

Course Outcomes(COs):

Upon completion of this Course, student will be able to:

- Analyze the architecture, merits and demerits of Wireless technologies like Infra Red, blue tooth, Wi-Fi, RFID and Wi-Max .
- Characterize the principles of mobile technologies like GPRS, GSM, CDMA, and TDMA
- Compare the characteristics and techniques MANET with VANET
- Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation wireless technologies.
- Apply the features of Android programming for developing Android Applications
- Understand and explain common wireless sensor node architectures.

Unit I

Adhoc Networks Fundamentals And Mac Protocols- Fundamentals Of WLANs – IEEE 802.11 Architecture - Self Configuration And Auto Configuration Issues In Ad-Hoc Wireless Networks – MAC Protocols For Ad-Hoc Wireless Networks – Contention Based Protocols - TCP Over Ad-Hoc Networks-TCP Protocol Overview - TCP And MANETs – Solutions For TCP Over Ad-Hoc Networks

Unit II

Routing in Ad hoc Networks - Introduction - Topology-Based versus Position-Based Approaches - Topology-Based Routing Protocols - Proactive Routing Approach - Reactive Routing Approach - Hybrid Routing Approach - Comparison - Position-Based Routing - AD HOC & SENSOR NETWORKS - Principles and Issues - Location Services - Forwarding Strategies - Comparisons - Other Routing Protocols - Signal Stability Routing - Power Aware Routing - Associativity-Based Routing - QoS Routing

Unit III

Broadcasting, Multicasting and Geocasting - Introduction - The Broadcast Storm - Broadcasting in a MANET - Flooding-Generated Broadcast Storm - Rebroadcasting Schemes - Multicasting - Issues in Providing Multicast in a MANET - Multicast Routing Protocols - Comparison - Geocasting - Geocast Routing Protocols

Unit IV

TCP over Ad Hoc Networks - Introduction - TCP Protocol Overview - Designed and Fine-Tuned to Wired Networks - TCP Basics - TCP Header Format - Congestion Control - Round-Trip Time Estimation - TCP and MANETs - Effects of Partitions on TCP - Impact of Lower Layers on TCP - Solutions for TCP over Ad Hoc - Mobility-Related - Fairness-Related

Unit V

Security in Ad Hoc and Sensor Networks: Security Requirements - Security Solutions Constraints - Challenges - Authentication - Key Management - Conceptual Background - Diffie-Hellman Key Agreement -Party Diffie-Hellman Key Agreement - The Ingemarsson Protocol - The Burmester and Desmedt Protocol - The Hypercube Protocol - The Octopus Protocol - The CLIQUES Protocol Suite -The Tree-based Generalized Diffie-Hellman Protocol- Routing - Problems with Existing Ad Hoc Routing Protocols - Detect and Isolate Misbehaving Nodes - Information Leaking on Network Topology - Concealing Network Topology - Secure Routing Protocol - The Wormhole Attack. Intrusion Detection Systems: Overview - Unsuitability of Current IDS Techniques - An IDS Architecture for Ad Hoc and Sensor Networks.

Text Books

1. Carlos De Moraes Cordeiro, Dharma Prakash Agrawal, 2011. Ad Hoc and Sensor Networks: Theory and Applications, 2nd Edition, World Scientific Publishing Ltd.

Reference Books

1. Holger Karl, Andreas willig, 2005. Protocols and Architectures for Wireless Sensor Networks, John Wiley & Sons, Inc .
2. 5. Erdal Çayırcı , Chunming Rong, 2009 .Security in Wireless Ad Hoc and Sensor Networks, John Wiley and Sons,
3. 6. Waltenegus Dargie, Christian Poellabauer, 2010 .“Fundamentals of Wireless Sensor Networks Theory and Practice”, John Wiley and Sons,
4. 10. Amiya Nayak, Ivan Stojmenovic, 2010. Wireless Sensor and Actuator Networks Algorithm and Protocols for Scalable Coordination and Data communication ,John Wiley & Sons

Web sites

1. en.wikipedia.org/wiki/Wireless_ad_hoc_network
2. searchmobilecomputing.techtarget.com/definition/ad-hoc-network
3. www.cs.jhu.edu/~cs647/intro_adhoc.pdf

Course Objectives:

Enable the students

- Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications
- Understand the fundamental concepts of XML and related technologies
- Acquire knowledge on how XML is currently being used in various application areas
- Know how to parse and transform XML documents via tools and through programming APIs
- Understand the EJB architecture and have a good grasp on when to use and how to use various EJB bean types and acquire relevant Java programming experience
- Learn Java web programming with J2EE.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Develop Swing-based GUI
2. Update and retrieve the data from the databases
3. Develop distributed applications using RMI
4. Develop component-based Java software using JavaBeans
5. Develop server side programs in the form of servlets
6. To understand object-oriented programming with J2EE.

Lists of Programs:

1. Create a sign in form in servlets.
2. Write a servlet Program to lock a server.
3. Write a servlet program that returns list of information in table format.
4. Design a counter that counts number of times user has visited the site in current browsing session.
5. Write a program to retrieve cookies information
6. Build a JAVA Bean for opening an applet from JAR file.
7. Write a program to add controls in BEAN.
8. Design a counter in JAVA BEAN.
9. Write a program to stream contents of a file using JSP.
10. Write a program to insert a menu applet into JSP page.

Text Book

1. Jim Keogh. 2008. The Complete Reference J2EE, 1st Edition, Tata McGraw Hill Edition, New Delhi .

Reference Books

1. Joseph J Bambaraetal. 2001. J2EE Unleashed, 1st Edition, Tech Media.
2. Paul J Perrone, Venkata S R R Chaganti, S .R.Venkata Krishna, R Chaganti and Tom Schwenk. 2003. J2EE Developer's Handbook, Sams Publications.
3. Rod Johnson. 2004. J2EE Development without EJB, 1st Edition, Wiley Dream Tech India, New Delhi.
4. Rod Johnson. 2004.Expert One-On-One J2ee Design and Development , John Wiley & Sons, Incorporated.

Web Sites

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/

Instruction Hours / week: L: 0 T: 0 P: 4 C : 2 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

Enable the student

- Become a good .NET programmer.
- Know how COM components and the .NET Framework interoperate with each other.
- Identify and use the classes and namespaces in the .NET Framework class library.
- Build WEB Applications using Microsoft ASP.NET programming.
- Understanding the components of the .NET Framework and the common language runtime (CLR)
- Know how COM components. Also provides better knowledge of Architecture

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Able to analyze program requirements
2. Develop programs with GUI interfaces
3. Code programs and develop interface using Visual Basic .Net,C#.Net,ASP.Net
4. Perform tests, resolve defects and revise existing code.
5. Able to develop projects using ASP .NET
6. Able to apply all the window controls.

List of Programs:**VB.Net**

1. Write a Program to perform various string manipulation functions.
2. Using windows application form, Develop a program to create a form, place controls and manipulate data.
3. Write a program to create inventory control using class library.
4. Write a program to create Web Services Using Vb.Net.
5. Write a program to create a screen saver using controls
6. Create an ActiveX program with simple example.
7. Using windows Application: Design Employee Details, use Sql Server as back end and also use checked list box.

Asp.Net

1. Write a program to create an on-line quiz using content page holder.
2. Write a program to retrieve Cookies information.
3. Write a program to count web page hits.
4. Write program to retrieve environment variables browser capability information.
5. Write a program for database connectivity to retrieve student information

Text Books

1. Evangelos Petroustos, Mastering Visual Basic.Net, BPB Publications, New Delhi.
2. Bill Evjen, Scott Hanselman , Devin Rader, Farhan Muhammad and S.Srinivasa Sivakumar. 2006. Professional ASP.net 2.0, Special Edition.

Reference Books

1. Dave Mercer, ASP.Net Beginner's Guide . 2003. 2nd Edition McGraw Hill, New Delhi.
2. Duncan Mackenzie Kent Sharkey. 2006. Sams Teach yourself Visual Basic.JNet, 1st Edition, McGraw Hill, NewDelhi.
3. Shirish Chavan. 2007. Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.

Web Sites

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.w3schools.com/ngws/default.asp
4. www.vbtutot.com

Course Objectives:

- Install and configure database
- Create users and assign roles
- Optimize schemas, tables, indexes and views
- Manage database services and clients
- Will be able to move the data from one database to another database.
- To keep database operational

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Design a data mart or data warehouse for any organization
2. Develop skills to write queries using DMQL
3. Extract knowledge using data mining techniques
4. Adapt to new data mining tools.
5. Explore recent trends in data mining such as web mining, spatial-temporal mining
6. Knowledge of monitoring performance of tasks

List of Programs:

1. Demo for Globalization Support
2. Setup Listener Security
3. Configuring Recovery Manager
4. Write a program Using Recovery Manager
5. Write a program for Managing Diagnostic Sources
6. Implement Database Recovery
7. Demo for Flashback Database
8. Implement User Error Recovery
9. Write a program for Dealing with Corruption
10. Show the demo for Automated Management
11. Creating a database and do the manipulation.
12. Managing index tables

Text Book

1. Bob Bryla, Kevin Loney 2008 Oracle Database 11g DBA Handbook McGraw-Hill Osborne

Reference Book

1. Saikat Basak. 2010. Oracle DBA Concise Handbook ,Ensel Software

Web Sites :

1. www.oracle.com/technology/software/products/database/oracle10g/index.html
2. www.oracle-base.com/articles/10g/
3. www.adp-gmbh.ch/ora/misc/10g.html

Course Objectives:

Enable the student

- To teach fundamental aspects of security in a modern networked environment with the focus on system design aspects and cryptography in the specific context of network.
- To build protection mechanisms in order to secure computer networks.
- Write coding to encrypt “Plain Text” into “Cipher Text” and vice versa, using different encryption algorithms.
- The ability to choose a suitable ciphering algorithm according to the required security level.
- Build cryptosystems by applying encryption algorithms,
- Build secure authentication systems by use of message authentication techniques.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Demonstrate the basic concepts of system level security
6. Understand the goals, issues, technologies, algorithms, protocols and design criteria used in cryptography and data security and solution.

List of Programs:

1. Write a program to convert your college name from plain text to cipher text using Transposition cipher method of encryption.
2. Write a program to convert your name from plain text to cipher text using the One Time Pads method of encryption.
3. Write a program to encrypt a paragraph using the Data Encryption Standard Algorithm.
4. Write a program to encrypt your biodata using the Advanced Encryption Standard Algorithm.
5. Write a program to decrypt the “Network Security” theory syllabus using the RSA Algorithm.
6. Write a program that takes a binary file as input and performs bit stuffing and Cyclic Redundancy Check Computation.
7. Write a program to Simulate the working of Sliding-Window protocol.
8. Write a program to find the shortest path in a network using Dijkstra's Algorithm.
9. Write a program to implement the Token Bucket Algorithm for Congestion Control.

10. Write a program for the following chat application:

One to One : Open a Socket connection and display what is written by one to another.

Many to Many : Each Client Opens a Socket connection to the client server and writes to the socket. Whatever is written by one can be seen by all. Implement symmetric key cryptography.

Text Book

1. William Stallings. 2013. Cryptography and Network Security, 6th Edition. Pearson Education, New Delhi.

Reference Books

1. Bruce Schneir. 2006. Applied Crptography, 2nd Edition. CRC Press, New Delhi.
2. A.Menezes, P.Van Oorschot and S.Vanstone.2010.Hand Book of Applied Cryptography, 2nd Edition. CRC Press, NewDelhi.
3. Ankit Fadia.2010. Network Security, 2nd Edition. McMillan India Ltd, New Delhi:2003.

Web Sites

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. www.flipkart.com/search-books/cryptography+and+network+security+William+stallings+ebook

Course Objectives:

- To perform test each time they are run, thereby eliminating human error.
- To test how the software reacts under repeated execution of the same operations.
- To program sophisticated tests which bring out hidden information from the application.
- To reuse tests on different versions of an application, even if the user interfaces changes.
- to provide stakeholders with information about the quality of the product or service under test.
- To know the Types of errors and fault models

Course Outcomes (COs):

Upon completion of this Course, student will be able to:

1. Test the software by applying testing techniques to deliver a product free from bugs
2. Evaluate the web applications using bug tracking tools.
3. Investigate the scenario and the able to select the proper testing technique
4. Explore the test automation concepts and tools
5. Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
6. Various test processes and continuous quality improvement

Software Testing

1. Create a VB form with the following fields and create the database also for them. Insert 3 records. Using Win Runner tool record the above 3 transaction and test them and produce the Report. (Blackbox Testing).
2. Create a VB form and then add login dialog form. Using Win Runner tool check the Username and Password and produce the Report. (Security testing).
3. Create a VB form with the following fields and check the calculation is correct or not by using the test toll Win Runner. (Functional Testing) Fields – Name, Designation, Department, Basic, HRA, DA, PF and netsal.
4. using Win Runner test tool check the database values after changing. Using Flight database. (Regression testing).
5. Write a C program for Boundary Testing.
6. Write a C program for Loop Testing.
7. Write a C program for Integration Testing.
8. Write a C program for Interface Testing.
9. Write a C program for Unit testing.

Software Quality Assurance

1. To develop a banking application, perform the requirement analysis and give a quality status report.
2. Perform the system testing to develop a electricity application and give a quality status report.
3. Perform the report design and give a quality status report.
4. Develop a library management system and give a quality status report.
5. Develop a hospital management system and a quality status report and give a comparison performance report in Linux and windows operating system.

Text Books

1. Boris Beizer , 2003, Software Testing Techniques, II Edn., DreamTech India, New Delhi. (Unit – I, II, III, IV)
2. Marnie L Hutcheson , 2003 software testing fundamentals I Edn, Wiley, DreamTech India, New Delhi. (Unit – V)

Reference Books

1. Burnstein, 2003, Practical Software Testing, Springer International Edn.
2. E. Kit, 1995, Software Testing in the Real World: Improving the Process, Pearson Education, Delhi.
3. R.Rajani, and P.P.Oak, 2004, Software Testing, Tata Mcgraw Hill, New Delhi.

Web sites

1. <http://my.safaribooksonline.com>
2. <http://www2.sas.com>
3. <http://www.softwaretesting fundamentals.com>
4. www.cs.cmu.edu
5. www.softwaretesting management.con

Course Objectives:

Enable the student

- Be aware of a range of XML tools (Many of them are free).
- Know how to set out an XML document
- Define custom markup language
- Understand the purpose of using DTDs and Schemas to validate XML
- Use XSLT to write a style sheet for XML document to produce multiple output
- Combine XML with existing web technologies.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand the use of web services in B2C and B2B applications.
2. Understand the design principles and application of SOAP and REST based web services.
3. Design collaborating web services according to a specification.
4. Implement an application that uses multiple web services in a realistic business scenario.
5. Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them.
6. to learn how to create websites using XML, understand the essentials of the XML standards.

List of Programs:

1. Create a menu in XML.
2. Create a demo for XSLT.
3. Display XML information in Tree structure format.
4. Integrate XML in Web Applications
5. Write a program to navigate the records in the file.
6. Write a database access with XML.
7. Write a program to save data to an XML file.
8. Write a program to show the function of CDATA.
9. Write a program to generate XML file on the server.
10. Write a program to generate XML file from the Database
11. Write a program to load a text file into a div element with XML HTTP.
12. List data from an XML file with XML HTTP.

Text Book

1. Deitel & Deitel. 2008. XML How to Program . 1st Edition, Pearson Education, New Delhi.

Reference Books

1. Ann Novarro, Chuck white, Linda Burman. 2000. Mastering XML, 1st Edition, BPB Publi, New Delhi.
2. Steve Holzner. 2001. Inside XML, 1st Edition, TechMedia, New Delhi.

Web Sites

1. en.wikipedia.org/wiki/XML
2. www.w3.org/XML/
3. www.w3schools.com/xml/default.asp

Instruction Hours / week: L: 0 T: 0 P: 4 C :2 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

- Understand general concepts of transmission and wireless communication.
- Understand how mobility affects all layers of the Internet protocol stack, from the MAC layer up through the application layer.
- Understand the emerging applications enabled by wireless networks, and ad hoc mobile wireless networks.
- Work in groups to design and implement wireless applications.
- Routing protocols in WSN.
- Data centric and content-based networking.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Understand and explain common wireless sensor node architectures.
2. Be able to carry out simple analysis and planning of WSNs.
3. Demonstrate knowledge of MAC protocols developed for WSN.
4. Demonstrate knowledge of routing protocols developed for WSN.
5. Understand and explain mobile data-centric networking principles.
6. Be familiar with WSN standards.

List of Programs:

1. Demonstrate the creation of output files for Xgraph.
2. Illustrate NS2 script to send data between two nodes.
3. Create a simple simulation topology to generate TCP and UDP traffic
4. Simulate a NS2 scenario to handle link failures.
5. Write a NS2 script to handle Multicast traffic.
6. Demonstrate OSPF routing.
7. Create a simulation topology and analyze QOS parameters.
8. Demonstrate the creation of wireless topology.

Text Book

1. Sandeep Singhal et al, 2007. The Wireless Application Protocol, 1st Edition. Pearson Education, New Delhi.
2. Charles Arehart-Nirmal Chidambarametal. Professional WAP, 1st Edition. Shroff Publishers & Distributors Pvt Ltd, New Delhi.

References

1. Dale BulBrook. 2004. WAP –A Beginner’s Guide, 1st Edition. TMH Publication, New Delhi.
2. Ruseyev S. 2003. WAP Technology &Applications ,1st Edition. Eswar Publications, New Delhi.

Web Sites:

1. www.en.wikipedia.org/wiki/Wireless_Application_Protocol
2. www.wap.com
3. www.w3schools.com/wap/

Course Objectives:

Enable the student

- Understand the fundamentals of HTML
- Use of different formatting options
- Creation of tables and frames
- Know the importance of object oriented aspects of Scripting.
- To understand and practice embedded dynamic scripting on client side Internet Programming
- Relate with DHTML and CSS

Course Outcomes(COs)

Upon completion of this course, student will be able to :

1. Design web pages.
2. Use technologies of Web Programming.
3. Apply object oriented aspects to Scripting.
4. Create a basic website using HTML and Cascading Style Sheets.
5. Design and implement dynamic web page with validation using JavaScript objects and by applying different event handling mechanisms.
6. Design structure of the website including the information architecture, the layout or the pages and the conceptual design with branding.

Unit-I : HTML: Introduction to HTML- History Of HTML-Structure of HTML-Formatting Text :Font type, Font Size, Big ,Small, bold ,italic, color, superscript , Subscript, striking out, Underlining the text , Predefined fonts , Pre formatted Text, Blinking Text and Block Quotes. Lists: Ordered, Unordered and Definition List. Creating Link - Images.

Unit-II :Tables: Creating Table –Dividing Table into Columns- Dividing Table into RowsCreating Headers- Adding Border –Putting a Background Image- Heading across two or more columns- Changing color of the cell-aligning the content –Display of Tables. Frames-Forms: Working with forms-Creating forms-working with menus- working with Radio buttons- check boxes-textboxes-text areas- password boxes-submit buttonResetting the form.

Unit-III :DHTML: Heading and Horizontal line-Hidden Message-Message at the center of the page- Moving Boxes- Changeable Box- CSS: Introduction- Creating Style Sheets - Common Tasks with CSS- Colors-The Font Family.

Unit-IV :JavaScript: Introduction-Operators-Starting with JavaScript- Using Quotes-Using Alerts Functions-Variables-data types- Statements-Comments.

Unit-V

Objects: Working with Objects- Date Object-Math Object-String Object--Handling Events in JavaScript-Event Handling attributes-Window Events-Window Object – Document Object-Navigator Object

Text Book

1. Ramesh Bangia. 2008. Web Technology, 1st Edition, Firewall Media Publications, New Delhi.

References

1. Deitel H.M., P.J.Deitel and A.B.Goldberg. 2007. Internet & World Wide Web, 3rd Edition, Pearson Education Asia, New Delhi.
2. Jeffrey C. Jackson. 2007. Web Technologies, 3rd Edition, Pearson Education Publishers, New Delhi.

Web Sites

1. www.w3schools.com/
2. alexle.net/archives/category/web-technolgy

Course Objectives:

- Identify key elements of the cloud computing
- Understand and appreciate the need for cloud computing, and identify their use in industrial applications
- Analyse the current issues in cloud computing
- Develop an in-depth understanding of selected parts of the material
- Public cloud, private cloud and hybrid clouds
- Security and Privacy issues in the Cloud

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Elaborating the basic concepts of cloud computing and defining the basic terms
2. Understanding the various cloud implementations and migration techniques
3. To define the various industrial applications of cloud virtualization.
4. In depth learning of security challenges and preventive measures in cloud computing
5. Practical implementation of cloud computing and live case studies
6. Understand the cloud computing technologies for Infrastructure as a Service, Platform as a Service, Software as a Service, Physical Systems as a Service and cloud security.

Unit I

Introduction to Cloud Computing -Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards- Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

Unit II

Virtualization Technologies -Load Balancing and Virtualization -Advanced load balancing - The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

Unit III

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

Unit IV

Cloud Information Security Objectives -Confidentiality, Integrity, and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad

Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations

General Issues- Trusted Cloud Computing -Identity Management and Access Control

Unit V

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2- Google Web services.

Text Book

- 1.Barrie Sosinsky .2010. Cloud Computing Bible, Wiley- India
- 2.Rajkumar Buyya, James Broberg, Andrzej M Goscinski. 2011. Tata Mc-Graw Hill, New Delhi.
3. Ronald L. Krutz, Russell Dean Vines. 2010. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley -India

Reference Book

1. Dr Kumar Saurabh.2012. Cloud Computing, 2nd Edition, Wiley India.
2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. 2010. Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
3. Nikos Antonopoulos, Lee Gillam. 2012. Cloud Computing: Principles, Systems and Applications, Springer.

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx

Course Objectives: To help students to

- Get hands-on experience in scripting, debugging, testing.
- Establish a working environment for PHP web page development
- Use variables, constants, and environment variables in a PHP program
- Learn to create dynamic interactive pages with PHP.
- Learn to manipulate files with PHP.
- Understand how MySQL works.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.
2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
3. Analyze and solve various database tasks using the PHP language.
4. Create server side web applications using PHP and MySQL
5. Implement SQL to output reports with MySQL
6. design a client-side programming

Unit I

Creating a Simple PHP Programs: How PHP Code Works- How Online PHP Programs Run Web; Communications: Internet Protocols and HTTP: TCP/IP- The HTTP Protocol; Using Variable in PHP Issues concerning Creating Variables-Defined Constants; Operators and Expressions: PHP Operators – PHP Expressions- Operators Types- Arrays

HTML Primer: The HTML Document type definition- The Form and Input Elements; Accessing PHP and HTTP Data: Predefined Variables- Variables in HTTP Request and Response- Super Global Arrays; Links; Query Strings; HTML(Web) Forms; HTML Form Elements-HTML Form Fields(Controls) and PHP; The Concept Of State: State Maintenance- Native Sessions in PHP.

Designing PHP Program Logic: Problem Statement- Writing Pseudo Code- Boolean Logic; Conditional Or Branching Statements: if statements- Switch statements- Loops and Arrays: Loops- Arrays.

Unit II

Testing and Debugging: Values that break your code- Basic error types; Debugging PHP Script: Understanding PHP error Messages- Syntax Errors- Logic Errors- Runtime Errors; Debugging and Handling Errors in PHP5: Preventing the display of private information-

Roll your-Own Debugging tools; Form Validation: Using the Exit statement- string validation and regular expressions- validating data entry- using reg exps to check file path parameters; Handling Errors: Gracefully- Configuring PHP for error handling- Try/Catch-New in PHP5.

Development planning: Formal software Development processes – optimizing your code- Using Coding standard; Writing user-defined functions in PHP: The Structure of Functions- Switching Functions – How Values Get Inside functions; Scope of variables: Global and Local Variables-Creating Static Function Variable-Nesting-Recursion-The Include and Require Statements-Things to be careful about with include and require.

Unit III

Files and Directories: Files and Directory Handling- Working with Files- Opening and Closing files-Getting Information about a file-reading and writing to files-Reading and writing characters in files-Reading Entire files-Random Access to file data-Getting Information on Files-Ownership and permissions; Working with files you own: Splitting the Name and path from a file-copying ,renaming and deleting files; Working with Directories: other Directory Functions –Traversing a directory hierarchy-creating a directory navigator-Building a Text Editor-Uploading Files.

Classes- Objects: Creating class- Adding a Method- Adding a Property- Protecting Access to Member Variables- Using `_get` and `_set`- Initializing objects- Destroying Objects-Inheritance- Overriding Methods- Interfaces- Encapsulation

Unit IV

The SQL Framework- Managing databases-Creating & Managing tables- Managing indexes; Inserting & Updating data in a MYSQL database-Deleting & Retrieving data from a MySQL database; SELECT statement- Optional clauses of a SELECT statement; Creating MySQL Expressions-using operators in expressions-Comparing and Converting Data; Managing different types of data: String functions-Numeric function- Date/Time functions-Summarizing date-Summary functions

Performing System Operations: Encryption functions- System related Functions- Query and Insert Functions; Accessing data from Multiple tables: Creating joins in your SQL statement- Creating subqueries in your SQL statements; Creating Unions that join SELECT statements.

Exporting, Copying and importing data; Managing transactions: Introducing transactions-Performing a transaction- Setting the auto commit mode and transaction isolation level-Locking Nontransactional tables

Unit V

Connecting to MySQL from a PHP application- Inserting and updating records in table-Deleting and retrieving data from table- Creating a user Registration Script. Structure of an E-Mail Message-sending E-mail with PHP- Working with Raster Images- Manipulating Raster Images- Using Text in Images

Text Book

1. Dave W.Mercer, Allan Kent, Steven D.Nowicki, Davd Mercer, Dan Squie, Wankyu Choi.2009. Beginning PHP5. Wiley India (P) Ltd, New Delhi

Reference Books

1. Luke welling, Laura Thomson, 2010. PHP and MySQL Web Development, 4th Edition, Pearson Education.
2. Julie Meloni . 2012. Sams Teach Yourself PHP, MySQL and Apache All in One, 5th Edition, Pearson Education India.
3. Paul Dubois. 2006. MySQL, 1st Edition, Tech Media, New Delhi.
4. Tim Converse & Joyce Park with Clark Morgan . 2006. PHP5 & MySQL Bible, 1st Edition, John Wily, India.
5. Baron Schwartz, Peter Zaitsev, Vadim Tkachenko. 2012 High Performance MySQL: Optimization, Backups, 3rd Edition, O'REILLY.

Web Sites

1. www.php.net/
2. en.wikipedia.org/wiki/PHP
3. www.w3schools.com/PHP/DEfaULT.asP

Course Objectives:

Enable the students

- The principles of mobile computing technologies;
- Knowledge of applications that mobile computing offers to people, employees, and businesses;
- Knowledge of GPRS network architecture and services .
- Future of mobile computing technologies and applications.
- Able to design, create, deploy, and test applications for the mobile phone platform.
- To explain how Android applications work, their life cycle, manifest, Intents, and using external resources.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Analyze the architecture, merits and demerits of Wireless technologies like Infra Red, blue tooth, Wi-Fi, RFID and Wi-Max .
2. Characterize the principles of mobile technologies like GPRS, GSM, CDMA, and TDMA
3. Compare the characteristics and techniques MANET with VANET
4. Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation wireless technologies.
5. Apply the features of Android programming for developing Android Applications
6. Implement a program in the Android environment.

Unit I

Mobile Computing- Middleware and Gateways-Developing Mobile Computing Applications-Security in Mobile Computing – Architecture of Mobile Computing-Three-Tier Architecture-Design Consideration for Mobile Computing-Mobile Computing through Internet- Mobile Computing through Telephone-Developing an IVR Applications

Unit II

Bluetooth-Rfid-Wireless Broadband (WiMax)- Mobile IP – IPV6-Java Card –Global System for Mobile Communications – GSM Architecture – Call Routing in GSM – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocation – Authentication and Security- Mobile Computing Over SMS – SMS-Value Added Services through SMS.

Unit III

GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations –Data Services in GPRS- Applications for GPRS – Limitations of GPRS- Spread Spectrum Technology- CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G – Wireless LAN Advantages – Wireless LAN Architecture- Mobility in Wireless LAN –Deploying Wireless LAN – Wireless LAN Security.

Unit IV

Mobile Phones – PDA- Design Constraints in Applications for Handheld Devices – Palm OS Architecture – Communications in Palm OS – Introduction to Symbian – Symbian OS Architecture– Applications for Symbian – Security on the Symbian OS- JAVA in the Handset – Java 2 Micro Edition Technology – Different Flavours of Windows CE- Windows CE Architecture.

Unit V

Android : Getting to know Android - Android development environment - Android development environment for real applications - start up code, M J Android applications- debugging Android applications

Text books

1. Ashok K Talukder and Roopa R Yuuvagal, 2005 “Mobile Computing”, Tata McGraw Hill Publishing Company Limited. [Unit I,II,III,IV]
2. R.Roger, J Lombarddo, Z Mednieks and B. Meike, 2010, Android Applications Development, O'Reilly, Shroft Publishers & Distributors Pvt Ltd, New Delhi. [Unit V]

Reference Books

1. JochenSchiller, Mobile Communication, Addison Wesley, 2000.
2. Brian Fling , Mobile Design and Development, O'Reilly Media, Inc 2009
3. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
4. Ivan Stojmenovic, 2002, HANDBOOK OF WIRELESS NETWORKS AND MOBILE COMPUTING, A WILEY-INTERSCIENCE PUBLICATION.
5. Asoke K. Talukder, Roopa R. 2011. Mobile Computing: technology, applications, and service creation, New Delhi : Tata McGraw Hill.

Websites:

1. en.wikipedia.org/wiki/Mobile_computing
2. www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
3. www.tutorialspoint.com/android/
4. pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf

Course Objectives:

To help the students

- To Possess knowledge of the concepts and terminology associated with database systems, statistics, and machine learning
- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research.
- to teach the techniques for preprocessing data before mining
- To know the concepts related to data warehousing, on-line analytical processing (OLAP)
- To know the data generalization.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. To understand the data mining process of voluminous data using OLAP
2. To implement the preprocessing concept in data mining applications
3. To apply the data mining algorithms on big data to extract useful data
4. To implement data mining techniques for complex data types
5. To implement Decision Support System concept in data mining for developing intelligence business application.
6. To Understand the methods for mining frequent patterns, associations, and correlations.

Unit I

Introduction to Data Mining: Motivation and importance, Data Mining, Relational Databases, Data Warehouses, Transactional Databases, Advanced Database Systems and Advanced Database Applications, Data Mining Functionalities, Pattern Classification of Data Mining Systems, Major issues in Data Mining. Pre-process the Data- Data Cleaning, Data Integration and Transformation.

Unit II

Classification and Regression Algorithms : Naïve Bayes – Multiple Regression Analysis – Logistic Regression – k-Nearest Neighbour Classification – GMDH –Computing and Genetic Algorithms. Support Vector Machines : Linear SVM - SVM with soft margin – Linear kernel – Proximal SVM – Generating Datasets.

Cluster Analysis : Partitional Clusterings – k-medoids – Birch – DBSCAN – Optics – Graph Partitioning – CHAMELEON – COBWEB – GCLuto.

Unit III

Mining Association rule in large Databases Association Rule Mining, Mining Single - Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Dataware houses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Unit IV

Mining Complex Types of Data : Mining Spatial Databases – Multimedia Databases – Time-series and Sequence Data – Text Databases – Web Data Mining – Search Engines.

Unit V

Data Warehouse and OLAP Technology for Data Mining. What is a Data Warehouse? Multi-Dimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Development of Data Cube Technology, Data Warehousing to Data Mining Data Preprocessing Data Warehousing: Failures of past Decision Support System- Operational vs. DSS- Building blocks: features- Data warehouse and Data Mart- Overview of the Components- Metadata Architectural Components: Distinguishing Characteristics- Architectural Framework- Technical Architecture.

Text Books

1. Jiawei Han and Micheline Kamber. 2011 . Data Mining Concepts and Techniques, 3rd Edition, Elsevier, India (Unit I, III, IV, V)
2. G.K.Gupta .2006. Prentice Hall India, New Delhi . Introduction to Data Mining with Case Studies (Unit – IV)
3. Soman.K.P, Shyam Divakar and V. Ajay. 2008. Insight to Data Mining- Theory and Practical, Prentice Hall India, New Delhi. (Unit – II)

Reference Books

1. Gupta.G.K. 2006. Introduction to Data Mining with Case Studies, Prentice Hall India, New Delhi .
2. Kantardzic, Mining Concepts, Models, Methods and Algorithms, IEEE Press – A John Wiley & Sons.
3. Paulraj Ponniah. 2008.Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals, John Wiley & Sons, New Delhi.
4. Professionals, John Wiley & Sons, New Delhi.

Web Sites:

1. www.wikipedia.org/wiki/Data_mining
2. www.anderson.ucla.edu/faculty/jason.frand/teacher/technologies/palace/datamining.htm
3. www.thearling.com/text/dmwhite/dmwhite.htm

Course Objectives:

- Understand concepts and terminology associated with SNMP and TMN
- Decide routing protocol for complex network.
- Gain knowledge the internal architecture of routers
- Understand the fundamentals and requirements for packet routing in computer communication network.
- To teach the concepts and techniques of network architecture management
- Know how to Remote Network Monitoring in TCP/IP Networks

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. To solve the problems in computer network system management
2. To analyze the challenges in the implementation of ATM networks
3. To implement SNMP Model in the management of computer networks
4. To configure routers using computer network software tools
5. To implement service level agreement in Computer Network management systems
6. To implement the architecture behind standards based network management

Unit I

Introduction: Objectives - Component architectures – Reference architecture – Architectural models; Addressing and Routing Architecture: Addressing mechanisms – Routing mechanisms – Addressing strategies – Routing strategies – Architectural considerations; Network Management Architecture: Defining Network Management – Network Management Mechanism - Architectural considerations; Performance Architecture; Developing goals – Performance mechanisms – Architectural considerations

Unit-II

Security And Private Architecture: Developing a security and privacy plan – Security and privacy Administration & Mechanism - Architectural considerations; Selecting Technologies for the Network Design: Goals – Design Concepts – Design Process – Vendor, Equipment and Service-Provider Evaluations – Network Layout – Design Traceability - Design Metrics.

Unit-III

Case history of Networking and Management: Challenges of Information Technology Managers – Goals, organization and functions – Network and System Management – Network Management System Platform; SNMP, Broadband and TMN Management: Network Management Standards & Model – Organization, Information and Communication Model – ASN.1 – Encoding structure – Macros – Functional model; Organization and Information Model: Managed Networks – The History of Network Management – Internet Organization and standards – SNMP Model – The Organization and Information Model; Communication and Functional Model: The SNMP Communication Model – Functional Model.

Unit-IV

SNMPv2 Management: Major changes – System architecture – Structure of Management Information – Management Information Base – SNMPv2 protocol – Compatibility; RMON: Remote monitoring – RMON1 – RMON2 – ATM remote monitoring; Broadband Network Management: ATM Networks - Network and Services – ATM Technology – ATM Network Management; Telecommunication Management Network: Operations systems – Conceptual model – Standards – Architecture – TMN Management service architecture – Integrated view of TMN – Implementation issues.

Unit-V

Network Management Tools and Systems: Network management tools – Network statistics measurement system – Network Management Systems – System Management; Network Management Applications: Configuration Management - Fault Management - Performance Management – Security Management – Accounting Management – Report Management - Policy Based Management – Service Level Management.

Text Books

- James D. Mc CABE. 2010 Network Analysis, Architecture and Design, 3rd Edition, Morgan Kaufmann Publishers.

Reference Books

1. Mani Subramanian. 2012. Network Management Principles and Practice, Pearson Education Asia Pvt. Ltd., 2nd Edition.
2. William Stallings. 2002. SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd Edition, Pearson Education Asia Pvt. Ltd.

Course Objectives:

To help students to

- Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
- Implement software.
- Analyze, specify and document software requirements for a software system.
- Express and understand the importance of negotiation, effective work habits, leadership
- Understand the good communication with stakeholders, in written and oral forms, in a typical software development environment.
- Understand the concept and techniques of project management for a broad range of systems

Course Outcomes (COs):

Upon completion of this Course, student will be able to:

1. Implement the concept of software effort estimation in developing software project.
2. Develop a responsible attitude towards the use of computer as well as the technology.
3. Evaluate the risks during the development of software projects
4. Understand the organization behavior in software project management.
5. Implement team management process in developing quality software
6. Apply project management concepts and techniques to an IT project.

Unit I

Introduction-Software Project Management -Project evaluation and programme Management- An overview of Project planning- Stepwise planning-Selection of an appropriate project Approach.

Unit II

Software effort estimation: Problems with over- and underestimates-Software effort estimation Techniques - Estimating by analogy -Albrecht function point analysis -Function points Mark II –COSMIC full function points - COCOMO 13: a parametric productivity model. Activity planning: The Objectives of activity Planning-Project schedules - Projects and activities - Sequencing and scheduling activities - Network planning models - Formulating a network model - Adding the time dimension - The forward pass - The backward pass - Identifying the critical path.

Unit III

Risk management: Introduction to Risk - Categories of risk - A framework for dealing with risk -Risk identification - Risk assessment - Risk planning - Risk management - Evaluating risks to the schedule - Applying the PERT technique - Monte Carlo simulation - Critical

chain concepts. Resource allocation :-Introduction -The nature of resources - Identifying resource requirements -Scheduling resources -Creating critical paths -Counting the cost - Being specific -Publishing the resource schedule - Cost schedules -The scheduling sequence.

Unit IV

Monitoring and control: Creating the framework-Collecting the data- Visualizing progress- Cost monitoring -Earned value analysis-Prioritizing monitoring - Getting the project back to target - Change control. Managing people in software environments: Understanding behavior -Organization behavior: a background - Selecting the right person for the job - Instruction in the best methods - Motivation - Stress -Health and safety -Some ethical and professional concern

Unit V

Working in teams: Becoming a team - Decision making - Organizational structures - Coordination dependencies - Dispersed and virtual teams - Communication genres - Communication plans - Leadership. Software quality: Introduction -The place of software quality in project planning - The importance of software quality - Defining software quality - ISO 9126 -Product versus process quality management -Quality management systems - Process capability models -Techniques to help enhance software quality -Testing -Quality plans

Text Book

1. Bob Hughes and Mike Cotterell.2011. Software Project Management, 5th Edition, New Delhi: Tata McGraw Hill.

Reference Book

1. Royce.2000. Software Project Management, 1st Edition, New Delhi: Addison Wesley.
2. Kelkar, "Software Project Management", 3rd edition, Prentice Hall India,2012

Web sites

1. http://en.wikipedia.org/wiki/Software_project_management
2. <http://www.onesmartclick.com/engineering/software-engineering.html>
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Instruction Hours / week: L: 4 T: 0 P: 0 C : 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

To help students to

- Develop server-side Ruby scripts for publishing on the Web
- Employ control structures, methods, procs, arrays and hashes to create Ruby programs
- Distinguish and use various Ruby datatypes
- Master the use of arrays and hashes
- Use the extensive pre bundled classes
- Use the I/O facilities of Ruby to read and write binary and text files

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Master the use of Iterators to loop through various data structures
2. Use Exceptions in handling various run time errors
3. Create Ruby modules
4. Use the wide variety of Ruby Modules that come with the Ruby distribution
5. Use object-oriented programming conventions to develop dynamic interactive Ruby applications
6. fundamental components of the Ruby Programming Language

Unit I

Introduction to Ruby: Installing Ruby - THE STRUCTURE AND EXECUTION OF RUBY PROGRAMS: Lexical Structure- Syntactic Structure - Block Structure in Ruby- File Structure - Program Execution. DATA TYPES: Numbers - Text - String Literals - Character Literals - String Operators - Accessing Characters and Substrings - Iterating Strings – Arrays – Hashes – Ranges – Symbols – True & False – Ruby Documentation: RDoc and ri.

Unit II

STATEMENTS AND CONTROL STRUCTURES: Conditionals – Loops - Iterators and Enumerable objects: custom iterators – enumerators – External iterators – Blocks: Variable scope – passing argument to blacks. Flow-altering statements like return and break- The special-case BEGIN and END statements. CLASSES : Creating and initializing class – Accessor and attributes – class methods – class variables – Defining operators. SUBCLASSING AND INHERITANCE: visibility – Overriding methods. OBJECTS: Object creation and initialization.

Unit III

METHODS: Defining a Method, Calling a Method; Undefined methods – Methods with Exception – Operator methods and names – Method Arguments – Method objects - Defining Attribute Accessor Methods - Dynamically Creating Methods. **EXCEPTIONS AND EXCEPTION HANDLING:** Hierarchy – Exception classes and objects – Raising Exception with raise – Handling Exception with rescue – Exception propagation – Else clause and ensure class.

Unit IV

MODULES: Namespaces - Modules as Mixins - Includable Namespace Modules - Loading and Requiring Modules - Executing Loaded Code. **Reflection and Meta programming:** Evaluating Strings and Blocks - Querying, Setting, and Testing Variables – Regular Expressions. **FILES AND DIRECTORIES:** Listing and manipulating Directories and testing files. **BASIC INPUT AND OUTPUT:** Opening Stream – Reading from a Stream – Writing to a stream – Random Access Methods – Closing, Flushing and testing streams.

Unit V

THREADS AND PROCESSES: Thread Life Cycle – Thread scheduling – Thread Exclusion – Deadlock. **Ruby Tk:** Introduction- Widgets and classes. **Networks:** A Very Simple Client - A Very Simple Server – Datagram - A Multiplexing Server - Fetching Web Pages. **Ruby on Rails:** Building a development Environment: Installation – Installing Databases – Code editors – web server Configuration – Creating an web application.

Text Books:

1. Dave Thomas, Andrew Hunt, 2013, Programming Ruby 1.9 & 2.0: The Pragmatic Programmers Guide 2nd Edition, The Pragmatic Bookshelf.

References:

1. David Flanagan, 2008, "The Ruby Programming Language", 1st Edition, O'Reilly Media.
2. Eldon Alameda 2011 "Practical Rails Projects" Apress, Berkeley, CA, USA.
3. David Black, 2006, "Ruby for Rails", Manning Publications.

Web sites :

1. http://www.tutorialspoint.com/ruby/ruby_tk_guide.htm
2. www.finner.org/tips/Languages/Ruby
3. www.troubleshooters.com/codecorn/ruby/basictutorial.htm
4. www.ruby-lang.org/en/documentation/quickstart

Course Objectives:

- To know the fundamental concepts of Wireless Communication Systems.
- To learn the latest technology of Mobile Communication.
- To provide a strong foundation in the field of Wireless Networks.
- To know about the various IEEE Standards.
- To know the transfer information over short distance or long distances
- To develop the application of wireless technology in today's world.

Course Outcomes (COs):

Upon completion of this Course, student will be able to:

1. Create a Sensor network environment for different type of applications
2. Design ad-hoc and sensor network architectures using QoS and Congestion control
3. mechanisms
4. Apply appropriate routing algorithms for different network environments
5. Analyze the working of ad-hoc and sensor network for various applications
6. Deploy security mechanisms in the wireless ad-hoc and sensor networks.

Unit I

Introduction-Wireless Transmission -Signal Propagation - Spread Spectrum - Satellite Networks - Capacity Allocation – FAMA - DAMA - MAC

Unit II

Mobile Networks-Cellular Wireless Networks - GSM-Architecture – Protocols - Connection Establishment - Frequently Allocation – Routing – Handover – Security – GPRA.

Unit III

Wireless Networks-Wireless LAN - IEEE 802.11 Standards – Architecture - Services-AdHoc Network- HiperLan - Blue Tooth Technology.

Unit IV

Routing -Mobile IP – DHCP - AdHoc Networks - Proactive and Reactive Routing Protocols - Multicast Routing – Sensor Networks.

Unit V

Transport and Application Layers-TCP over Ad Hoc Networks - WAP-Architecture - WWW Programming Model-WDP - WTLS - WTP – WSP – WAE - WTA Architecture – WML - WML scripts.

Text Books

1. William Stallings.2010.Wireless Communications and Networks, 5th Edition, Pearson Education

Reference Books

1. C.Puttamadappa, Subir Kumar Sarkar, T. G. Basavaraju.2013.Ad Hoc Mobile Wireless Networks: Principles, Protocols, and Applications, 2nd Edition,CRC Press.
2. Benvenuto.2011.Principles of Communications Networks and Systems, 2nd Edition, Wiley India Pvt. Ltd.
3. Jochen Schiller. 2003. Mobile Communications, 2nd Edition, Pearson Education

Course Objectives: To impart to students the skills required

- To design scalable systems that can accept, store, and analyze large volumes of unstructured data.
- Fundamentals of big data analytics
- Methodologies used in storing, manipulating, and analyzing big data.
- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, No Sql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Analyze the big data analytic techniques for useful business applications.
2. Implement the concept of virtualization and abstraction in analyzing big data
3. Analyze the HADOOP and Map Reduce technologies associated with big data analytics
4. Understand the fundamentals of various bigdata analysis techniques
5. Implement the integration of data sources in operationalizing Big Data
6. Analyze the concept to solve complex real-world problems in for decision support.

Unit-I

Fundamentals of Big Data - The Evolution of Data Management Understanding the Waves of Managing Data- Defining Big Data - Big Data Management Architecture- The Big Data Journey -Big Data Types-Defining Structured Data-Defining Unstructured Data-Putting Big Data Together.

Unit-II

Big Data Stack- Basics of Virtualization - The importance of virtualization to big data - Server virtualization - Application virtualization - Network virtualization -Processor and memory virtualization - Data and storage virtualization-Abstraction and Virtualization-Implementing Virtualization to Work with Big Data.

Unit-III

Hadoop - Hadoop Distributed File System - Hadoop MapReduce- The Hadoop foundation and Ecosystem.

Unit-IV

Big Data Analytics-Text Analytics and Big Data-Customized Approaches for Analysis of Big Data

Unit-V

Integrating Data Sources-Real-Time Data Streams and Complex Event Processing-Operationalizing Big Data.

Text Book

1. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman. 2013. Big Data For Dummies, Wiley India, New Delhi.

References

1. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan. 2012. Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, New Delhi.
2. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author). 2013. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, New Delhi.
3. Zikopoulos, Paul, Chris Eaton. 2011 .Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, New Delhi.

Web Sites

1. www.oracle.com/BigData
2. www.planet-data.eu/sites/default/files/Big_Data_Tutorial_part4.pdf
3. www.ibm.com/developerworks/data
4. www.solacesystems.com
5. en.wikipedia.org/wiki/Big_data
6. www.sap.com/solution/big-data.html

Course Objectives:

To help students to

- Understand the architecture and topology of network
- Understand the design process of a distributed systems
- Examine distributed and parallel computing operating system
- Know the need and challenges of distributed database
- to distinguish between local programming (on a single machine) and distributed programming using multiple components via a network
- To develop the applications in a distributed parallel computing environment.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Distinguish between distributed computing and parallel computing
2. Understand concepts of SOA.
3. Demonstrate different cloud technologies
4. Designing security and storage in cloud technologies.
5. Demonstrate the understanding of advance data communication technologies
6. Demonstrate the understanding of protocol used for management of network.

UNIT – I

Introduction : Distributed Computing – Relation to multiprocessor and multi computer systems-message passing systems versus shared memory systems – primitives for distributed computing. Distributed Computations : distributed program – global state of a distributed system – models of process communications.

UNIT – II

Message ordering and Group Communication : message ordering paradigm – Asynchronous execution with synchronous communication – classification of application level multicast algorithm – distributed multicast algorithm at the network layer.

UNIT – III

System model for distributed computation – termination detection using distributed snapshots – termination detection in a faulty distributed system – Distributed mutual execution algorithm : Lamport's algorithm – Token Based algorithm – Raymond's tree-based algorithm.

UNIT – IV

DeadLock : system model – models of deadlocks – knapp's classification of distributed deadlock detection algorithms – chandy model – stable and unstable predicates – distributed algorithms for conjunctive predicates .

UNIT – V

Distributed shared memory : Abstraction – memory consistency – shared memory mutual execution – register hierarchy and wait free simulations- issues in failure recovery – check point based recovery – Authentication : protocols – password-based authentication-authentication protocol failures.

Text Book

1. Ajay. D. Kshemkalyani and Mukesh Singhal. Distributed Computing: Principles, Algorithms and Systems.

References Books

1. Uyless D. Black, 2004, “Data Communication and Distributed Networks”, 3rd Edition, Prentice hall of India, New Delhi.
2. Joel M Crichlow, 1998, “An Introduction to Distributed and Parallel Computing”, 1st Edition, Prentice – Hall Publication, New Delhi.

Web Sites

1. wikipedia.org/wiki/Distributed_computing
2. www.webopedia.com/TERM/D/distributed_computing.html
3. www.tech-faq.com/distributed-computing.shtml

**Instruction Hours / week: L: 4 T: 0 P: 0 C: 4 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**

Course Objectives: To help students to

- Understand the basic terminology and state fundamental facts about software metrics and process models.
- Identify the essential elements of a given metric or model, describe the interrelationships among its various elements
- Understand software process assessment cycles, complexity metrics and models.
- basis for the development and validation of models of the software development process
- to improve software productivity and quality.
- To understand the role and functioning of various system programs over application program.

Course Outcomes (COs):

Upon completion of this Course, student will be able to:

1. To analyze the importance of modeling and modeling languages
2. To apply the basic quality tools in software development
3. Analyze the software process metrics in the process of software testing
4. Implement function point metrics to measure software process improvement
5. Explain the business requirements pertaining to software development.
6. Identify risks, manage the change to assure quality in software projects.

Unit I

Introduction:- software quality-popular views-the role of the customer-software quality-Total quality management.Software development process models-the spiral model-iterative Development process-The Cleanroom Methodology-Process Maturity Framework and Quality standards. Fundamentals of Measurement theory-Level of measurement-Reliability and validity-Measurement Errors

Unit-II

Applying the seven basic quality tools in software development-Defect removal effectiveness-The rayleigh model-Exponential distribution and reliability growth models-Quality management models

Unit-III

In-process metrics for software testing-Complexity metrics and models-Metrics and lessons learned for object oriented projects-Availability metrics

Unit-IV

Measuring and analyzing customer satisfaction-Conducting in-process quality assessments

Unit-V

Software project assessments-Dos and don'ts of software process improvement-Using function point metrics to measure software process improvement-Concluding remarks

Text Books:

1. Stephen H.Kan . Metrics And Models In Software Quality Engineering. 2013. SECOND EDITION , Pearson India.

Reference Book

1. Norman Fenton, Software Metrics: A Rigorous and Practical Approach, Third Edition (Chapman & Hall/CRC Innovations in Software Engineering and Software Development Series) 2014
2. C. Ravindranath Pandian, Software Metrics: A Guide to Planning, Analysis, and Application, .2003Paperback.

Course Objectives:

- To represent data from a chosen problem in XML with appropriate semantic tags obtained or derived from the ontology.
- To understand the semantic relationships among these data elements using Resource.
- To design and implement a web services application that “discovers” the data and/or other Description Framework (RDF).web services via the semantic web
- Able to discover the capabilities and limitations of semantic web technology for many applications.
- to discover, classify and build ontology for searching.
- To build and implement a small ontology that is semantically descriptive of chosen problem domain.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
2. To have an appreciation for the engineering issues underlying the design of AI systems.
3. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
4. To have an understanding of the basic issues of knowledge representation.
5. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.
6. implement applications that can access, use and manipulate the ontology.

Unit I

Introduction : Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies –Semantic Modeling - Potential of semantic web solutions and challenges of adoption

Unit II

Ontological Engineering: Ontologies – Taxonomies –Topic Maps – Classifying Ontologies – Terminological aspects: concepts, terms, relations between them – Complex Objects – Subclasses and Sub-properties definitions – Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building – Methods and methodologies for building ontologies – Multilingual Ontologies -Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning

Unit III

Structuring And Describing Web Resources :Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing - RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modeling for Combinations and Patterns- Transitivity

Unit IV

Web Ontology Language :OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – Owl Logic.

Unit V

Semantic Web Tools And Applications :Development Tools for Semantic Web – Jena Framework – SPARL –Querying semantic web - Semantic Wikis - Semantic Web Services – Modeling and aggregating social network data - Ontological representation of social relationships, Aggregating and reasoning with social network data Understand semantic web basics, architecture and technologies

TEXT BOOK:

1. Grigoris Antoniou, Frank van Harmelen. 3rd Edition 2012. A Semantic Web Primer.,MIT Press, USA

REFERENCES:

1. Liyang Yu, “A Developer's Guide to the Semantic Web”, Springer, First Edition, 2011
2. John Hebel, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, “Semantic Web Programming”, Wiley, First Edition, 2009.
3. Robert M. Colomb, “Ontology and the Semantic Web”, Volume 156 Frontiers in Artificial Intelligence and Applications (Frontier in Artificial Intelligence and Applications), IOS Press, 2007.
4. Dean Allemang and James Hendler, “Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Morgan Kaufmann”, Second Edition, 2011.
5. Karin Breitman, Marco Antonio Casanova and Walt Truszkowski, “Semantic Web: Concepts, Technologies and Applications (NASA Monographs in Systems and Software Engineering)”, Springer, Softcover, 2010.

Instruction Hours / week: L: 4 T: 0 P: 0 C: 4**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3Hours****Course Objectives:**

- To understand about the ATM protocols
- To learn the latest technology ATM network.
- To provide a strong foundation in routing issues.
- To know about the various Real Time Transport Protocol.
- To introduce issues related to traffic engineering and capacity planning.
- To make learners aware about advances in computer networking technologies.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Analyze ATM in terms of the technology as well as how it is applied to real-life applications.
2. .Identify appropriate algorithm to be applied for the various application like geometric modeling, robotics, networking, etc.
3. Analyze various algorithms.
4. Demonstrate the understanding of WAN Technology typically ATM .
5. Analyze issues of traffic requirements and perform capacity planning.
6. Demonstrate the understanding of protocol used for management of network.

Unit I

Introduction : ATM – Historical Perspective – Protocol Architecture – Logical Connections – Cells – Transmission of ATM Cells – SDH – SONET – Switches.

Unit II

ATM Protocol: Connection Setup – Routing Switching , Signaling , ATM Service Categories – QOS Parameters – Adaptation Layer.

Unit III

Routing Issues: Routing for High Speed Networks – RSVP, Traffic and Congestion Control – Achieving QOS – Traffic Shaping – Generic Cell Rate Algorithms – Rate Based Congestion Control – Connection Admission Control.

Unit IV

High Speed LANs: Fast Ethernet – ATM LAN's – LANE.

Unit V

Protocols Over ATM: Multiple Protocols Over ATM, IP Over ATM , TCP Over ATM – Real Time Transport Protocol – Wireless ATM – Current Trends.

Text Books

1. Rainer Handel, Manfred N.Huber, Stefan Schroder.1999.ATM Networks, Addison Wesley,1999.

References

1. William Stallings.1998.High Speed Networks TCP/IP and ATM Design Principles,Prentice Hall International.
2. Uyles Black.1999. ATM Vol.1 and 2,PHP TR.
3. William Stallings.1999. ISDN with Broad Lane ISDN with Frame Relay and ATM”,PHI,Fourth Edition.

Course Objectives:

To help students to

- Get hands-on experience in scripting, debugging, testing.
- Establish a working environment for PHP web page development
- Use variables, constants, and environment variables in a PHP program
- Learn to create dynamic interactive pages with PHP.
- Learn to manipulate files with PHP.
- Understand how MySQL works.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Implement regular expressions in PHP programming including modifiers, operators, and meta characters.
2. Create PHP programs that use various PHP library functions, and that manipulate files and directories.
3. Analyze and solve various database tasks using the PHP language.
4. Create server side web applications using PHP and MySQL
5. Implement SQL to output reports with MySQL
6. design a client-side programming

List of Programs:

1. Design an online loan application form.
2. Design a form to submit your resume in net.
3. Design an application for Library Management System
4. Design form for online reservation in air ways.
5. Design form for online shopping
6. Design an application for creating an online Advertisement.
7. Design an application for student Information System.
8. Design an application to display cookies information.
9. Write a program for display environment variables in MySQL.
10. Write a program to count web page hits.
11. Design an email form that validates the inputs, produces errors when inputs are typed incorrectly, and send an email to you when submitted.
12. Design an application to upload multiple files

Text Book

1. Dave W.Mercer, Allan Kent, Steven D.Nowicki, Davd Mercer, Dan Squie, Wankyu Choi.2009. Beginning PHP5. Wiley India (P) Ltd, New Delhi

Reference Books

1. Luke welling, Laura Thomson, 2010. PHP and MySQL Web Development, 4th Edition, Pearson Education.
2. Julie Meloni . 2012. Sams Teach Yourself PHP, MySQL and Apache All in One, 5th Edition, Pearson Education India.
3. Paul Dubois. 2006. MySQL, 1st Edition, Tech Media, New Delhi.
4. Tim Converse & Joyce Park with Clark Morgan . 2006. PHP5 & MySQL Bible, 1st Edition, John Wily, India.
5. Baron Schwartz, Peter Zaitsev, Vadim Tkachenko. 2012 High Performance MySQL: Optimization, Backups, 3rd Edition, O'REILLY.

Web Sites

1. www.php.net/
2. en.wikipedia.org/wiki/PHP
3. www.w3schools.com/PHP/DEfaULT.asP

Course Objectives:

To impart to students

- The principles of mobile computing technologies;
- Knowledge of applications that mobile computing offers to people, employees, and businesses;
- Knowledge of GPRS network architecture and services .
- future of mobile computing technologies and applications.
- Able to design, create, deploy, and test applications for the mobile phone platform.
- To explain how Android applications work, their life cycle, manifest, Intents, and using external resources.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Analyze the architecture, merits and demerits of Wireless technologies like Infra Red, blue tooth, Wi-Fi, RFID and Wi-Max .
2. Characterize the principles of mobile technologies like GPRS, GSM, CDMA, and TDMA
3. Compare the characteristics and techniques MANET with VANET
4. Analyze technology of 1G, 2G, 3G and 4G for gaining the working knowledge of four generation wireless technologies.
5. Apply the features of Android programming for developing Android Applications
6. Implement a program in the Android environment.

List of Programs:

1. Write a program to build your first Android Application “Hello World” with common activity.
2. Write a program which will implement Sub menu in android application.
3. Write a program which will implement Context menu (Floating List of Menu Items) in android application.
4. Write a program to display the use of Relative Layout Views with different attributes.
5. Write a program to display the use of Linear Layout Views with different attributes.
6. Write a program to implement a Custom Button and handle the display message on button press.
7. Write a program to implement the List View in your android application.
8. Write a program to implement between animations and rotate the text in your android application.
9. Write a sample program to create a progress bar for your android applications.
10. Write a program to show how to use Date picker control of ADK in your android applications.

11. Write a program which enables you to draw an image using bitmap class object.
12. Write a program which allows you to get image from web and displayed them using the Image View.

Text books

1. Ashok K Talukder and Roopa R Yuuvagal, 2005 “Mobile Computing”, Tata McGraw Hill Publishing Company Limited. [Unit I,II,III,IV]
2. R.Roger, J Lombarddo, Z Mednieks and B. Meike, 2010, Android Applications Development, O’Reilly, Shroft Publishers & Distributors Pvt Ltd, New Delhi. [Unit V]

Reference Books

1. JochenSchiller, Mobile Communication, Addison Wesley, 2000.
2. Brian Fling , Mobile Design and Deevlopment, O’Reilly Media, Inc 2009
3. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley, 1993.
4. Ivan Stojmenovic, 2002, HANDBOOK OFWIRELESS NETWORKS AND MOBILE COMPUTING, A WILEY-INTERSCIENCE PUBLICATION.
5. Asoke K. Talukder, Roopa R. 2011. Mobile Computing: technology, applications, and service creation, New Delhi : Tata McGraw Hill.

Websites:

1. en.wikipedia.org/wiki/Mobile_computing
2. www.cse.iitk.ac.in/users/rkg/Talks/mobile_main.pdf
3. www.tutorialspoint.com/android/
4. pl.cs.jhu.edu/oose/resources/android/Android-Tutorial.pdf

Course Objectives:

To help the students

- To Possess knowledge of the concepts and terminology associated with database systems, statistics, and machine learning
- To develop skills of using recent data mining software for solving practical problems.
- To gain experience of doing independent study and research.
- to teach the techniques for preprocessing data before mining
- To know the concepts related to data warehousing, on-line analytical processing (OLAP)
- To know the data generalization.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. To understand the data mining process of voluminous data using OLAP
2. To implement the preprocessing concept in data mining applications
3. To apply the data mining algorithms on big data to extract useful data
4. To implement data mining techniques for complex data types
5. To implement Decision Support System concept in data mining for developing intelligence business application.
6. To Understand the methods for mining frequent patterns, associations, and correlations.

List of Programs:

1. Use the following learning schemes, with the default settings to analyze the weather data (in weather.arff). For test options, first choose "Use training set", then choose "Percentage Split" using default 66% percentage split. Report model percent error rate
2. Using iris dataset preprocess and classify it with J4.8 and Naïve Bayes Classifier. examine the tree in the Classifier output panel
3. Using the datasets *ReutersCorn-Train* and *ReutersGrain-Train*. Classify articles using binary attributes and word count attributes.
4. Apply any two association rule based algorithm for the supermarket analysis
5. Using weka Experimenter perform comparison analysis of J48, oneR and ID3 for vote dataset
6. Using Weka Experimenter perform comparison analysis of Naïve Bayes with different datasets
7. Apply ZeroR, OneR, and J48, to classify the Iris data in an experiment using 10 train and test runs, with 66% of the data used for training and 34% used for testing.

8. Using Weka Knowledge flow Set up a flow to load an ARFF file (batch mode) and perform a cross-validation using J48 (WEKA's C4.5 implementation).
9. Draw multiple ROC curves in the same plot window, using J48 and RandomForest as classifiers.
10. Use any three clustering algorithm on Vehicle data set and find best among them
11. Perform Preprocessing, feature selection and apply any one of the algorithm each from clustering, Association and classification to find their performance
12. Examine the performance of different filters for the breast cancer dataset

Text Books

1. Jiawei Han and Micheline Kamber. 2011 . Data Mining Concepts and Techniques, 3rd Edition, Elsevier, India (Unit I, III, IV, V)
2. G.K.Gupta .2006. Prentice Hall India, New Delhi . Introduction to Data Mining with Case Studies (Unit – IV)
3. Soman.K.P, Shyam Divakar and V. Ajay. 2008. Insight to Data Mining- Theory and Practical, Prentice Hall India, New Delhi. (Unit – II)

Reference Books

1. Gupta.G.K. 2006. Introduction to Data Mining with Case Studies, Prentice Hall India, New Delhi .
2. Kantardzic, Mining Concepts, Models, Methods and Algorithms, IEEE Press – A John Wiley & Sons.
3. Paulraj Ponniah. 2008.Data Warehousing Fundamentals: A Comprehensive Guide for IT
4. Professionals, John Wiley & Sons, New Delhi.

Web Sites:

1. www.wikipedia.org/wiki/Data_mining
2. www.anderson.ucla.edu/faculty/jason.frand/teacher/technologies/palace/datamining.htm
3. www.thearling.com/text/dmwhite/dmwhite.htm

Instruction Hours / week: L: 0 T: 0 P: 4 C: 2 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives:

- Understand concepts and terminology associated with SNMP and TMN
- Decide routing protocol for complex network.
- Gain knowledge the internal architecture of routers
- Understand the fundamentals and requirements for packet routing in computer communication network.
- To teach the concepts and techniques of network architecture management
- Know how to Remote Network Monitoring in TCP/IP Networks

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. To solve the problems in computer network system management
2. To analyze the challenges in the implementation of ATM networks
3. To implement SNMP Model in the management of computer networks
4. To configure routers using computer network software tools
5. To implement service level agreement in Computer Network management systems
6. To implement the architecture behind standards based network management

List of Programs:

1. Simple router configuration.
2. Access and utilize the router to set basic parameters.
3. Connect, configure, and verify operation status of a device interface.
4. Implement static and dynamic addressing services for hosts in a LAN environment.
5. Identify and correct common problems associated with IP addressing and host configurations.
6. Describe basic routing concepts (including: packet forwarding, router lookup process).
7. Configure, verify, and troubleshoot RIPv2.
8. Perform and verify routing configuration tasks for a static or default route given.
9. Configure, verify and troubleshoot DHCP and DNS operation on a router.
10. Configure and verify a PPP connection between routers.

Text Books

1. James D. Mc CABE. 2010 Network Analysis, Architecture and Design, 3rd Edition, Morgan Kaufmann Publishers.

Reference Books

1. Mani Subramanian. 2012. Network Management Principles and Practice, Pearson Education Asia Pvt. Ltd., 2nd Edition.
2. William Stallings. 2002. SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd Edition, Pearson Education Asia Pvt. Ltd.

Course Objectives:

To help students to

- Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
- Implement software.
- Analyze, specify and document software requirements for a software system.
- Express and understand the importance of negotiation, effective work habits, leadership
- Understand the good communication with stakeholders, in written and oral forms, in a typical software development environment.
- Understand the concept and techniques of project management for a broad range of systems

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Implement the concept of software effort estimation in developing software project.
2. Develop a responsible attitude towards the use of computer as well as the technology.
3. Evaluate the risks during the development of software projects
4. Understand the organization behavior in software project management.
5. Implement team management process in developing quality software
6. Apply project management concepts and techniques to an IT project.

List of Programs:

Prepare a more detailed, organized and easy-to-read documentation, for any application software, which should describe the following using Moodle tool:

1. User Requirement Documentation (USD)
2. Requirement Analysis Documentation. (RAD)
3. User Interfaces Specification. (UIS)
4. Object Oriented Design (OOD) or Low Level Design (LLD)
5. Code Documentation (CD)
6. Testing Documentation (TD)
7. User's Guide (UG)

Text Book

1. Bob Hughes and Mike Cotterell.2011. Software Project Management, 5th Edition, New Delhi: Tata McGraw Hill.

Reference Book

1. Royce.2000. Software Project Management, 1st Edition, New Delhi: Addisison Wesley.
2. Kelkar, “Software Project Management”, 3rd edition, Prentice Hall India,2012

Web sites

1. http://en.wikipedia.org/wiki/Software_project_management
2. <http://www.onesmartclick.com/engineering/software-engineering.html>
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Course Objectives:

To help students to

- Develop server-side Ruby scripts for publishing on the Web
- Employ control structures, methods, procs, arrays and hashes to create Ruby programs
- Distinguish and use various Ruby datatypes
- Master the use of arrays and hashes
- Use the extensive pre bundled classes
- Use the I/O facilities of Ruby to read and write binary and text files

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Master the use of Iterators to loop through various data structures
2. Use Exceptions in handling various run time errors
3. Create Ruby modules
4. Use the wide variety of Ruby Modules that come with the Ruby distribution
5. Use object-oriented programming conventions to develop dynamic interactive Ruby applications
6. fundamental components of the Ruby Programming Language

List of Programs:

1. Write a ruby program to perform basic array and hash operations
2. Write a code to choose random numbers and find the behaviour of the number
3. Develop a program which gets raised when you handle an exception
4. Write a ruby code to display grade sheet of students using case.
5. Write a ruby program to evaluate polynomial.
6. Write a ruby program to draw box and fill with special characters.
7. Write a program to copy each line from input file to output file.
8. Write a program to create a button and fill the button with colors.
9. Write a program to create different color balls and make it bounce on window.
10. Write ruby program to display notebook widget.
11. Develop a ruby program to manipulate text with font color and images.
12. Write ruby program to create a main thread and execute multiple process through the main thread.
13. Write a ruby code to display color pallet and open dialog with the help of tk controls.

14. Design an application form using tk classes and validate all fields on Rails framework.

Text Books:

1. Dave Thomas, Andrew Hunt, 2013, Programming Ruby 1.9 & 2.0: The Pragmatic Programmers Guide 2nd Edition, The Pragmatic Bookshelf.

References:

1. David Flanagan, 2008, "The Ruby Programming Language", 1st Edition, O'Reilly Media.
2. Eldon Alameda 2011 " Practical Rails Projects" Apress, Berkeley, CA, USA.
3. David Black, 2006, "Ruby for Rails", Manning Publications.

Web sites :

1. http://www.tutorialspoint.com/ruby/ruby_tk_guide.htm
2. www.finner.org/tips/Languages/Ruby
3. www.troubleshooters.com/codecorn/ruby/basictutorial.htm
4. www.ruby-lang.org/en/documentation/quickstart

Course Objectives:

- To know the fundamental concepts of Wireless Communication Systems.
- To learn the latest technology of Mobile Communication.
- To provide a strong foundation in the field of Wireless Networks.
- To know about the various IEEE Standards.
- To know the transfer information over short distance or long distances
- To develop the application of wireless technology in today's world.

Course Outcomes(COs)

Upon completion of this Course, student will be able to:

1. Create a Sensor network environment for different type of applications
2. Design ad-hoc and sensor network architectures using QoS and Congestion control
3. mechanisms
4. Apply appropriate routing algorithms for different network environments
5. Analyze the working of ad-hoc and sensor network for various applications
6. Deploy security mechanisms in the wireless ad-hoc and sensor networks.

List of Programs:

1. AM Modulation
2. AM Demodulation
3. FM Modulation
4. FM Demodulation
5. Pulse Amplitude Modulation and Detection
6. Pulse Width Modulation
7. Pulse Position Modulation and Detection
8. Pulse Code Modulation and Detection
9. Amplitude Shift Keying and Detection
10. Frequency Shift Keying and Detection

Text Books

1. William Stallings.2010.Wireless Communications and Networks, 5th Edition, Pearson Education

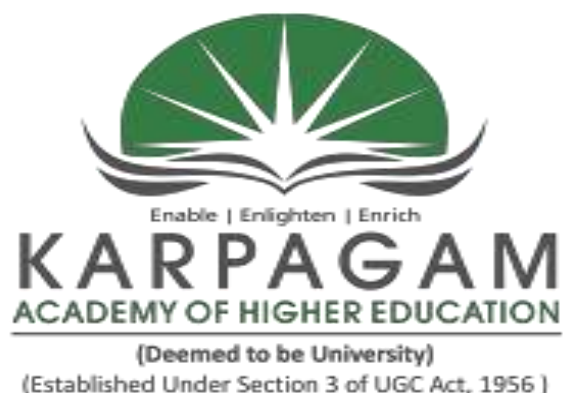
Reference Books

1. C.Puttamadappa, Subir Kumar Sarkar, T. G. Basavaraju.2013.Ad Hoc Mobile Wireless Networks: Principles, Protocols, and Applications, 2nd Edition,CRC Press.
2. Benvenuto.2011.Principles of Communications Networks and Systems, 2nd Edition, Wiley India Pvt. Ltd.
3. Jochen Schiller. 2003. Mobile Communications, 2nd Edition, Pearson Education

B.Sc. COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus
Regular (2015 – 2016)



DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Eachanari (Post), Coimbatore – 641 021.

Tamilnadu, India

Phone No. 0422-2980011 - 15

Fax No: 0422-2980022-23

E mail ID: info@karpagam.com

Web: www.kahedu.edu.in

PROGRAM OUTCOMES (POs): The program must enable students to attain by the time of graduation

- a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline
- b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.
- d) An ability to function effectively on teams to accomplish a common goal
- e) An understanding of professional, ethical, legal, security and social issues and responsibilities
- f) An ability to communicate effectively with a range of audiences
- g) An ability to use current techniques, skills and tools necessary for computing practice
- h) An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking and web systems and technologies
- i) An ability to effectively integrate IT-based solutions into the user environment
- j) An understanding of best practices and standards and their application

PROGRAM SPECIFIC OUTCOME (PSOs)

- k) Understand analyze and develop computer programs in the areas related to Database systems and Big data Analytics, cloud computing, soft computing, IoT, Image processing, Green computing, web designing, mobile computing and networking for efficient design of computer based system of varying complexity.
- l) Apply standard software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality for business success.
- m) Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.
- n) An ability to produce cost effective, quality and maintainable software products and solutions (services) meeting the global standards and requirements with the knowledge acquired and using the emerging techniques, tools and software engineering methodologies and principles and able to comprehend and write effective project reports in multidisciplinary environment in the context of changing technologies.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO I : To be a working Information Technology (IT) professional with core competencies that can be used on multi-disciplinary projects
- PEO II : To understand the importance of relationship building within the IT industry
- PEO III : To understand the need for lifelong learning in the exploration and journey in IT
- PEO IV : To understand, evaluate and practice ethical behavior within the IT industry
- PEO V : To be cognizant of security issues and their impacts on industry

MAPPING of PEOs and POs

POs	a	b	C	d	e	f	f	h	i	j	k	l	m	n
PEO I	X	X	X				X	X	X				X	
PEO II				X	X	X								X
PEO III	X	X						X		X	X			
PEO IV			X	X	X				X			X		
PEO V					X					X		X		

KARPAGAM ACADEMY OF HIGHER EDUCATION
 (Deemed to be University)
 Established Under Section 3 of UGC Act, 1956)
 Coimbatore - 641 021, India
FACULTY OF ARTS, SCIENCE AND HUMANITIES (FASH)
B.Sc Computer Science - Curriculum (CBCS)
 (2015 – 2018 Batch)

Code	Course(s)	Objectives and out comes		Ins*	Marks			Exa m Hrs	Credit (s)
		PEO s	POs		CIA	ESE	Total		
SEMESTER – I									
15LAU101	Language-I	IV	d,e	5	40	60	100	3	5
15ENU101	English-I	I	a,b,c	4	40	60	100	3	4
15CSU101	Computer Fundamentals & Programming in C	I	b,c,g	5	40	60	100	3	5
15CSU111	C Programming Lab	III	b,c,g	5	40	60	100	3	3
15CSU102	Digital Electronics	I	a,b,c,g	4	40	60	100	3	4
15CSU112	Digital Electronics Lab	I	a,c,g	3	40	60	100	3	2
15FCA101	Foundation Course–A(Value Education)	III	b,h,j	2	100	-	100	3	1
15SSD101	Soft Skill Development –I	IV	d,e	2	-	-	-	-	-
Semester Total:				30	340	360	700	-	24
SEMESTER – II									
15LAU201	Language-II	IV	d,e	5	40	60	100	3	5
15ENU201	English-II	II	d,f	4	40	60	100	3	4
15CSU201	Object Oriented Programming with C++	I	c,h,i	5	40	60	100	3	5
15CSU211	Object Oriented Programming with C++ Lab	III	c,h,i	5	40	60	100	3	3
15CSU202A	Allied Elective – I	IV	e,a,c	4	40	60	100	3	4
15CSU202B									
15CSU202C									
15CSU212A	Allied Lab – I	I	e,i a,c,h,i	3	40	60	100	3	2
15CSU212B									
15CSU212C									
15FCB201	Foundation Course–B (Environmental Studies)	III	h,j	2	100	-	100	3	1
15SSD101	Soft Skill Development –I	IV	d,e	2	100	-	100	-	1
Semester Total:				30	440	360	800	-	25
SEMESTER – III									
15ENU301	English-III	II	d,f	4	40	60	100	3	4
15CSU301	Data Structures and	I	a,b,g,h	5	40	60	100	3	5

	Algorithms								
15CSU302	Java Programming	I	c,h,i	5	40	60	100	3	5
15CSU311	Java Programming Lab	I	c,h,i	4	40	60	100	3	2
15CSU303	Numerical Methods	III	a,b	6	40	60	100	3	4
15CSU304A	Core Elective – I	I	a,b,h	4	40	60	100	3	4
15CSU304B									
15CSU304C									
15SSD301	Soft Skill Development – II	IV	d,e	2	-	-	-	-	-
Semester Total:				30	240	360	600	-	24
SEMESTER – IV									
15ENU401	English-IV	II	d,f	4	40	60	100	3	4
15CSU401	Relational Database Management System	I	a,b,g,h	6	40	60	100	3	6
15CSU402	Operating System	III	a,b,h,k	6	40	60	100	3	6
15CSU411	RDBMS (Oracle) Lab	I	a,b,g,h	6	40	60	100	3	3
15CSU403A	Allied Elective – II	III	a,b,j,k	6	40	60	100	3	4
15CSU403B									
15CSU403C									
15SSD301	Soft Skill Development – II	IV	d,e	2	100	-	100	-	1
Semester Total:				30	300	300	600	-	24
SEMESTER – V									
15CSU501	Visual Programming	IV	c,d,e,i,g	5	40	60	100	3	5
15CSU502	Data Communication Networks	III	a,b,j,k	5	40	60	100	3	5
15CSU503	Computer Graphics	I	a,b,c,m	5	40	60	100	3	5
15CSU504	Multimedia Systems	IV	e,i	5	40	60	100	3	5
15CSU505A	Core Elective – II	III	a,b,j,k	5	40	60	100	3	5
15CSU505B									
15CSU505C									
15CSU511	Visual Programming Lab	IV	c,d,e,i,g	5	40	60	100	3	3
15OEU501	Open Elective	III	a,b,j,k	-	-	100	100	3	3
Semester Total:				30	240	460	700	-	31
SEMESTER – VI									
15CSU601	Software Engineering	IV	c,d,e,l	5	40	60	100	3	5
15CSU602	Web Technology	IV	c,d,e,i,g	5	40	60	100	3	5
15CSU603A	Core Elective – III	III	a,b,j,k	5	40	60	100	3	5
15CSU603B									

15CSU603C									
15CSU611	Web Designing Lab	I	a,c,h,i,g	5	40	60	100	3	3
15CSU691	Project	II	d,e,f,n	10	80	120	200	3	5
	NCC/ NSS/ Sports/ Club Activity			-	-	-	-	-	-
Semester Total:				30	240	360	600	-	23
Grand Total				180	1800	2200	4000	-	151
Additional Courses									
15CSU506	Advanced Java Programming			-	-	100	100	3	4
15CSU604	Advanced Networking			-	-	100	100	3	4
Honors									
15CSU507	Mobile Communication			-	-	100	100	3	5
15CSU605	Soft Computing			-	-	100	100	3	5

Allied Elective – I

15CSU202A	Embedded Systems
15CSU202B	PC Hardware & Trouble Shooting
15CSU202C	Microprocessor and its Applications

Allied Elective – II

15CSU403A	Statistical Methods
15CSU403B	Operations Research
15CSU403C	Discrete Mathematics

Core Elective – I

15CSU304A	Compiler Design
15CSU304B	System Software
15CSU304C	Artificial Intelligence

Core Elective – II

15CSU505A	Data Mining and Warehousing
15CSU505B	Big Data
15CSU505C	Cloud Computing

Core Elective – III

15CSU603A	Open Source Software
15CSU603B	Cyber Security
15CSU603C	Client Server Technology

Open Elective

15OEU501	E-Learning
----------	------------

Allied Lab – I

15CSU212A	Embedded Systems Lab
15CSU212B	PC Hardware & Trouble Shooting Lab
15CSU212C	Microprocessor Lab

Entrepreneur Oriented Courses -Green
Employability Oriented Courses -Blue
Skill Development Oriented Courses -Red

கற்பகம்உயர்கல்விகலைக்கழகம்
பகுதி - I தமிழ்ப்பாடத்திட்டம் (2015 - 2016)

முதல்பருவம்

(இளநிலை அறிவியல் பட்டவகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கைமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன்விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்புத் திறன் பெற்றிருத்தல்

தாள்கள்வரிசையும்தேர்வுச்செயல்திட்டமும்பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	4	3	40 / 60	100	4

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்மப்பிக்கை பா.விஜய் - தன்மப்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்த்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்த்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்த்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிரும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - தூண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட தூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

(For all undergraduates students admitted from 2015 onwards)

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry
Vocabulary: Words Often Confused, Anagrams
Grammar: Prepositions, Voice- Active and Passive
Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil
One-Act Play: The Cellphone Epidemic – Claudia I. Haas
Vocabulary: Portmanteau Words, One Word Substitute
Grammar: Questions, Pronunciation
Composition: Letter Writing- Formal

Prescribed Texts:

Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

Course Objectives

- To know the basic concepts of computers and its parts
- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions
- To learn effective usage of pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to do the following:

1. Understand the concept of a program in a high-level language being translated by a compiler into machine language program and then executed.
2. Develop programs using the basic elements like control statements, Arrays and Strings.
3. understand about the dynamic memory allocation using pointers which is essential for utilizing memory
4. Understand about the code reusability with the help of user defined functions.
5. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.
6. Understand the uses of preprocessors and various header file directives.

UNIT-I

Introduction to computers- characteristics- evolution of computers- computer generations- classification of computers-basic computer organization-software – types of software – overview of compilers & interpreters- Structure of C – C Tokens – Keywords and Identifier - Constants – Variables - Declarations of Variables – Data types – Type Conversion – Operators and Expressions - Formatted and Unformatted I/O Operations. Design a code to find range of fundamental data types.

UNIT-II

Decision Statements – Loop Control Statements – Arrays: Initialization of array – Characteristic of Array- Array types. Strings - String Handling Functions. Design a Calculator using Loop.

UNIT-III

Functions - Introduction - Definition of Functions - Function Declaration - Types of Functions – Recursion. Structures and Unions : Introduction - Defining a Structure -

Declaring Structure Variables - Arrays of Structure-Structures & Function- Typedef- Enumerated data type – Unions – Bit fields.

Design a code to reverse all the bits of an 32 bit integer.

UNIT-IV

Pointers – Introduction – Declaring Pointer Variables - Pointer and Arrays - Pointers and Strings – Array of Pointers - Functions and Pointers - Function Returning Pointers - Pointers to functions - Pointers and Structures. Storage Classes – Auto-extern-static-register.

UNIT-V

File Management in C – Introduction - Defining a File – Steps for file operations – Input/output operations on files - Error handling During I/O Operations - Random Access to Files - Command Line Arguments - The Preprocessor.

Design a code to shut down the computer.

TEXT BOOK

1. Ashok N. Kamthane, ITL Education Solutions Limited, 2013. C Programming. 1st Edition, Pearson education, New Delhi.
(Page Nos.: 1-18, 29-37,259-261,269-282,291-310,317-334,341-365,373-404,415-452,467-473,481-500,519-540,551-559,581-597, 617-631,673-719)

REFERENCES

1. Dixit J.B. 2007. Programming in C. 1st Edition, Firewall Media Publications, New Delhi.
2. Karthikeyan E. 2008. Text book on C: Fundamentals, Data Structures and Programming, 1st Edition, PHI, New Delhi.
3. Susant K. Rout. 2008. Cimple- C is Simple.... 1st Edition, Tata McGraw Hill Publishers, New Delhi.
4. Yeswanth Kanetkar. 2007. Let Us C. 8th Edition, BPB Publications, New Delhi.
5. Balagurusamy .E. 2007. Programming in ANSI C. 4th Edition, Tata McGraw Hill Publishers, New Delhi.

WEB SITES

1. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
2. <http://www2.its.strath.ac.uk/courses/c/>
3. <http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Course Objectives

- To know the basic concepts of computers and its parts
- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions
- To learn effective usage of pointers and to implement the memory management concepts.
- To teach the issues in file organization and the usage of file systems.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to do the following:

1. Understand the concept of a program in a high-level language being translated by a compiler into machine language program and then executed.
2. Develop programs using the basic elements like control statements, Arrays and Strings.
3. understand about the dynamic memory allocation using pointers which is essential for utilizing memory
4. Understand about the code reusability with the help of user defined functions.
5. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems.
6. Understand the uses of preprocessors and various header file directives.

List of Programs

1. Swapping of two numbers without using third variable
2. Shift input data by two bits to the left.
3. Find that entered year is leap year or not.
4. To check the given string is palindrome or not.
5. To Print a Fibonacci series for any number
6. Print a table of any number.
7. Program to sort the given set of numbers in ascending order.
8. Convert a given number into words
9. Write a program to add two matrices.
10. Find factorial of a number using recursive functions.
11. Program to reverse a given number without using array.
12. Find a substring in the main string without using library function.
13. Find the maximum number in array using pointer.
14. Mark sheet preparation using array of structures.
15. Copy the content of one file to another file using command line arguments.

Course Objectives

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D & D/A Converters and its Applications.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. learn about Cache memory and its importance
6. Solve the binary arithmetic problems and conversion among the number systems

UNIT I – Number System and Codes

Introduction to Digital concepts – Number Systems: Decimal, Binary, Octal and Hexadecimal Numbers – Conversion – 1's and 2's Complements of Binary Numbers – Binary Arithmetic with Signed and Unsigned Numbers – Codes: Binary Coded Decimal (BCD) — Excess-3 – Gray Code — ASCII Codes — Error Detection and Correction Codes.

UNIT II – Logic Gates and Boolean Algebra

Introduction to Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates. Boolean Logic and Expression, Laws and Rules of Boolean Algebra, DeMorgan's Theorem – Simplification using Boolean Algebra – Karnaugh Map.

UNIT III – Combinational Logic Circuits

Basic overview of Logic functions – Basic Adders & Subtractor – Parallel Binary Adder – 4-bit Binary Adder/Subtractor – Comparators – Encoders and Decoders – Code Converters – Multiplexers and Demultiplexers — Parity Generators/Checkers.

UNIT IV – Sequential Logic Circuits

Flip-flops: RS – Clocked RS – Edge-triggered RS, D, and JK – JK Master-Slave flip flops – Registers and its Types – SISO, SIPO, PISO, PIPO – Shift Registers and its Types – Ring Counters – Asynchronous and Synchronous Counter – UP/DOWN Counter- Ring Counter.

UNIT V – D/A, A/D Converters

Digital to Analog converters: Resistor Networks - Binary Ladder – Analog to Digital converters: Counter type – Ramp type – Successive Approximation Type.

TEXT BOOK

- 1.Digital Electronics and its Principles, Salilvahanan, Tata McGraw Hill, Seventh Edition, 2014.
- 2.Digital Principles and Application, Albert Paul Malvino, Donald P. Leach and Goutam Saha, Tata McGraw Hill, Seventh Edition, 2010.
- 3.Digital Design: With an Introduction to Verilog HDL, Morris Mano, Pearson Education, Fifth Edition, 2013.

REFERENCES

- 1.Modern Digital Electronics, Jain R.P, Tata McGraw Hill Company, Fourth Edition, 2012.
2. Integrated Circuits, Botkar K.R, Khanna Publications, Fourth Edition, 2008.

Course Objectives

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D& D/A Converters and its Applications.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. learn about Cache memory and its importance
6. Solve the binary arithmetic problems and conversion among the number systems

List of Experiments

(Any 8 Experiments)

1. Verification of basic gates
2. Realization of Logic Gates Using Universal Gates
3. Adder using Gates
4. Subtractor using Gates.
5. Multiplexer
6. Demultiplexer
7. Encoder
8. Decoder
9. Study of Flip-flops
10. Binary to Gray and Gray to Binary Converter

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100**Course Objectives**

- To teach and inculcate the importance of value based living and sustainable lifestyle.
- To give students a deeper understanding about the purpose of life.
- To teach and inculcate the essential qualities to become a good leader.
- To be responsible citizens with clear conviction to practice values and ethics in life.
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom

Course Outcomes (COs)

1. Students will understand the importance of value based living.
2. Students will gain deeper understanding about the purpose of their life.
3. Students will understand and start applying the essential steps to become good leaders.
4. Students will emerge as responsible citizens with clear conviction to practice values and ethics in life.
5. Students will become value based professionals
6. Students will contribute in building a healthy nation

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

Course Objectives

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes(COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

கற்பகம் உயர்கல்விகலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப்பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்டவகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப்பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்புத் திறன் பெற்றிருத்தல்

தாள்கள்வரிசையும் தேர்வுச்செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
இரண்டு	II	4	3	40 / 60	100	4

பகுதி - I, தமிழ்

15LAU201 :

தமிழ் இரண்டாம் தாள்

பருவம் II

5-H,5-C

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை,

ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுள்ளேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பளிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புளல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,

சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,

மாவள்கின்னி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நிர்வாகம் - முனைவர் ச. முத்துக்குமார்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

(For all undergraduates students admitted from 2015 onwards)

Course Objectives:

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

- Learn to enjoy the ecstasy of literature.
- The select literary pieces will develop the confidence level of the learners.
- To get the social values.
- To know the importance of communication
- Get sound knowledge in English
- Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley
One-Act Play: The Pot of Broth- W.B. Yeats
Vocabulary: Collective Nouns
Grammar: Correction of Sentences
Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck
One-Act Play: The Bear – Anton Chekov
Vocabulary: Acronyms
Grammar: Question Tags
Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2014. Board of Directors. Emerald Publishers:
Chennai

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course Objectives

- To understand how C++ improves C with object-oriented features.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To learn how to overload functions and operators in C++.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Course Outcomes(COs)

1. Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
2. Able to make use of objects and classes for developing programs.
3. understand the concept of data abstraction and encapsulation
4. Able to use various object oriented concepts to solve different problems
5. Using inheritance and virtual functions to implement dynamic binding with polymorphism.
6. Ability to use exception handling in debugging the programs

UNIT-I

Principles of Object Oriented Programming: A look at Procedure-oriented programming - Basic concepts of object oriented programming – benefits of OOP – structure of c++ program – Declaration of variables. **Control statements:** Decision making statements – if...Else, jump, go to, break, continue- switch case statements – do-while – while statement, for statement. Inline functions – function overloading. Design an array of 10 doubles and set all of them to 1.0.

UNIT-II

Classes and Objects: Specifying a class – defining member functions Inside the Class – Defining member functions outside the class - static data members – static member functions - array of objects –friendly functions. **Constructors and destructors:** Constructors – multiple constructors in a class – constructors with default arguments - copy constructor – destructors

UNIT-III

Operator Overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. **Inheritance:** Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

Design a code to perform arithmetic and comparison operation using operator overloading.

UNIT-IV

Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual function. **Managing console I/O operations:** C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

UNIT-V

Files: Classes for file stream operations – opening and closing a file – sequential input and output operations – updating a file random access – command line arguments.

Templates: Templates – class templates – function templates – member function templates.

TEXT BOOK

1. Ashok N. Kamthane. 2009. Object Oriented Programming with ANSI and Turbo C++. 2nd Edition, Pearson Education, New Delhi.
(Page Nos.:1-14, 19-32, 96-113,115-130,144-164, 171-187, 201-240, 251-281,290-317)

REFERENCES

1. Balagurusamy. E. 2007. Object Oriented Programming with C++. 3rd Edition, Tata McGraw Hill publishing company Ltd, New Delhi.
2. Chandra .B. 2005. Object Oriented Programming using C++, 2nd Edition, Narosa Publishing House, New Delhi
3. Jesse Liberty and David B. Horvath. 2005. SAMS teach yourself C++ in 24 hours, 4th Edition, Pearson Education, New Delhi.
(Page Nos.:125-149, 25-48,496-519)
4. John R. Hubbard. 2006. Programming with C++, 2nd Edition, Tata McGraw Hill Publishers, New Delhi.

WEB SITES

1. <http://www.cplusplus.com/doc/tutorial/>
2. www.cplusplus.com/
3. www.cppreference.com/

Course Objectives

- To understand how C++ improves C with object-oriented features.
- To learn the syntax and semantics of the C++ programming language.
- To learn how to design C++ classes for code reuse.
- To learn how to implement copy constructors and class member functions.
- To learn how to overload functions and operators in C++.
- To learn how to design and implement generic classes with C++ templates.
- To learn how to use exception handling in C++ programs.

Course Outcomes(COs)

1. Identify importance of object oriented programming and difference between structured oriented and object oriented programming features.
2. Able to make use of objects and classes for developing programs.
3. understand the concept of data abstraction and encapsulation
4. Able to use various object oriented concepts to solve different problems
5. Using inheritance and virtual functions to implement dynamic binding with polymorphism.
6. Ability to use exception handling in debugging the programs

List of programs

1. Create a class **Patient** with necessary data members. In the main () program, have the facility to
 - Store the details of n inpatients and outpatients
 - Display the details in a neat format
2. Create two classes **British** and **Metric** to store the measurements of distance in the British (feet and inches) and Metric (meters and centimeters) systems respectively. In the main () program, perform the following:
 - Get two measurements: one in British and the other in Metric
 - Ask the user in which system (British or Metric) (s) he wants the output.
3. Add two input measurements and print the result according to the user's choice Create a class **Date** whose data members are Day, month, and Year. Write necessary member functions and perform the following operations using overload operator.
 - Increment a date by a day
4. Create a class **Date** whose data members are Day, month, and Year. Write necessary member functions and perform the following operations using overload operator.
 - Compares two dates
5. Create a class **String** that has a character array as a data member and perform the following operations using overloaded operators.
 - '+' To add two strings
 - '==' To compare two strings
6. Create a class **Computer** and derive two classes **Client** and **Server** from it. In the main () program, get the data about n clients and servers and print it back in a neat format.

7. Create a class **Shape** that contains two data members of type double to hold the two dimensions of the shape. Derive 3 more classes' **Circle**, **Rectangle** and **Triangle** from the class Shape. Using appropriate member functions, get the values, calculate and print the area of different shapes using dynamic binding.
Hint:- Write 2 member functions in all the derived classes: one to set the data and the other to calculate and display the area.
8. Create a class **Staff** that contains the name, designation, and years of experience of a staff member of a college. Using containership, create two more classes **TeachingStaff** and **NonTeachingStaff** according to the following specifications. In addition to the properties of the staff class, the TeachingStaff class should contain the highest qualification, the staff member possesses and the departments he belongs to. The NonTeachingStaff class needs to contain the properties of Staff only. In the main (), get data about some of the teaching and NonTeachingStaff members of your college and print the details in neat format.
9. Create a class **Address** as whose data members are Name, Street, City, Pincode and Phone Number of a person. In the main () program, using array of pointers, get addresses of n persons, sort it in alphabetical order of names and display it back in a neat format.
10. Create a class that copies the content of a text file into another file. Write the program in such a way that the program accepts command line arguments and make the program to execute in a way exactly the copy command in DOS.
11. Create a class **Student** that could have the name, register number and marks in the subjects of the semester. Have the program to perform the following operations:
 - Store the data about n students in a data file.
 - Print the mark list of each student whenever requested.
 - Add details about some more students at any time.
12. Sort an integer and a floating –point array using function template.

Course Objectives

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes

1. Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Ability to write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

UNIT I – 8051 Microcontroller

Introduction to Microcontroller and Embedded Processors – Microcontroller for Embedded Systems – Overview of 8051 Family – 8051 Architecture – 8051 flag bits and PSW Register - Register Bank and Stack.

UNIT II –8051 Programming

8051 Assembly and C Programming – Instruction Set –Address Modes - Loop and Jump Instructions - Arithmetic Instruction - Logic Instructions - Single Bit Instructions. Data Types and Directives - I/O Port Programming.

UNIT III – Internal Peripherals of 8051

Basic Registers of Timer - Programming 8051 Timer-Counter Programming – Basics of Serial Communication – 8051 Connection to RS232 - 8051 Serial Communication Programming – 8051 Interrupts - Programming External Hardware Interrupts.

UNIT IV – Applications

Interfacing LCD to the 8051 – Interfacing ADC – Sensors to 8051- Interfacing Stepper Motor - 8051 Interfacing to the Keyboard - Interfacing DAC to the 8051.

UNIT V – Real-Time Operating System

Survey of Software Architecture: Round Robin-Round Robin with Interrupts-Function – Queue Scheduling Architecture - Introduction of RTOS - RTOS Architecture

-Task and Task States - Task and Data - Semaphores and Shared Data - Message Queues, Mailboxes and Pipes - Timer Function – Events - Memory Management.

TEXT BOOK

1. The 8051 Microcontroller and Embedded Systems, Mohammed Ali Mazidi and Janice Gillispie Mazidi, Pearson Education, Singapore, Third Edition, 2008.
2. The 8051 Architecture and its Applications, Ayala, Prentice Hall of India, Sixth Edition, 2010, New Delhi.

REFERENCES

1. Embedded Microcontroller, Intel Manual – Volume I and II, 2008.
2. The 8051 Microcontroller and Embedded Systems, Dr. Rajiv Kapadia, Jaico, Publishing House, First Edition, 2004, Mumbai.

Course Objectives

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Knowledge of all the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

UNIT I – Micro Computer System

Introduction to Micro Computer System – Computer Organization – Number Systems and Codes Memory – Arithmetic and Logic Unit – Control Unit.

UNIT II – Peripheral Devices

Introduction to Peripheral Devices – Keyboard – CRT Display monitor – Printer – Magnetic Storage Devices – Floppy Disk Drive – Hard Disk Drive – Peripherals Interfaces and Controller – Keyboard Interface

UNIT III – Display Adapter

CRT Display — CRT Controller –Auxiliary Subsystems – Data Communication fundamentals – Serial Port in PC – Real time clock (RTC) – Magnetic Tape Subsystems – LAN – Memory Expansion Options

UNIT IV – Installation and Preventive Maintenance

Pre Installation Planning – Installation Practice – Routine Checks – Special Configurations – Memory Up Gradation

UNIT V – Trouble shooting

Troubleshooting – Computer faults – Nature of faults – Types of Faults
Diagnostic Programs and Tools — Faults in Elimination Process – Systematic
Troubleshooting – POST (Power on Self-Test)

.

TEXT BOOK

- 1 IBM PC and Clones, B. Govindarajalu, Tata McGraw Hill Publishing Company, Second Edition, 2011.
- 2 Introduction to PC Hardware and Troubleshooting, Michael Meyers, The Mike Meyers' Computer Skills, McGraw Hill, First Edition, 2003.

REFERENCES

- 1 Hardware and Software of Personal Computers, Sanjay K. Bose, New Age International Publishers, 1999.

Course Objectives

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes(COs)

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

UNIT I – Introduction to 8-bit Microprocessor

Introduction to 8085 – Pin Diagram –Architecture – Demultiplexing the Bus –Generation of Control Signals – Fetching, Decoding and Execution of Instruction – Instruction Timing and Status Flag.

UNIT II – Addressing Modes

Instruction Set – Addressing Modes – Instruction Format – Simple Program – Memory Read Machine Cycle – Memory Unit s Machine Cycle.

UNIT III- Interfacing Concepts

Peripheral I/O Instructions – Device Selection And Data transfer – Types of Data Transfer - Input Interfacing – Input Interfacing Using Decoders – Output Interfacing: LED and 7 Segment Display – Interfacing Memory.

UNIT IV Peripheral Devices

Introduction to Programmable Peripheral Interface 8255 – Pin Diagram –Architecture – Modes of Operation: I/O and BSR – Architecture and Operation of 8251(USART). Architecture and Operation of Programmable Interrupt Controller (8259) – Architecture of 8254(8253) Programmable Interval Timer/Counter –DMA Controller(8279).

UNIT V- Applications

Time Delay Program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC –Interfacing ADC – Temperature Measurement.

TEXT BOOK

1. Microprocessor Architecture, Programming and Application with 8085, Ramesh S Gaonkar, Penram International Publishing, Fourth Edition, 2000. New Delhi.
2. Microprocessor, Microcomputer, Microcontroller and Interfacing, M.K.Gupta, Paragon International Publisher, 2006, First Edition, New Delhi.

REFERENCES

1. Introduction to Microprocessors, Adithya P.Mathur, Tata MCGraw Hill Publishers, Second Edition, 2004, New Delhi.
2. Fundamentals of Microprocessor and Microcontroller, Ram.B, Dhanpat Rai Publication, Second Edition, 2000, Mumbai.

Course Objectives

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes

1. Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Ability to write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

List of Experiments**(Any 8 Experiments)**

1. Addition of 8/16 Bit Array of Data
2. Subtract of 8/16 Bit Array of Data
3. Multiplication & Division
4. Ones and Two's Compliment
5. Data Transfer using Parallel Port
6. Sorting of Numbers
7. Stepper Motor Interface
8. Wave Form Generation
9. Biggest and Smallest Number in an Array
10. D/A Converter

Course Objectives

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Knowledge of all the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

List of Experiments**(Any 8 Experiments)**

1. Identifying External Ports and Interfacing
2. Identifying PC cards and Interfacing.
3. Assembling of PC
4. Preventive Maintenance of a PC
5. Trouble Shooting of SMPS
6. Keyboard Servicing
7. Study of CRT
8. Communication and Bus Interfacing
9. Partitioning and Formatting Hard disks.
10. Installing System And Application Software

Course Objectives

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes(COs)

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

List of Experiments**(Any 8 Experiments)****MICROPROCESSOR LAB**

1. Addition of 8/16-bit and Array of Data
2. Subtraction of 8/16-Bit Number
3. Multiplication of 8-Bit Number
4. Division of 8-bit Number
5. Fill and Transfer an Array of Data.
6. Ascending and Descending of an Array.
7. Data Transfer using Parallel Ports.
8. Stepper Motor Interface
9. Traffic Light Controller
10. A/D Convertor and D/A Convertor

Course Objectives

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Outcomes (COs)

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy-water conservation and management -Rain water harvesting- water shed management.

Resettlement and Rehabilitation. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Course Objectives

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes(COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

(For undergraduates students admitted from 2015 onwards)

Course Objectives

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcomes (COs)

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions. (Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Reference Books:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Course Objectives

- To understand the fundamental concepts of data structures
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand and apply sorting, searching algorithms
- To analyze algorithms using big-Oh notation
- To develop application using data structures

Course Outcomes (COs)

Upon completion of this course, the student will be able to:

1. Implement abstract data types for linear data structures.
2. Apply the different linear and non-linear data structures to problem solutions.
3. Analyze the applications of tree.
4. Implement graph theory over various data structures.
5. Critically analyze the various sorting algorithms.
6. Apply searching algorithms over various data structures.

UNIT I

Introduction: Introduction to Algorithms- Analyzing Algorithms- Creating the Algorithms; Arrays: Representation of Arrays- Stacks and Queues- Multiple Stacks and Circular Queue- Sparse Matrices- Polynomial Addition; Infix to Postfix Conversions- Evaluation of Expression

Internal Sorting: Insertion sort – Quick sort- Selection sort – Shell sort – 2-Way Merge sort

Searching: Linear Search

UNIT II

Linked list: Singly Linked List: Insertion and Deletion in Singly Linked List- Linked Stacks and Queues;

Doubly Linked List: Insertion and Deletion in Doubly Linked List - Sparse Matrices- Polynomial Addition;

Dynamic Storage Management: Allocating blocks- Freeing Blocks;

UNIT III

Non Linear Structures: Trees: Basic Terminology; Binary Trees: Binary Tree Representations- Binary Tree Traversals - Threaded Binary Trees

Searching and Sorting: Binary Search- Heap sort

Application of Trees: B Trees- Tree indexing.

UNIT IV

Non Linear Structures: Graphs: Basic Terminology– Graph Representation- Traversals- Spanning Tree- Kruskal's Algorithm

Applications of Graph: Shortest Path: Single Source All Destinations- All Pairs Shortest

UNIT V

Sorting: External Sorting: K-Way Merge Sort- Sorting with tapes: Balanced Merge sort, Polyphase Merge

Static Tree – Dynamic Tree

Hash Tables: Hashing Functions – Overflow handling.

TEXT BOOK

1.Ellis Horowitz and Sartaj S Shani. .2010. Fundamentals of Data Structures, 2nd Edition ,Galgotia Publications, , New Delhi.

REFERENCES

1. Kirshnamoorthy. 2008. Data Structures Using C, Tata Mcgraw Hill Publishing Company Limited, New Delhi.
- 2.Kruse R. 2007. Data Structures & Program Design In C, 2nd Edition, Prentice-hall Of India Pvt Ltd, New Delhi.
- 3.Murugan .M. Graph Theory and Algorithms,1st Edition, Muthali Publications house, Chennai.
- 4.Robert L. Kruse.2000. Data Structures and Program Design, 3rd Edition, Printice- Hall of India, Delhi.
- 5.Seymour Lipschutz.1986. Theory and Problems of Data Structures, 2nd Edition, McGraw Hill, New Delhi.

WEB SITES

http://en.wikipedia.org/wiki/Data_structure

<http://www.cs.sunysb.edu/~skiena/214/lectures/>

www.amazon.com/Teach-Yourself-Structures-Algorithms

Course Objectives

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

1. Student will obtain knowledge of the structure and model of the Java programming language.
2. How to use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

UNIT-I

Introduction to Object Oriented Programming: Object Oriented Paradigm and Concepts-Structured versus Object Oriented Approach. Java Language: Features of Java - Environment-Java Architecture-Java Development Kit-Types of Java Program. Variable Declaration and Arrays: Data Types-Java Tokens –Variable Declaration – Type Casting and Conversion – Arrays, Operators, And Control Statements: Selection Constructs – Iteration Constructs –Jump Statements.

Design various approach to determine the integer is prime or not.

UNIT-II

Introduction to classes: Instance variables, Class variables, Instance Methods, Constructors, Class methods, Declaring Objects, Garbage Collection, Method Overloading - Constructor Overloading - This Reference. Inheritance: Super class variables- Method Overriding - final Keyword, Abstract Classes and Interfaces.

UNIT-III

Packages and Access Modifiers: Package Declaration – import statement - Access Protection. Strings: Creation – Operation on strings - Character Extraction Methods – Comparison –Searching and Modifying –String Buffer Class. Collection and Utilities: Collection of Objects –CORE Interfaces and Classes –Iterators – List, Set, Map Implementations.

Design a code to remove multiple spaces in a string.

UNIT-IV

Input Output Classes: I/O Operations –Hierarchy of Classes – File class – Input Stream, Output Stream, FilterInputStream, FilterOutputStream, Reader and Writer classes – Random Access File class –Stream Tokenizer. Applets: Basics – Life Cycle –Methods – Graphics Class- Color, Font, and Font Metrics Class.

UNIT-V

Exception Handling: Fundamentals – Hierarchy of Classes – Types of Exception. Multithreaded Programming: Thread Model – Runnable Interface - Thread Class-Thread Life Cycle. AWT Components: AWT Classes – Basic Component and Container Classes – Frame Window in an Applet.

Design a code to open notepad.

TEXT BOOK

1. ISRD Group. 2007. Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi.
(Page Nos.:1- 49, 54-115 161-172,177 -189, 218- 242, 253 -271, 292-306, 311-325)
2. Herbert Schildt. 2011. Java Complete Reference, 8th Edition, Tata McGraw Hill, New Delhi.

REFERENCES

1. Deitel H.M. and P.J.Deitel. 2005. Java, How to Program, 6th Edition, Pearson Education, New Delhi.
2. Somasundaram Dr. S. 2004. Java Programming, 1st Edition. Techmedia, New Delhi.
3. Somasundaram Dr. K. 2008. Programming in Java 2, 1st Edition. Jaico publishing house, New Delhi.

WEB SITES

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Objectives

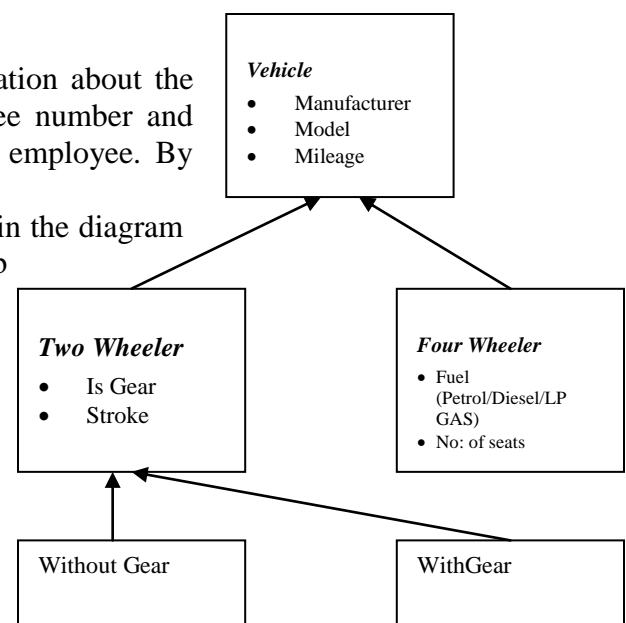
- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

1. Student will obtain knowledge of the structure and model of the Java programming language.
2. How to use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

Write a java program to solve the following:

1. Create an employee package to maintain the information about the employee. Use constructors to initialize the employee number and use overloading method to set the basic pay of the employee. By using this package, create a Java program.
2. Create a set of classes with the relationship as shown in the diagram and use inheritance relationship to define the sub classes.
Get and display the details of some of the two and four wheelers and display them in a neat format.
3. Create a frame with user specific size and position it at user specific position (use command line argument). Then different shapes with different colors (use menus).
4. Create an applet for a calculator application.



5. Java program to maintain the student information in text file.
6. Animate images at different intervals by using multi-threading concepts.
7. Write a program to accept more strings and arrange them in alphabetical order.
8. Write a program to create a window and draw cross lines.
9. Write a program to create an applet and draw the shapes.
10. Write a program to create a window with a background color and display a message.
11. Write a program for multiplication tables by multithreading.
12. Write a program to create an exception for marks out of bounds. If mark is greater than 100 throw an exception.

Course Objectives

This course enables the students to

- To understand the basic concepts of numerical methods
- To develop the mathematical skills in the areas of numerical methods.
- To understand numerical techniques as powerful tool in scientific computing.
- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.

Course Outcomes (COs)

On completion of the course students will be able to

1. Apply Numerical analysis which has enormous application in the field of Science
2. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
3. Familiar with calculation and interpretation of errors in numerical method.
4. Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.
5. Understand the basics of Numerical Differentiation & Integration and numerical solutions of ordinary differential equations.
6. Understand the concepts of difference operators and the use of Interpolation.

UNIT I

Solution of algebraic and transcendental equations: Bisection method –Regula Falsi method – Newton Raphson method. Polynomoial Equations – Graeffe’s root squaring method.

UNIT II

Solution of simultaneous linear algebraic equations: Gauss elimination method – Gauss Jordan method – Method of triangularization – Gauss-Jacobi method – Gauss-seidel method.

UNIT III

Interpolation: Gregory Newton Forward and Newton Backward interpolation formula – Interpolation with unequal intervals — Lagrange’s interpolation formula – Inverse interpolation formula.

UNIT IV

Numerical Differentiation and Integration: Newton’s Forward and backward differences to compute derivatives – Trapezoidal rule, Simpson’s 1/3 & 3/8 rule.

UNIT-V

Numerical methods for solving ordinary differential equations – Taylor series(I order) – Euler and Modified Euler method – Runge kutta methods (II order , III order and IV order).

TEXT BOOK

1. Venkataraman .M.K., Fifth Edition,2001. Numerical Methods in Science and Engineering, National publishing Company ,Madras. (Unit I – V)

REFERENCES

1. Kandaswamy. P., Thilagavathy K., and K.Gunavathy., 2013 .Numerical Methods, S. Chand & Company Ltd., New Delhi.
2. Vedamurthy V.N.,N.CH.S.N.Iyenger., 1999. Numerical Methods,Vikas Publishing House Pvt Ltd, New Delhi.

Course Objectives

- To provide an understanding of the fundamental principles in compiler design
- To provide the skills needed for building compilers for various situations that one may encounter in a career in computer science.
- To learn the process of translating a modern high-level language to executable code required for compiler construction.
- To understand fundamentals of compiler and identify the relationships among different phases of the compiler.
- To understand the application of finite state machines, recursive descent, production rules, parsing, and language semantics.
- To analyze & implement required module, which may include front-end, back-end, and a small set of middle-end optimizations.

Course Outcomes(COs)

On successful completion of the course students will be able to:

1. Specify and analyze the lexical, syntactic and semantic structures of advanced language features
2. Separate the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation
3. Write a scanner, parser, and semantic analyzer without the aid of automatic generators
4. Turn fully processed source code for a novel language into machine code for a novel computer
5. Describe techniques for intermediate code and machine code optimization
6. Design the structures and support required for compiling advanced language features.

UNIT I

Introduction: Compilers - Analysis of the source program - phases of compiler - cousins of the compiler - Grouping of phases.

Simple one - pass compiler: - Overview - syntax definition - syntax directed translation - parsing - a translator for simple expressions - Incorporating a symbol table - symbol tables

UNIT II

Lexical Analysis: The role of the Lexical analyzer - Input buffering - specification of tokens - recognition of tokens.

Syntax Analysis: The role of the parser - context free grammars - writing a grammar - Top down parsing - Bottom up parsing - operator precedence parsing - LR parsers.

UNIT III

Syntax directed translation: Syntax directed definitions - construction of syntax trees - Bottom up evaluation of S-attributed definitions - L attributed definition. Type checking - Type systems - specification of simple type checker.

UNIT IV

Runtime Environments: Source language issues - storage organization - storage allocation strategies. Intermediate Code Generation: Intermediate languages - declarations - assignment statements.

UNIT V

Code Generation: Issues in the design of a code generator - The target machine - runtime storage management - Basic blocks and flow graphs.

Code optimization: Introduction - The principle sources of optimization.

TEXT BOOK

1. Alfred V. Aho, Ravi Sethi and Jeffrey D Ullman, 2003, “Compilers, principles, Techniques and Tools”, 1st Edition, Addison Wesley Publishing Company, New Delhi.

REFERENCES

1. Dhamedhere .D.M, 2003, “Compilers Construction Principles and Practice”, 2nd Edition, Macmillan publication Ltd, New Delhi.

WEBSITES

1. www.cs.bilkent.edu.tr/~ilyas/Courses/CS416/
2. web.cecs.pdx.edu/~sheard/course/Cs321/notes/index.html
3. www.personal.kent.edu/~rmuhamma/Compilers/compiler.html
4. engineeringppt.blogspot.com/2009/08/compiler-design-ppt.html

Course Objectives

- To introduce students the concepts and principles of system programming
- To provide students the knowledge about both theoretical and practical aspects of system programming, teaching them the methods and techniques for designing and implementing system-level programs.
- To train students in developing skills for writing system software with the aid of sophisticated OS services, programming languages and utility tools.
- To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
- To describe the various concepts of assemblers and macroprocessors.
- To understand how linker and loader create an executable program from an object module created by assembler and compiler.

Course Outcomes(COs)

1. Understand different components of system software.
2. This course enables for good understanding of the role of system programming and the scope of duties and tasks of a system programmer.
3. This course enables to learn the concepts and principles of developing system-level software (e.g., compiler, and networking software)
4. Understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
5. Describe the various concepts of assemblers and macroprocessors.
6. Understand how linker and loader create an executable program from an object module created by assembler and compiler.

UNIT-I

Introduction – System Software and Machine Architecture – Simplified Instructional Computer (SIC) – CISC Machines – RISC Machines – **Assemblers:** Basic Assembler Functions – Machine Dependent Assembler Features - Machine Independent Assembler Features – Assembler Design Options – Implementation Examples: MASM Assembler.

UNIT-II

Loaders and Linkers: Basic Loader Functions - Machine Dependent Loader Features - Machine Independent Loader Features –Loader Design Options – Implementation Examples: MSDOS Linker.

UNIT-III

Compilers: Basic Compiler Functions - Machine Dependent Compiler Features - Machine Independent Compiler Features – Compiler Design Options – Implementation Examples: Sun OS C Compiler – Java Compiler and Environment.

UNIT-IV

Macro Processors: Basic Macroprocessor Functions - Machine Independent Macroprocessor Features – Macroprocessor Design Options – Implementation Examples: ANSI C Macro language.

UNIT-V

Operating System: Basic Operating System Functions - Machine Independent Operating System Features – Operating System Design Options – Implementation Examples: MSDOS - Sun OS.

Other System Software: Database Management Systems – Text Editors.

TEXT BOOK

System Software-An Introduction to Systems Programming, Leland. L. Beck, 3rd Edition, 2010, Pearson Education.

(Page Numbers: Unit-I -1, 3-4, 4-20, 21-28, 29-40, 44-52, 52-65, 66-92, 92-102, 103-105. Unit-II - 123-124, 124-129, 129-147, 147-151, 151-159, 160-162. Unit-III - 225-271, 272-278, 278-299, 299-305, 305-308, 313-315. Unit-IV - 175-186, 186-197, 197-206, 209-213. Unit-V- 325-331, 372 – 387, 387 – 399, 400-403, 406-409)

REFERENCES

- 1) John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.
- 2) The Art of assembly language, Randall Hyde, 2nd Edition, 2010, No Starch Press.
- 3) Santanu Chattopadhyay, “System Software”, Prentice-Hall India, 2007.
- 4) Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers: Principles, Techniques, and Tools”, 2nd Edition, Pearson Education Asia, 2006.

Course Objectives

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To experiment with a machine learning model for simulation and analysis.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

Course Outcomes (COs)

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems.
4. Understand the a basic concept of logical inference and use inference in propositional or predicate logic
5. Understand the concept of how expert systems work
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

UNIT-I

Introduction: AI Problems-AI Techniques-Criteria for success-Problems, Problem spaces and search: Defining the problem as State space search-Production Systems-Problem characteristics-Issues in design of search.

UNIT-II

Heuristic Search Techniques: Generate and test-Hill Climbing-Best-First search-Problem Reduction-Constraint Satisfaction-Mean end analysis

UNIT- III

Knowledge Representation Issues: Representations and Mappings-Approaches to Knowledge representation-Issues to knowledge representation-Frame problem.

UNIT-IV

Using Predicate logic: Representing simple facts in logic-Representing Instance and ISA relationships-Computable functions and predicates-Resolution-Natural Deduction.

UNIT-V

Representing Knowledge using Rules: Procedural versus Declarative Knowledge-Logic Programming-Forward versus Backward Reasoning-Matching-Control Knowledge-Expert Systems.

TEXT BOOK

Elaine Rich, Kevin Knight and Shiva Shankar B. Nair 2009. Artificial Intelligence, 3rd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.

(Page Nos.: 4-20, 25-47; 50-74; 79-96; 99-125; 128-142, 422-429)

REFERENCES

Stuart Russell and Peter Norvig. 2008. Artificial Intelligence-A Modern Approach, 2nd Edition, Pearson Education, New Delhi.

WEB SITES

1. www.en.wikipedia.org/wiki/Artificial_intelligence
2. www.cin.ufpe.br/.../artificial-intelligence-modern-approach.
3. www.amazon.in/Artificial-Intelligence-Elaine-Rich/dp/0070522634

Course Objectives

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes(COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

(For undergraduates students admitted from 2015 onwards)

Course Objectives:

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

1. Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference:

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Course Objectives

- To describe a good introduction to the discipline of database management systems.
- To give a good formal foundation on the data models and E-R model.
- To demonstrate the principles database constraints behind systematic database design by covering normalization concept.
- To introduce the concepts of basic SQL as a universal Database language.
- To have an introductory knowledge about the PL/SQL concept
- To normalize the existing database to various levels

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Demonstrate an understanding of the elementary features of RDBMS
2. Design conceptual models of a database using ER modeling for real life applications
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database
5. Design efficient PL/SQL programs to access Oracle databases
6. Demonstrate the principles database constraints behind systematic database design by covering normalization concept.

UNIT-I

Understanding Database Fundamentals: What is data, information, database, RDBMS. – Database environments – origin of database – database elements – design concepts – what makes a good database?- Database Models : flat file – hierarchical model – network model – relational model – object oriented model – object relational model. Relational database: characteristics – concepts – language (SQL).

UNIT-II

Entities and Entity Relationships: entities – relationships: one to one, one to many, many to many, recursive, mandatory, and optional – transformation of the entity in design – accessing the data – avoiding poor relationship constructs. ER Diagram: how ERD is used – typical ERD symbols – cardinalities – sample ERD.

Functional Dependencies: Introduction – definition – keys – inference axioms – redundant functional dependencies – membership algorithm. Closures, cover and equivalence of functional dependencies: closure of a set F - closure of a set of attributes – closure algorithm – Non Redundant cover algorithm.

UNIT-III

Objects : table – view – index – sequence – synonyms. Data types. Constraints – primary key, unique, not null, default, check, referential integrity constraints – table level – column level – naming constraints. E.F. Codd's rules.

Data Definition Language: create objects, CTAS – alter objects, add and drop columns and constraints; changing field size – drop objects – truncate table.

Data Manipulation Language : Insert, insert ... as – update – delete – select with where, group by, order by, having clauses- Simple sub queries –

Operators: arithmetic – relational – boolean – exists, like, in, all, not - assignment – concatenation . Set operators: intersect – minus – union – union all-Aggregate functions.

Data Control language: grant, revoke – simple privileges. Simple flashback queries: drop table

UNIT-IV

Overview of PL/SQL – declaration section – executable command section: conditional logic, loops, CASE statements – exception handling section: predefined and user defined exceptions.

Triggers: definition – types : row level, statement level, before and after, instead of – syntax – enabling and disabling triggers - replacing and dropping triggers.

Cursors – definition – open – fetch – close – cursor attributes- select for update – types : implicit, explicit.

Procedures, Local and global – procedures vs functions – stored procedures- syntax - calling procedures - replacing and dropping procedures.

Functions: stored functions - syntax - calling functions - replacing and dropping functions.

UNIT-V

Packages: Package header-package body- calling packages-replacing and dropping packages.

Overview of Normalization: advantages - disadvantages. Normal forms: first normal form – second normal form – third normal form – boyce- codd normal form – Introduction to fourth, fifth and sixth normal forms – denormalization.

TEXT BOOKS

1. Bipin C. Desai. 2008. An Introduction to Database Systems, Galgotia Publications, New Delhi.
2. Kevin Loney and George Koch. 2002. Oracle 9i The Complete Reference, 1st Edition, Tata McGraw-Hill, New Delhi.
(Page Nos.: 117,232-236,325-340,355-362,480-484, 490-506,511,527-528,532-547)
3. Ramon A. Mata-Toledo and Pauline K. Cushman. 2001. Schaum's Outline of Fundamentals of Relational Databases, 1st Edition, Tata McGraw-Hill, New Delhi.
(Page Nos.: 122-136)
4. Ryan K. Stephens and Ronald R. Plew. 2000. Database Design, 1st Edition, Sams Publishing, New Delhi.
(Page Nos.: 11-52, 162-174, 186-197)

REFERENCES

1. Gerald V. Post. 2005. Database Management Systems Designing and Building Business Applications, 2nd Edition, Tata McGraw-Hill, New Delhi.
2. Raghu Ramakrishnan and Johannes Gehrke. 2003. Database Management Systems, 3rd Edition, McGraw-Hill, New Delhi.
3. Rajesh Narang. 2006. Database Management Systems, 1st Edition, Prentice Hall of India, New Delhi.

WEB SITES

1. <http://en.wikipedia.org/wiki/RDBMS>
2. http://aspalliance.com/1211_Relational_Database_Management_Systems__Concepts_and_Terminologies
3. www.compinfo-center.com/apps/rdbms.html

Course Objectives

- To Study the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To Learn about Processes, Threads and Scheduling algorithms.
- To Understand the principles of concurrency, Deadlocks and Memory Management
- To Learn about the Protection and Security Concepts.
- To provide experience on MS Windows and LINUX environment.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Design various Scheduling algorithms.
2. Apply the principles of concurrency.
3. Design deadlock, prevention and avoidance algorithms.
4. Compare and contrast various memory management schemes.
5. Apply the Security Concepts based on Authentication.
6. Work in MS Windows and LINUX environment.

UNIT-I

Introduction - What is an OS? – Mainframe systems Desktop Systems – Multiprocessor systems – distributed systems – real time systems. Process: - Process concepts – Operation on process – cooperation process - Inter process Communication -Mutual Exclusion - Critical sections- primitives – Semaphores

UNIT-II

Storage management: Memory Management –Background-swapping- Contiguous memory allocation – paging, segmentation – segmentation with paging – Virtual memory :Background- Demand Paging, Process Creation – Page replacement – Thrashing.

UNIT-III

CPU Scheduling : Basic concepts : - Scheduling Criteria – Scheduling Algorithms – FCFS- SJF- Priority – RoundRobin –Multilevel Queue – Multilevel Feedback Queue -. Deadlock: Introduction, Examples of deadlock, Deadlock prevention, avoidance, detection, recovery from deadlock.

UNIT-IV

File systems: File System Concepts – Access Methods – Directory structure – File Sharing – Allocation Methods – Free space management –Efficiency and performance – Recovery-Disk Performance Optimization: Introduction – Disk structure – Disk scheduling – Disk management.

UNIT-V

Case Studies: Linux → Introduction-History-Design Principles-File System-Memory Management-Windows → History, Design Principles, File System and Networking-Android → Why develop for Android, Android Development Basics.

TEXT BOOK

1. Operating System concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th edition, 2013, John Wiley & Sons, Inc.

REFERENCES

1. Deitel H.M. 2005. Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.
2. Pramod Chandra P. Bhatt. 2007. An Introduction to Operating Systems, 2nd Edition, Prentice Hall India, New Delhi.
3. Tanenbaum Woodhull. 2014. Operating Systems 4th Edition, Prentice Hall.
4. William Stallings. 2009. Operating Systems internals and Design Principles, 6th Edition, Prentice Hall of India, New Delhi.
5. Android Application development for dummies, Michael Burton, Donn Felker, 2nd Edition, Wiley.

WEB SITES

1. www.cs.columbia.edu/~nieh/teaching/e6118_s00/
2. www.clarkson.edu/~jnm/cs644
3. pages.cs.wisc.edu/~remzi/Courses/736/Fall2002/

Course Objectives

- To describe a good introduction to the discipline of database management systems.
- To give a good formal foundation on the data models and E-R model.
- To demonstrate the principles database constraints behind systematic database design by covering normalization concept.
- To introduce the concepts of basic SQL as a universal Database language.
- To have an introductory knowledge about the PL/SQL concept
- To normalize the existing database to various levels

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Demonstrate an understanding of the elementary features of RDBMS
2. Design conceptual models of a database using ER modeling for real life applications
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Able to develop structured query language (SQL) queries to create, read, update, and delete relational database
5. Design efficient PL/SQL programs to access Oracle databases
6. Demonstrate the principles database constraints behind systematic database design by covering normalization concept.

List of programs

1. Create a table, “Customer” with the following fields:

Field	Data type	Sample Values
Cust_name	Varchar2	Karpagam, Ananya
gender	Char	F or M
DOB	Date	
type	Varchar2	Credit or Cash
address	Varchar2	
city	Varchar2	
last_purchased	Date	

- a) Insert records into the table.
- b) List all male customers.
- c) List all female customers who live in Coimbatore.
- d) List all customers who bought things today for credit.

2. Create a parent table, “Suppliers” with the following fields:

Field	Data type	Constraints	Sample Values
Sup_code	Varchar2	Primary Key	A001, S001, A002
Name	Varchar2	Not null	Ananya, Shakthi, Ananth
gender	Char	Check (F / M)	F, M
type	Varchar2	Check (Credit / Cash)	Credit, Cash

address	Varchar2		
city	Varchar2		
Mobile	Number	unique	

Child table : Supply_items

Field	Data type	Constraints	Sample Values
Sup_code	Varchar2	Reference Key	
Item_Name	Varchar2	Not null	
Price	Number	Check (>=5 and <=250)	
Deliver_within	Number		1, 2, 3, ...

- Insert records into both the table.
 - List the suppliers name and city, who supply “Ice creams”
 - List the total number of different items along with the suppliers name.
 - List the suppliers name, who supply Biscuits within one day.
 - List all the female suppliers who supply for credit but do not supply Pepsi.
- Create the tables, Item (item_code, name, sell_price, qty_at_hand) and sales(item_code, s_date, qty_sold) with the required constraints.
 - Change the name of the item from “System” to “Computer System”.
 - Delete all the sales records if the item name is “Mouse”.
 - Insert a new attribute “Tax” to Sales table.
 - Fill the Tax field with the following value: 4% of selling price * sold quantity.
 - Delete the records from both the table, if the item have not been sold for the past 20 days.
 - Create a table, “Vehicle” with the following fields:

Field	Sample Values
V_code	B001, S001, C002, Auto,...
V_Name	Bike, Scooter, Car, Auto
Type	Only 2, 3, or 4. (Wheelers)
Company	
On_road_price	
Colour	Only Red,black, yellow or silver
Date_purchased	
Model	

- Insert the records. For V_code use sequence.
- Create a view on vehicle table, but only for silver colour four wheelers.
- Delete the vehicles whichever purchased before one year from the view.
- Select the records from the view, which have the on road rate between 3 and 7.5 lakhs.
- Drop the view
- Select all the silver colour cars. (observe the difference between view and a table)

5. Write a recursive program to find the factorial and Fibonacci for the given number using PL/SQL.

6. Create the following tables:

- (i) "Library_Books" with the following fields: Book_Acc_No (primary key), ISBN, Title, Author, Publication, Year_Pub (<=2008), Edition, Copies (minimum 1), Specification (CSC, Phy, Che, Eng, Fus, Bus,...)
- (ii) "Student" with the following fields: (primary key), Name, Gender(F / M), Course, (CSC, Phy, Che, Eng, Fus, Bus,...), Year(I, II, III)
- (iii) "Lend_Books" with the following fields: Book_Acc_No (Foreign key), Reg_no(Foreign key), Date_issued, Date_return. (Note: Book_Acc_No and Reg_no, both together provide uniqueness)

- a) Insert records in all the tables created.
- b) Write a trigger, to reduce the number of copies in the Library_Books table, whenever a book is lent to a student.
- c) List the books information, which is issued before Jan 1st, 2008, along with the student information who borrowed them.

7. Create a student detail database with roll number, name, date of birth, course, department, semester, percentage.

Field	Data type	Sample Values
RNo	Number	3
SName	Varchar2	15
DOB	Date	
Course	Varchar2	6
Dept	Varchar2	4
Semester	Varchar2	3
Percentage	Number	5,2

Insert 5 records into the database and perform the following operations.

1. Select all Records.
2. Select rollno, name, percentage from student.
3. Select distinct course and dept.
4. Select details of all students with percentage greater than 75.
5. Select roll number and name of all records sorted in order by percentage.
6. Select name of students belonging to 3rd semester MBA degree.
7. Select name, course and semester of all students not in MBA department.
8. Select all records where name is start with alphabet "A".

8. Create a table "Mobile", with the following fields: code (alphanumeric field), mobile_name, model, company, amount, warranty

- a) Generate the code automatically through a stored function. Code is an alphanumeric field. (Sample values : NOK001, SON001, SAM001, NOK002,...)
 - a. List all mobiles details, whose company name start with "S".

- b. Create another table “Nokia” from the Mobile table using CTAS concept, which includes only Nokia mobiles.
- c. Insert more records into Nokia table.
- d. Select all the records from both the table individually, to observe the link between these two tables.
- e. Select all the records from the Nokia table, which are not in Mobile table.
- f. Display the information about the second highest price Sony mobile.
- g. List the number of mobiles and the average price of each mobile company.
- h. List the mobiles information in company’s alphabetical order.
- i. List the mobile names and models, which have the palindrome model numbers.

9. Demonstrate a program for exceptional handling (using an employee database).

10. Consider the following database for a banking enterprise.

BRANCH(**branch_name**:string , branch_city:string , assets:real)

ACCOUNT(**accno**:int , branch_name:string , balance:real)

DEPOSITOR(**customer_name**:string , **accno**:int)

CUSTOMER(**customer_name**:string , customer_street:string , customer_city:string)

LOAN(**loan_number**:int , branch_name:string , amount:real)

BORROWER(**customer_name**:string , **loan_number**:int)

1) Create the above tables by properly specifying the primary keys and foreign keys.

2) Enter at least five tuples for each relation.

3) Find *all* the customers who have at least two accounts at the *main* branch.

4) Find all the customers who have an account at *all* the branches located in a specific city.

5) Demonstrate how you delete all account tuples at every branch located in a specific city.

11. Create table Department and Student with relevant fields and constraints. and enter the records. Create one more table : “Result”.

- Write a stored procedure using cursor, to get the input for Result table and enter into it.

12. Create the following tables:

- i) Parent table : “Department” with the following fields: Dept_code (primary key), Dept_name, Head
- ii) “Employee” : Fields – emp_code, dcode(foreign key), emp_name, basic_pay, experience, net_pay. [Note: primary key – emp_code, dcode, net_pay – default value is 0]
- iii) “Salary” (child table of Employee) : Fields – emp_id, dcode, Da, hra, cca, ia, ma, pf.
- iv) “Loan” (child table of Employee) : Fields – emp_id, dcode, house, vehicle, medical.

1. Insert records into Department and Employee tables.

2. Update net pay by calling a stored function.

3. Create a stored procedure to get the input for Loan table and enter the data as record into it.
4. Create a stored function, to calculate the DA, HRA, CCA, IA, MA and the Net pay of the employees. Enter the data as records into Salary table and update the net pay field in the Employee table.
5. Create a package including the above created procedure and function.

Calculation:

DA	103 % of Basic Pay
HRA	25 % of Basic Pay
CCA	1 % of Basic Pay
IA	1.1 % of Basic Pay
MA	8 % of Basic Pay
PF	12 % of Basic Pay
Net Pay	BP + DA + HRA + CCA + IA + MA – PF – Loan if any.

13. Normalize a student table (include the necessary filed) from 1NF to 4NF.

Some sample PL/SQL Programs

14. Write a recursive program for finding the factorial of a given number.
15. Write a recursive program for finding the first n Fibonacci number.
16. Write a PL/SQL program for multiplication tables 3, 4, 5 and 6.
17. Write a recursive program for finding the reverse of a given number.
18. Write SQL queries to illustrate the string functions and mathematical functions.
19. Write a program for finding the reverse of a given string.

Course Objectives

- To recognize the error in the number generated by the solution.
- To compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
- To apply method of interpolation and extrapolation for prediction.
- To recognize elements and variable in statistics and summarize qualitative and quantitative data.
- To calculate mean, median and mode for individual series.
- To outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

Course Outcomes (COs)

Upon completion of the course students shall be able to:

1. Recognize the error in the number generated by the solution.
2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
3. Apply method of interpolation and extrapolation for prediction.
4. Recognize elements and variable in statistics and summarize qualitative and quantitative data.
5. Calculate mean, median and mode for individual series.
6. Outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

UNIT-I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

UNIT – II

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion-Range, standard deviation, Coefficient of variation.

UNIT – III

Correlation – Meaning and definition - Scatter diagram –Karl pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – IV

Probability theory : Axioms of Probability–Addition theorem – Multiplication theorem–conditional Probability.

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

UNIT – V

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit.

TEXT BOOK

1. R.S.N.Pillai , Bagavathy. “Statistics”, S. Chand & Company Ltd. New Delhi, 2002.

REFERENCES:

1. Jerrold H.Zar, 2003, Bio-Statistical Analysis, Fourth Edition, Pearson Education, (Pte) .Ltd, New Delhi.
2. PA.Navnitham. 2006. Business Mathematics and Statistics, Jai Publishers, Trichy - 21,
3. S.P. Gupta . “Statistical methods”. Sultan Chand & Sons, New Delhi,2001.

Course Objectives

This course enables the students to

- To learn the basic concepts and applications of linear programming.
- To impart knowledge in concepts and tools of Operations Research.
- To know the constructive techniques to make effective business decisions
- Define and formulate linear programming problems and appreciate their limitations
- To Identify and develop operational research models from the verbal description of the real system
- To Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. Understand the basic concepts and application of operation research in various fields.
2. Understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively
3. Define and formulate linear programming problems and appreciate their limitations
4. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry
5. Identify and develop operational research models from the verbal description of the real system
6. Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

UNIT I

Linear Programming: Formulation of LPP – Graphical solution to LPP –Simplex method – Big M method and Duality in LPP.

UNIT II

Transportation model: Introduction – Mathematical Formulation –Finding initial Basic Feasible solutions – Optimum solution for non degeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem

UNIT III

The Assignment problem - Mathematical formulation of the problem – Hungarian method –Unbalanced Assignment problem- Maximization case in Assignment problem.

Queuing theory : Introduction – Characteristics of queuing system.Problems in (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) models .

UNIT IV

Inventory Control: Introduction – Costs involved in inventory – Deterministic EOQ models – Purchasing Model without and with shortage, Manufacturing Model without and with shortage -Price break.

UNIT V

PERT and CPM: Network representation – Calculation of Earliest expected time, latest allowable occurrence time.CPM - various floats for activities – critical path.

PERT –Time estimates in PERT- Probability of meeting scheduled date of completion of projects .

TEXT BOOK

1. Kanthi Swarup, Gupta P.K., Man Mohan., 2006. Operations Research, Sultan Chand & Sons, New Delhi. (For Unit I – V)

REFERENCES

1. Sharma J.K., 2009.Operations Research: Theory and Applications, Macmillan publishers India Ltd, New Delhi.
2. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2005(III edition), Resource Management Techniques, A. R. Publications, Nagapatinam.
3. Shanthi Sophia Bharathi D.,1999(II edition),Operations Research/Resource management techniques, Charulatha Publications.

Course Objectives

This course enables the students to

- To learn the basic concepts of sets, types of sets, functions and relations
- To understand about Pigeonhole principle, Permutation and Combination, Mathematical Induction
- To solve the problems using Recurrence relations and generating functions.
- To know the basic concepts of Logical Connectives, Graphs and Trees.
- To express ideas using mathematical notation
- To solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course, students will be able to

1. Familiar with elementary algebraic set theory.
2. Acquire a fundamental understanding of the core concepts in growth of functions.
3. Describe the method of recurrence relations.
4. Get wide knowledge about graphs and trees
5. Initiate to knowledge from inference theory
6. Solve problems with the help of tools of mathematical analysis.

UNIT-I

Mathematical logic: Connections well formed formulas, Tautology, Equivalence of formulas, Tautological implications, Duality law, Normal forms, Predicates, Variables, Quantifiers, Free and bound Variables.

UNIT-II

Relations: Properties of Binary relations – Equivalence relations - composition of relations, Closure of relations – Order relations – Partial order relations.

Functions: one-to-one, onto, one-to-one-onto functions – composition of functions, Inverse functions.

UNIT-III

Formal languages and Automata: Grammars: Phrase-structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata-Deterministic finite automata and Non deterministic finite automata-conversion of non deterministic finite automata to deterministic finite automata.

UNIT-IV

Lattices and Boolean algebra: Partial ordering, Poset, Lattices, Boolean algebra, Boolean functions, Theorems, Minimization of Boolean functions.

UNIT-V

Graph Theory: Directed and undirected graphs, Paths, Reachability, Connectedness, Matric representation, Euler paths, Hamiltonian paths, Trees, Binary trees simple theorems, and applications.

TEXT BOOK

1. Tremblay J.P., and R.P Manohar., 1975 . Discrete Mathematical Structures with applications to computer science, Tata Mc.Graw Hill, New Delhi. (For Unit I – V)

REFERENCES

1. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2002. Discrete Mathematics, A.R. Publications, Nagapattinam.
2. Veerarajan T., 2007, Discrete mathematics with graph theory and combinatorics, Tata Mc-graw hill companies, New Delhi.
3. Sharma.J.K, 2005 , Discrete Mathematics, Second Edition , Macmillan India Ltd.

Course Objectives

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes(COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives

- To understand the visual platform and apply the power of .Net technologies in programming
- To Create windows forms using arrays and flow control statements.
- To Learn to use Basic windows controls using Visual Basic.Net
- To Learn to use the classes and namespaces in the .NET Framework class library.
- To Develop Web Applications using Microsoft ASP.NET programming.
- To Understand the concept of Multiple Document Interface and the architecture of .NET

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Develop Windows based applications using Visual Basic.Net
2. Learn various tools in .net applications
3. Differentiate between the types of applications supported by .Net
4. Implement ADO.Net concept in VB.Net and ASP.Net applications
5. Create server side web applications using ASP.NET
6. Understand the concept of data sources and data bound controls in VB.NET and ASP.NET

UNIT-I

Getting Started With VB.NET: The Integrated Development Environment-IDE Components-Visual Basic: The Language -Variables-Constants-Arrays – Variables as Objects-Flow Control Statements- Writing and Using Procedures: Module Coding – Arguments-Working with Forms: Appearance of Forms- Loading and Showing Forms.

UNIT-II

Basic Windows Controls: Textbox Control- ListBox, CheckedListBox-Scrollbar and TrackBar Controls. More Windows Control: The common Dialog Controls-The Rich TextBox Control.The TreeView and ListView Controls -Designing Menus. Multiple Document Interface

UNIT- III

Handling Strings, characters and Dates: Handling Strings and Characters – Handling Dates. Working with Folders and Files: Accessing Folders and Files – Accessing Files. Drawing and Painting with Visual Basic: Displaying Images – Drawing with GDI – Co-ordinate Transformation – Bitmaps.

UNIT-IV

Web forms and ASP.NET: Web forms, web controls-ASP.NET Configuration, Scope and state- ASP.NET and state-The Application Object-ASP sessions-The Session object-ASP.NET objects and components-Active server components and controls.

UNIT-V

Web server and ASP.NET-ASP.NET and SQL server-Using SQL server, using database in ASP.NET applications, ActiveX data objects-The ADO.NET objects model.

TEXT BOOK

1. Jeffrey R. Shapiro. 2008. The Complete Reference Visual Basic.Net, 1st Edition, Tata -McGraw-Hill Edition, New Delhi.
2. Evangelos Petroustos. 2002. Mastering Vb. Net, SYBEX Inc., USA.
3. Dave Mercer. ASP.NET – Beginner’s Guide. 2nd Edition, New Delhi: MCGraw Hill, 2003.

REFERENCES

1. Richard Bowman. 2002. Visual Basic.Net, Hungry Minds Inc. Publication, Canada
2. Bill Eyjen, Scott Hanselman, Farhan Mohammed, Srinivasa Siva Kumar and Devin Rader. 2006. Asp.Net 2.0, Wiley Publication, USA.
3. Greg BucZek. Asp.Net Tips and Techniques, 1st Edition, New Delhi: Tata McGraw Hill Publications 2005.

WEB SITES

1. <http://visualbasic.w3computing.com/vb2008/>
2. http://www.tutorialspoint.com/vb.net/vb.net_environment_setup.htm
3. <http://www.msdotnet.co.in>
4. <http://www.w3schools.com/>

Course Objectives

- To master the fundamentals of data communications networks by gaining a working knowledge of data transmission concepts.
- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To read the fundamentals and basics concepts of Physical layer with real time examples
- To study data link layer concepts, design issues, and protocols.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer and Application layer.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the functions of each layer in OSI and TCP/IP model.
2. Explain the multiplexing, switching concept and types of transmission media with real time examples.
3. Understand the error detection and correction methods and can implement the data link layer protocols
4. Understand channel error detection and correction, MAC protocols, Ethernet and WLAN.
5. Learn different medium access method to avoid collision and to learn about routing table.
6. Learn basic functionalities of transport layer and application layer.

UNIT-I

Data Communication: An Overview – Protocols and Standards. Network Models: The OSI Model and Layers – TCP/IP Protocol Suite – Addressing. Physical Layer: Analog and Digital Signals – Transmission Impairments.

UNIT-II

Physical Layer: Multiplexing – Frequency Division Multiplexing-Wavelength Division Multiplexing– Synchronous Time-Division Multiplexing– Statistical Time Division Multiplexing. Transmission Media - Guided Media- Twisted pair and coaxial cable - Fiber optic cable-Unguided Transmission Media Switching – Circuit Switched Networks-Datagram Networks – Virtual Circuit networks.

UNIT-III

Data Link Layer: Error Correction and Detection – Framing – Flow and Error Control – Protocols – Noisy and Noiseless Channel – Multiple Access.

UNIT-IV

Network Layer: IPv4 addresses – Internetworking – IPv4 – Delivery and Forwarding – Unicast Routing Protocols.

Transport Layer: Process to Process Delivery – User Datagram Protocol – Transmission Control Protocol.

UNIT-V

Transport Layer: Data Traffic – Congestion Control.

Application Layer: Electronic Mail – File Traffic – WWW and HTTP – Symmetric Key and Asymmetric Key Cryptography – Security Services – Message Integrity – Message Authentication – Digital Signature.

TEXT BOOK

1. Behrouz A. Forouzan. 2006. Data Communication and Networking, 4th Edition, McGraw Hill, New Delhi.
(Page Nos. : 3-6, 19-21, 27-50, 57-94, 161-185, 191-207, 213-227, 267-300, 307-339, 363-390, 549-565, 579-595, 647-677, 703-735, 824-844, 851-868, 935-955, 961-962, 964-976, 981-989)

REFERENCES

1. Andrews S. Tanenbaum. 2003. Computer Networks. 4th Edition, Prentice Hall of India, New Delhi.
2. Douglas E. Comer. 2000. Computer Networks and Internets, 2nd Edition. Pearson Education Asia, New Delhi.
3. Stanford H. Rowe and Marsha L. Schuh. 2005. Computer Networking, 1st Edition, Pearson Education,
4. William Stallings. 2007. Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. www.mhhe.com/engcs/compsci/forouzan/
2. www.amazon.com/Data-Communications-Networking-Behrouz-Forouzan/dp/0072923547
3. highereducation.mcgraw-hill.com/sites/0072515848/information_center_view0/ -

Course Objectives

- To describe characteristics and functioning of common graphics input/output devices
- To learn the basic principles of 3- dimensional computer graphics
- To Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition
- To Provide an understanding of mapping from a world coordinates to device coordinates and projections.
- To extract scene with different clipping methods and its transformation to graphics display device.
- To explore projections and visible surface detection techniques for display of 3D scene on 2D screen

Course Outcomes(COs)

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this..

UNIT-I

A Survey of Computer Graphics- Video Display Devices- Refresh cathode-Ray Tubes- Raster Scan Displays-Random Scan Displays-Color CRT Monitors-Direct –View Storage Tubes-Flat Panel Displays-Raster Scan Systems-Three Dimensional Viewing Devices-Random Scan Systems.

UNIT-II

Input Devices: Keyboards-Mouse –Joysticks- digitizers-Image Scanners- Touch Panels-Light Pens-Voice Systems-Wireless I/O devices **-Hard Copy Devices:** Printers and Plotters

UNIT-III

Point and Lines- Line Drawing Algorithms: DDA Algorithm- Bresenham's Line Algorithm. **Circle Generating Algorithms:** Mid Point Circle Algorithm. Two Dimensional Geometric Transformations: **Basic Transformations:** Translation-Rotation-

Scaling-Composite Transformations: Translations-Rotations- Scaling. General Pivot Point Rotation- General Fixed Point Scaling.

UNIT-IV

Two Dimensional Viewing: The Viewing Pipeline- Window to view port Transformation-**Clipping Operations**-Point Clipping -Line Clipping: Cohen Sutherland Line Clipping. Polygon Clipping: Sutherland –Hodgeman Polygon Clipping-Text Clipping.

UNIT-V

Three – Dimensional Display Methods-Parallel Projection- three Dimensional Geometric Transformations: Translation-Rotations- Scaling. **Projections:** Parallel Projections-Perspective Projections. **Visible Surface Detection Methods:** Classification of Visible Surface Detection Algorithms-Back Face Detection-Depth Buffer Method-Depth Buffer Method- Area Sub division Method.

TEXT BOOK

1. Donald Hearn and M. Pauline Baker. 2007. Computer Graphics-C Version, 2nd Edition, Pearson Education, New Delhi.
(Page Nos. : 24-54, 56-77, 80-92, 103-118, 204-215, 236-256, 427-443, 458-463, 490-495, 502-505)

REFERENCES

1. Amarendra N. Sinha. 2008. Computer Graphics, 1st Edition, Tata McGraw Hill, New Delhi.
2. Foley, Vandam, Feiner and Hughes. 1999. Computer Graphics Principles and Practices, 2nd Edition, Addison Wesley, Singapore.

WEB SITES:

1. www.cgshelf.com
2. www.cgtutorials.com
3. www.allgraphicdesign.com

Course Objectives

- To learn and understand technical aspect of Multimedia Systems.
- To understand the standards available for different audio, video and text applications.
- To Design and develop various Multimedia Systems applicable in real time.
- To learn various multimedia authoring systems.
- To understand various networking aspects used for multimedia applications.
- To develop multimedia application and analyze the performance of the same.

Course Outcomes (COs)

1. Developed understanding of technical aspect of Multimedia Systems.
2. Understand various file formats for audio, video and text media.
3. Develop various Multimedia Systems applicable in real time.
4. Design interactive multimedia software.
5. Apply various networking protocols for multimedia applications.
6. To evaluate multimedia application for its optimum performance.

UNIT-I

Definition of multimedia – Introduction to making multimedia: the stages of a project – Basic software tools-Using Text in multimedia - font editing and design tools – hypermedia and hypertext.

UNIT-II

Introduction to Photoshop 6: Interfaces and Navigation-Tools-Text-Working in Photoshop-Creating new documents-Saving Files.

UNIT-III

Displaying the Images- Using Rulers, Guides and Grids – Making Selections- Layers and Types-Choosing Colors-Creating Brushes- painting & editing Tools- Making and Applying Gradients.

UNIT-IV

Introduction to Flash: Variables & data types- Data types in Action Script-Creating and placing variables – Buttons with text fields.

UNIT-V

Basic Actions: Play, stop, Back & forth- Between frames and scenes – Timelines – External scripts-Loops.

TEXT BOOKS

1. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, DreamTech Press, New Delhi.
(Page Nos : 1-19, 20-36, 51-69)

2. Steve Romaniello. 2001. Mastering Photoshop 6, 1st Edition, BPB Publications, New Delhi.
(Page Nos : 1-16, 21-24, 39-50, 70-79, 107- 122, 195-213, 256-289)
3. Tay Vaughan. 2008. Multimedia making it Work, 7th Edition, Tata McGraw-Hill, New Delhi.
(Page Nos : 1-11, 18-23, 50-56, 262-276)

REFERENCES

1. Dinesh Maidasani. 2006. Flash 8, 1st Edition, Firewall Media Publications, New Delhi.
2. Robert Shufflebotham. 2004. Photoshop CS in Easy Steps, 1st Edition, DreamTech Press, New Delhi.
3. Ze-Nian Li and Mark S. Drew. 2004. Fundamentals of Multimedia, Pearson Education, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Multimedia
2. www.arena-multimedia.com/ -
3. www.nextwavemultimedia.com/

Course Objectives

- To introduce students to the basic concepts and techniques of Data Mining.
- To understand data mining fundamentals and characterize the kinds of patterns that can be discovered by association rule mining
- To compare and evaluate different data mining techniques like classification, prediction, etc.
- To cluster the high dimensional data for better organization of the data
- To describe complex data types with respect to spatial and web mining
- To design data warehouse with dimensional modelling and apply OLAP operations.

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Understand the basic concepts and techniques of Data Mining
2. Extract knowledge using data mining techniques and Implement Preprocess the data for mining applications and apply the association rules for mining the data
3. Design and deploy appropriate classification techniques
4. Understand the concept of clustering and its real time applications
5. Explore recent trends in data mining such as web mining, spatial-temporal mining
6. Analyze the basic concepts of data warehouse and OLAP operations

UNIT I

Data Mining: Introduction: Basic Data Mining Tasks – Data Mining versus Knowledge Discovery in Database Mining Issues and Mechanisms. Data Mining Techniques: Statistical Perspective on Data Mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.

UNIT II

Classifications: Bayesian Classification – Distance Based Algorithms – K-Nearest Neighbor. Clustering: K-Means Clustering –Clustering with Genetic Algorithms – Clustering with Neural Networks. Association Rules – Basic Algorithms – Parallel and Distributed Algorithms – Comparing Approaches – Generalized and Multilevel Association Rules. Web Mining: Web Content Mining: Personalization.

UNIT III

Data Warehousing: Introduction – Architecture – System Process-Process Architecture.Design: Database Schema – Partitioning Strategy – Aggregations – Data Marting – Meta Data.

UNIT IV

Hardware and Operational Design : Hardware Architecture – Physical layout – Security – Backup and Recovery – Service Level Agreement – Operating and Data Warehousing.

UNIT V

Capacity planning – Tuning and Data Warehouse – Testing and Data Warehouse – Data Warehouse Futures. Application: Data warehousing and data mining in government: Introduction-national data warehouses-other areas for data warehousing and data mining.

TEXT BOOK

1. Sam Anahory and Dennis Murray. 2009. Data Warehousing in the Real World, Pearson Education, New Delhi.

REFERENCES

1. Margaret H. Dunham. 2004. Data Mining Introductory and Advanced Topics, Pearson Education, 2004.
2. Pieter Adriaans, Dolf Zantinge. 1998. Data Mining, Addison Wesley.
3. Jiawei Han and Micheline Kamber. 2006. Data Mining – Concepts and Techniques, 1st Edition, Morgan Kaufmann Publishers, Mumbai.

WEB SITES

1. Thedacs.Com
2. Dwreview.Com
3. Pcai.Com
4. Eruditionhome.Com

Course Objectives

- To provide an overview of an exciting growing field of Big Data analytics.
- To discuss the challenges traditional data mining algorithms face when analyzing Big Data.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To introduce to the students several types of big data like social media, web graphs and data streams.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support

Course Outcomes(COs)

1. Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
2. Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.
3. Implement several Data Intensive tasks using the Map Reduce Paradigm
4. Apply several newer algorithms for Clustering Classifying and finding associations in Big Data
5. Design algorithms to analyze Big dat a like streams, Web Graphs and Social Media data.
6. Design and implement successful Recommendation engines for enterprises.

UNIT-I

Fundamentals of Big Data - The Evolution of Data Management Understanding the Waves of Managing Data- Defining Big Data - Big Data Management Architecture- The Big Data Journey -Big Data Types-Defining Structured Data-Defining Unstructured Data-Putting Big Data Together.

UNIT-II

Big Data Stack- Basics of Virtualization - The importance of virtualization to big data - Server virtualization - Application virtualization - Network virtualization -Processor and memory virtualization - Data and storage virtualization-Abstraction and Virtualization-Implementing Virtualization to Work with Big Data.

UNIT-III

Hadoop - Hadoop Distributed File System - Hadoop MapReduce- The Hadoop foundation and Ecosystem.

UNIT-IV

Big Data Analytics-Text Analytics and Big Data-Customized Approaches for Analysis of Big Data

UNIT-V

Integrating Data Sources-Real-Time Data Streams and Complex Event Processing-Operationalizing Big Data.

TEXT BOOK

1. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman. 2013. Big Data For Dummies, Wiley India, New Delhi.

REFERENCES

1. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan. 2012. Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, New Delhi.
2. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author). 2013. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, New Delhi.
3. Zikopoulos, Paul, Chris Eaton. 2011 .Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, New Delhi.

WEB SITES

1. www.oracle.com/BigData
2. www.planet-data.eu/sites/default/files/Big_Data_Tutorial_part4.pdf
3. www.ibm.com/developerworks/data
4. www.solacesystems.com
5. en.wikipedia.org/wiki/Big_data
6. www.sap.com/solution/big-data.html

Course Objectives

- To Provide a good understanding of the concepts, standards in Cloud computing
- To make the student understand about the cloud service providers and their usage.
- To learn how to secure the data in cloud depending.
- To understand the various service level agreements.
- To understand the cloud using various case studies.
- to portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.
2. Know the architecture of the cloud and the usage of clouds.
3. Secure their data from the security issues.
4. Make the students to work based on the various service level agreements.
5. Work with the traditional cloud and Microsoft azure, etc.
6. Provide a good understanding of the concepts, standards and protocols in Cloud computing

UNIT-I

First Drive: Introduction-Essentials-Benefits-Why Cloud-Business and IT perspective-cloud and virtualization-cloud service requirements-cloud and dynamic infrastructure-cloud computing characteristics-cloud adoption-cloud rediments. **Cloud Deployment Models:** Introduction-Cloud characteristics-Measured service-Cloud deployment models-Security in a public cloud-Public versus Private clouds-cloud infrastructure self-service.

UNIT-II

Cloud as a service: Introduction-Gamut of cloud solutions-Principal technologies-Cloud strategy-Cloud design and implementation using SOA-Conceptual cloud model-Cloud service definitions. **Cloud solutions:** Introduction-Cloud ecosystem-cloud business process management-cloud service management- On-premise cloud orchestration and provisioning engines-computing on demand(CoD)-Cloud sourcing.

UNIT-III

Cloud offerings: Introduction-Information storage, retrieval, archive and protection-Cloud analysis-Testing under cloud-Information security-Virtual desktop infrastructure-Storage cloud. **Cloud management:** Governance-High availability and disaster recovery-Charging models, usage reporting, billing and metering.

UNIT-IV

Cloud virtualization technology: Introduction-Virtualization defined- Virtualization benefits-Server Virtualization- Virtualization for x86 architecture-Hypervisor management software- Virtual infrastructure requirements. **Cloud infrastructure:** Introduction-storage Virtualization-storage area networks- Network-Attached storage- Cloud server Virtualization-networking essential to cloud.

UNIT-V

Cloud and SOA: Introduction-SOA journey to infrastructure-SOA and cloud-SOA defined-SOA and IAAS- SOA-based cloud infrastructure steps. **Cloud mobility:** Introduction-the business problem-Mobile enterprise application platform-Mobile application platforms – Mobile application architecture overview.

TEXT BOOK

1. Dr Kumar Saurabh.2012. Cloud Computing, 2nd Edition, Wiley India.

REFERENCES

1. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. 2010. Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
2. Barrie Sosinsky .2010. Cloud Computing Bible, Wiley- India
3. Rajkumar Buyya, James Broberg, Andrzej M Goscinski. 2011. Tata Mc-Graw Hill, New Delhi.
4. Ronald L. Krutz, Russell Dean Vines. 2010. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley -India

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx

Course Objectives

- To understand the visual platform and apply the power of .Net technologies in programming
- To Create windows forms using arrays and flow control statements.
- To Learn to use Basic windows controls using Visual Basic.Net
- To Learn to use the classes and namespaces in the .NET Framework class library.
- To Develop Web Applications using Microsoft ASP.NET programming.
- To Understand the concept of Multiple Document Interface and the architecture of .NET

Course Outcomes (COs)

Upon completion of this course the students will be able to:

7. Develop Windows based applications using Visual Basic.Net
8. Learn various tools in .net applications
9. Differentiate between the types of applications supported by .Net
10. Implement ADO.Net concept in VB.Net and ASP.Net applications
11. Create server side web applications using ASP.NET
12. Understand the concept of data sources and data bound controls in VB.NET and ASP.NET

VB.Net

1. Calculate Simple interest and compound Interest
2. Find mouse events and coordinates where the mouse is clicked.
3. Implement Notepad
4. Draw several shapes and fill with color.
5. Perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
6. Calculate the days elapsed between the given two dates.
7. Create Menu and link multiple forms with different colors.
8. Animate the picture using animation control.
9. Implement Employee Payroll using ADO.
10. Create and manipulate a File.

ASP.Net

11. Write a program to create a Web-based calculator.
12. Write a program for database connectivity to retrieve student information.
13. Write a program to retrieve Cookies information.
14. Write a program to count web page hits.
15. Write a program to find Fibonacci series and Factorial of a given number.

Course Objectives

- To give the students a basic understanding of e-learning.
- To understand the standards available for different audio, video and text applications.
- To develop simple animations using Flash.
- To include audio files in animations and edit them in sound forge.
- To create and edit video files using Adobe Premiere
- To develop multimedia application and analyze the performance of the same.

Course Outcomes (COs)

1. Developed understanding of technical aspect of E-Learning.
2. Understand various file formats for audio, video and text media.
3. Develop simple animations using Flash.
4. Include audio files in animations and edit them in sound forge.
5. Create and edit video files using Adobe Premiere
6. Evaluate multimedia application for its optimum performance.

UNIT-I

E-Learning Evolution - Advantages and Disadvantages of E-Learning - Instructional design Models for E-Learning -Applying User-Centered Design to E-Learning - Methods and Measures to Retain Students Enrolled in Online Education -Choosing an Effective Communication Tool.

UNIT-II

Flash : Geometric shape tools – Drawing tools- fill and stroke controls- Selection Tools.

UNIT-III

Creating Animation and Effects: Animation strategies – TimeLine Animation – Character animation Techniques – fundamentals of Editing.

UNIT-IV

Sound: Import and Export formats – Importing sound to flash – adding sound to timeline – synchronizing audio to animations- stopping sounds – Working with sound forge.

UNIT-V

Video: Integrating and Importing Video – Editing video with Adobe Premiere – Organizing & Editing clips – Adding Transition between clips – Adding special effects to video.

TEXT BOOKS

1. Robert Reinhardt and Snow Dowd. 2006. MacroMedia flash 8 Bible, 1st Edition, Wiley India (P) Ltd, New Delhi.

(Page Nos.:111 -146, 309-323, 325-349, 423-428, 461-476, 545-567)

2. Pamela Berman, institute for Interactive Technologies, Bloomsburg University of Pennsylvania, USA (e-book), 2006, E-Learning Concepts and Techniques.
(Page Nos.:1-7, 13-17)

REFERENCES

1. Dinesh Maidasani. 2006. Flash 8, 1st Edition, Firewall Media Publications, New Delhi.
2. Fred T.Hofstetter. 2001. MultiMedia Literacy, Tata McGraw Hill, New Delhi.
3. NIIT. 2004. A guide to film Making with Software tools Adobe Premier and Sound forge, Prentice Hall of India, New Delhi.
4. Tay Vaughan. 2008. Multimedia making it work, 7th Edition, Tata McGraw-Hill, New Delhi.

WEB SITES

1. iit.bloomu.edu/spring2006_ebook_files/**ebook_spring2006**.pdf (E-Learning Concepts and Techniques)
2. en.wikipedia.org/wiki/Multimedia
3. www.arena-multimedia.com/ -
4. www.nextwavemultimedia.com/
5. <http://www.bmf.hu/conferences/mtn2005/Bucko.pdf>

Course Objectives

- To Apply their knowledge of mathematics, sciences, and computer science to the modeling, analysis, and measurement of software artifacts.
- To Work effectively as leader/member of a development team to deliver quality software artifacts.
- To Analyze, specify and document software requirements for a software system.
- To Implement a given software design using sound development practices.
- To Verify, validate, assess and assure the quality of software artifacts.
- To Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.

Course Outcomes(COs)

1. Apply their knowledge of mathematics, sciences, and computer science to the modeling, analysis, and measurement of software artifacts.
2. Analyze, specify and document software requirements for a software system.
3. Implement a given software design using sound development practices.
4. Verify, validate, assess and assure the quality of software artifacts.
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its scope and risks, and estimate its cost and time.
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.

UNIT-I

Introduction to Software Engineering: The Evolving Role of Software-Software-Software Myths- A Generic View of process: Software Engineering –A Layered Technology-Process Models: Prescriptive Models- Waterfall Model- Incremental process Models. Evolutionary Process Models: Prototyping, The Spiral Model. Specialized process Models

UNIT-II

Building the Analysis Model: Requirements Analysis-Analysis Modeling Approaches-Data Modeling Concepts: Data Objects-Data attributes-Relationships Cardinality and Modality-Flow Oriented Modeling: Creating Data Flow Model-Creating a Control Flow Model-The Control Specification-The Process Specification- Creating a Behavioral Model.

UNIT-III

Design Engineering: Design with the Context of Software Engineering-Design Process and Design Quality-Design Concepts-Creating An Architectural Design: Software

Architecture-Data Design-Architectural Design- Assessing Alternative Architectural Designs-Mapping Data Flow into Software Architecture.

UNIT-IV

Performing User Interface Design: The Golden Rules: Place the User in Control-Reduce the User's Memory Load-Make the Interface Consistent- User Interface Analysis and Design: Interface Analysis and Design Models- The Process- Interface Analysis: User Analysis - Task analysis and Modeling. Interface Design Concepts-Appling Interface Design Steps-User Interface Design Patterns-Design Issues –Design Evolution.

UNIT-V

Testing Tactics: Software Testing Fundamentals- Black -Box and White-Box Testing- White Box Testing-Basis Path Testing- Control Structure Testing: Condition Testing- Data Flow Testing-Loop Testing- Black Box Testing- Quality Concepts: Quality- Quality Control –Quality Assurance –Cost Of Quality.

TEXT BOOKS

1. Roger S. Pressman. 2010. Software Engineering – A Practitioner's Approach, 7th Edition, McGraw Hill International Edition, New Delhi.
(Page Nos .: 34-93, 208-215, 226-232, 248-250, 259-271, 287-298, 304-306, 356-381, 420-439, 462-464)

REFERENCES

1. Ian Sommerville. 2005. Software Engineering 6th Edition, Pearson Education Publication, New Delhi. Daniel Hoffman and Paul Strooner. 2006. Software Design Automated Testing and Maintenance, Thomson Publications, Asia.
2. Kalkar S.A. 2007. Software Engineering a Concise Study, 1st edition, Prentice Hall of India, New Delhi.
3. Richard Fairley. 1998. Software Engineering Concepts, 1st Edition, Tata McGraw Hill Publishing, New Delhi.
4. Stephen Schach. 2007. Software Engineering, 7th Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. http://en.wikipedia.org/wiki/Software_engineering
2. <http://www.onesmartclick.com/engineering/software-engineering.html>
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Course Objectives

- To understand the fundamentals of HTML and use different formatting options
- To creation of tables and frames
- To relate with DHTML and CSS
- To develop open source applications that deal with database and website development.
- To establish a working environment for PHP web page development
- To get Familiar with GUI, coded, modified controls

Course Outcomes(COs)

1. Understand the fundamentals of HTML and use different formatting options
2. Creation of tables and frames
3. Relate with DHTML and CSS
4. Develop open source applications that deal with database and website development.
5. Establish a working environment for PHP web page development
6. Familiarity with GUI, coded, modified controls

UNIT-I

HTML: Introduction to HTML- History Of HTML-Structure of HTML-Formatting Text :Font type, Font Size, Big ,Small, bold ,italic, color, superscript , Subscript, striking out, Underlining the text , Predefined fonts , Pre formatted Text, Blinking Text and Block Quotes. Lists: Ordered, Unordered and Definition List. Creating Link - Images. Tables: Creating Table –Dividing Table into Columns- Dividing Table into Rows- Creating Headers- Adding Border –Putting a Background Image- Heading across two or more columns- Changing color of the cell-aligning the content –Display of Tables. Frames

UNIT-II

Forms: Working with forms-Creating forms-working with menus- working with Radio buttons- check boxes-textboxes-text areas- password boxes-submit button-Resetting the form. DHTML: Heading and Horizontal line-Hidden Message-Message at the center of the page- Moving Boxes- Changeable Box- CSS: Introduction- Creating Style Sheets- Common Tasks with CSS- Colors-The Font Family.

UNIT-III

JavaScript: Introduction-Operators-Starting with JavaScript- Using Quotes-Using Alerts-Functions-Variables-data types- Statements-Comments. Objects: Working with Objects- Date Object-Math Object-String Object--Handling Events in JavaScript-Event Handling attributes-Window Events-Window Object – Document Object-Navigator Object

UNIT-IV

PHP: Introduction-What is PHP?-Why PHP?-Basic PHP syntax-Comments in PHP- PHP5 variables-PHP5 echo and Print Statements- How Online PHP Programs Runs- PHP Datatypes-PHP String Functions

UNIT-V

Functions-Arrays-PHP Form Handling-GET,POST Methods-Form Validation-PHP File Handling-PHP Exception Handling. MySQL: Introduction to MySQL -Connecting to MySQL from a PHP application- Inserting and updating records in table- Deleting and retrieving data from table.

TEXT BOOK

1. Ramesh Bangia. 2008. Web Technology, 1st Edition, Firewall Media Publications, New Delhi (Chapters : 4,5,6 and 11)
2. Dave W.Mercer, Allan Kent, Steven D.Nowicki, David Mercer, Dan Squie, Wankyu Choi.2006. Beginning PHP5. Wiley India (P) Ltd, New Delhi

REFERENCES

1. Deitel H.M., P.J.Deitel and A.B.Goldberg. 2007. Internet & World Wide Web, 3rd Edition, Pearson Education Asia, New Delhi.
2. Jeffrey C. Jackson. 2007. Web Technologies, 3rd Edition, Pearson Education Publishers, New Delhi.
3. Rohit Khurana. 2002. JavaScript, 1st Edition, A.P.H Publishing, New Delhi.
4. Xavier C. 2003. Web Technology and Design, 1st Edition, New Age International Publishers, New Delhi.
5. Luke welling, Laura Thomson, 2010. PHP and MySQL Web Development, 4th Edition, Pearson education.
6. Tim Converse & Joyce Park with Clark Morgan . 2006. PHP5 & MySQL Bible, 1st Edition, John Wiley, India.

WEB SITES

1. www.w3schools.com/
2. alexle.net/archives/category/web-technology
3. jmarshall.com/easy/
4. www.php.net/
5. en.wikipedia.org/wiki/PHP
6. www.w3schools.com/PHP/DEfaULT.asp

Course Objectives

- To identify the licensing of open source systems and make decisions on their use, based on an understanding of the legal, economical and technical issues.
- To find open source projects related to a given development problem.
- To install from source code an open source project and start using it.
- To choose the correct license, development model, and development community for open source projects, and can initiate a new project or join an existing project.
- To understand the OSS Perl and its fundamental concepts
- To develop a Perl application and connect it to MySQL

Course Outcomes(COs)

1. Can identify the licensing of open source systems and make decisions on their use, based on an understanding of the legal, economical and technical issues.
2. Can find open source projects related to a given development problem.
3. Can install from source code an open source project and start using it.
4. Can choose the correct license, development model, and development community for open source projects, and can initiate a new project or join an existing project.
5. Understand the OSS Perl and its fundamental concepts
6. Can develop a Perl application and connect it to MySQL

UNIT I

Overview of Free/ Open Source Software: The Open Source Definition - Examples of OSD Compliant Licenses - Examples of Open Source Software Product – The Open Source Software Development Process – A History of Open Source software: The Berkeley Software Distribution – The Free Software Foundation – Linux – Apache – Mozilla – Open Source Software.

UNIT II

Qualification: Defining Open Source Software – Categorizing Defining Open Source Software – Specific Characteristics of Open Source Software Transformation: The OSS Development Process – Taboos and Norms in OSS Development – The OSS Development Life Cycle – Deriving a Framework for Analyzing OSS – Zachman’s Framework for IS Architecture – CATWOE and Soft System Method – Deriving the Analytical Framework for OSS.

UNIT III

Environment: The “where” of OSS – the “when” of OSS – World View: A Framework for classifying OSS Motivations – Technological Micro-level (individual) motivation – Economic Micro-level and Macro-level (individual) Motivation – Socio-political Micro-level and Macro-level (individual) Motivation.

Open Source Server Applications: Infrastructure Services – Web Services – Database Servers – Mail Servers – Systems Management – Open Source Desktop Applications: Introduction – Graphical Desktops – Web Browsers – The Office Suite – Mail and Calendar Clients – Personal Software – Cost of OSS: Total Cost of Ownership – Types of Costs Licensing: Types of Licenses – Licenses in Use – Mixing Open and Close Code – Dual Licensing.

UNIT IV

Perl Programming

Perl - Introduction, Perl Basics: - Syntax, Variables, Strings, Numbers, Operators, Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays, Chop, Length, and Sub string. Hashes, Arguments, Logic, Looping, Files, Pattern Matching, Environment Variables, Using cgilib for Forms.

UNIT V

File Management PERL: - File Handling, Reading From Files, Appending Files, Writing to Files, File Checking, Reading Directories.

Databases PERL: - DBI Module, DBI Connect, DBI Query, MySQL Module, MySQL Connect, MySQL SelectDB, MySQL Query.

TEXT BOOK

1. Joseph Feller, Brain Fitzgerald, Eric S. Raymond, “Understanding Open Source Software Development”, Addison-Wesley Professional, 1st Edition, 2001.
2. Perl CookBook –Tom Christinasen & Nathan Torkington , O’Relliy ,SPD Pvt ltd,2006 Edition.

REFERENCES

1. PHP 5 and MySQL Bible Wiley Dream teck India Pvt.ltd 2006 Edition.

WEB SITES

1. www.php.net/
2. en.wikipedia.org/wiki/PHP
3. www.w3schools.com/PHP/DEfaULT.asP

Course Objectives

- To state the basic concepts in information security, including security policies, security models, and security mechanisms.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To understand principles of web security.
- To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- To understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
- To provide the learner will be able to examine secure software development practices.

Course Outcomes (COs)

A student who successfully completes this course should at a minimum be able to:

1. State the basic concepts in information security, including security policies, security models, and security mechanisms.
2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
6. The learner will be able to examine secure software development practices.

UNIT-I

Introduction to cybercrime: Introduction-Cybercrime: Definition and Information Security-who are cybercriminals? - Classification of cybercrimes. Cybercrime: The legal perspectives- cybercrimes: An Indian Perspective - cybercrime and the Indian ITA2000: Hacking and the Indian law(s) - A Global Perspective on cybercrimes: cybercrime and the Extended Enterprise - cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

UNIT-II

Cyberoffenses: How Criminals Plan Them: Introduction: categories of Cybercrime -How criminals Plan the Attacks: Reconnaissance, Passive Attacks, Active Attacks, Scanning and Scrutinizing Gathered Information, Attack (Gaining and Maintaining the system Access) -social Engineering: Classification of Social Engineering - Cyberstalking: Types

of stalkers, Cases Reported on Cyberstalking, How stalking Works?, real-life incident of Cyberstalking -Cybercafe and Cybercrimes

UNIT-III

Cybercrime: Mobile and wireless Devices-Introduction - Proliferation of Mobile and Wireless Devices - Trends in Mobility-Credit Card Frauds in Mobile and Wireless Computing Era: Types and Techniques of Credit Card Frauds - Security challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service security: cryptographic security, LDAP Security, RAS Security, Media Player Control Security, Networking API Security.

UNIT-IV

Mobile Devices: Security Implication for Organizations – Managing Diversity and Proliferation of Hand-Held Devices, Unconventional/ Steath Storage Devices, Threats through Lost and Stolen Devices, Protecting Data on lost devices, Educating the Laptop Users - Organizational Measures for Handling Mobile devices - Related Security Issues:

UNIT-V

Encrypting Organization Databases, Including Mobile Devices in Security Strategy - Organizational Security Policies and Measures in mobile Computing Era: Importance of Security polices relating to mobile Computing Devices, Operating Guidelines for Implementing Mobile Devices Security Polices, Organizational Policies for the Use of Mobile Hand - Held Devices - Laptops: Physical Security Countermeasures.

TEXT BOOK

1. Nina Godbole and Sunit Belapure. 2013. CYBER SECURITY. Wiley India Pvt. Ltd.

REFERENCES

1. Charles P. Pfleeger and Shari L. Pfleeger. 2003.
2. Dieter Gollmann . 2006. Computer Security. 2nd Edition . John Wiley & Sons.
3. Godbole, N. (2009) Information Systems Security :Metrics, Frameworks and Best Practices, Wiley India, New Delhi.
4. T. Marther, S. Kumaraswamy and S. Latif (2009). Cloud Security and Privacy: An Enterprise Perceptive on Risk and Complainece, O'Reilly.

WEB SITES

1. <http://www.csc.ncsu.edu/faculty/ning>
2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

Course Objectives

- To comprehend the basic concepts of the client-server model.
- To understand how client-server systems work.
- To differentiate between two-tier and three-tier architectures.
- To improve the performance and reliability of client server based systems.
- To identify security and ethical issues in client server computing
- To understand contemporary terminology, progress, issues, and trends of client server systems.

Course Outcomes (COs)

1. Comprehend the basic concepts of the client-server model.
2. Understand how Client-Server systems work.
3. Differentiate between two-tier and three-tier architectures.
4. Improve the performance and reliability of Client Server based systems.
5. Identify security and ethical issues in Client Server Computing
6. Ability to understand contemporary terminology, progress, issues, and trends of Client Server Systems.

UNIT-I Client/Server Computing

What is client/server-types of servers-FAT server-Fat clients-2tier vs 3-tier.client/server building blocks

UNIT-II Clients, Servers & Operating Systems

NOS Creating the single system image-RPC, Messaging and peer-to-peer

UNIT-III SQL Database servers

SQL Middleware and Federated Database-Data Warehouses

UNIT-IV Client/Server Transaction

Processing: The magic of transaction-TP monitors-TP Lite or TP heavy-TP Monitors: Meet the players

UNIT-V Client/Server Groupware

CORBA-Client/Server and the Internet: web client/server The Interactive era-client/server distributed system management

Text Book

1. Robert Orfali, Dan Harkey, Jeri Edwards,"Client/Server Survival Guide",3rd edition,Wiley India pvt Ltd,2008

Reference Books

- 1) Neil Jenkins et al, "Client/Server Unleashed", Techmedia, 1998 Satyapriya Battacharjee, "A Textbook of Client/Server Computing", 1st edition, Dominant Publishers & Distributors, 2001
- 2) Larry T. Vaughn, "Client/Server System Design & Implementation", Mc Graw Hill Inc, 1995 Alex Berson, "Client/Server Architecture", Mc Graw Hill Inc, 1994

Course Objectives

- To understand the fundamentals of HTML and use different formatting options
- To creation of tables and frames
- To relate with DHTML and CSS
- To develop open source applications that deal with database and website development.
- To establish a working environment for PHP web page development
- To get Familiar with GUI, coded, modified controls

Course Outcomes(COs)

1. Understand the fundamentals of HTML and use different formatting options
 2. Creation of tables and frames
 3. Relate with DHTML and CSS
 4. Develop open source applications that deal with database and website development.
 5. Establish a working environment for PHP web page development
 6. Familiarity with GUI, coded, modified controls
-
1. Create a HTML document which includes an unordered list, ordered list, definition list to your document and create a link to Yahoo.
 2. Create a table in HTML document with following formats
 - table with no borders
 - display table headers
 - to handle cells that have no content
 - table cells that span more than one row or one column
 - Adding background image to a table.
 3. Develop a HTML page to display an advertisement.
 4. Develop a HTML page to input information to create a mail id.
 5. Create a DHTML page using Various Filter on images, mask images, mask text
 6. Create a DHTML page to change background color of a dropdown list and to shake an image.
 7. Develop a Web page using Java script to perform the following information
 - Input student information.
 - Display student results for a given roll number.
 8. Develop a web page for online exam using Java Script.
 9. Design a form to submit your resume in net using PHP.
 10. Design an application to display cookies information using PHP
 11. Write a program to count web page hits.
 12. Design an application for creating an online Advertisement.

Course Objectives

- To make effective use of Java generic types.
- To write multi-threaded Java applications.
- To use the Reflection API for highly generic tasks, discovery, or code-generation.
- To use standard annotations and develop custom annotations to express meta-data in Java source files.
- To communicate between processes using network sockets.
- To create JDBC applications and connect them with other applications

Course Outcomes (COs)

1. Make effective use of Java generic types.
2. Write multi-threaded Java applications.
3. Use the Reflection API for highly generic tasks, discovery, or code-generation.
4. Use standard annotations and develop custom annotations to express meta-data in Java source files.
5. Communicate between processes using network sockets.
6. Create JDBC applications and connect them with other applications

UNIT-I

Graphics and Java2D: Graphics Contexts and graphics Objects – Color Control – Font Control – Drawing Lines, Rectangles, Ovals, Arcs, Polygons and Polylines – Java2D API. Graphical User Interface Components: Overview of Swing Components- JLabel – EventHandling – Textfields – How event handling works – JButton – JCheckBox and JRadioButton – JComboBox – JList – Multiple-Selection Lists – Mouse Event Handling – Adapter classes – Key Event Handling – Layout Managers – Panels – JTextArea – JPanel – JSlider – Using Menus with Frames – JPopupMenu – Pluggable Look-and-Feel.

UNIT-II

Exception Handling: Java Exception Hierarchy – Rethrowing and Exception – finally Clause – printStackTrace, getStackTrace and getMessage – Chained Exceptions. Multithreading: Life Cycle of a Thread – Thread Priorities and Thread Scheduling – Creating and Executing Thread – Thread Synchronization – Daemon Threads – Runnable Interface. Files and Streams: Data Hierarchy – Files and Streams – Class File – Creating a Sequential-Access File – Reading Data from a Sequential-Access File – Random-Access Files – Creating/Writing/Reading Random-Access Files – New I/O APIs for the Java Platform.

UNIT-III

Java Utilities Package and Bit Manipulation: Vector Class and Enumeration Interface – Stack Class of Package java.util – Hashtable Class – Properties Class – Bit Manipulation

and the Bitwise Operators – BitSet Class. Collections: Collections Overview – Class Arrays – Interface Collection and Class Collections – Lists – Sets – Maps.

UNIT-IV

Networking: Manipulating URLs – Reading a File on a Web Server –Client/Server Interaction with Stream Socket Connections. Multimedia: Loading, Displaying and Scaling Images – Animating a series of Images – Image Maps – Loading and Playing Audio Clips.

UNIT-V

Java Database Connectivity with JDBC: Relational Database Overview – SQL – Manipulating Databases with JDBC – Stored Procedures. Servlets: Servlet Overview and Architecture – Handling HTTP get /post Requests - Redirecting Requests to other Resources – Multi-Tier Applications. JSP: JSP Overview – Implicit Objects – Scripting – Standard Actions – Directives.

TEXT BOOK

1. Deitel & Deitel. 2007. Java How to Program, 6th Edition, Pearson Education Asia, New Delhi.
(Page Nos.: 32 – 58, 98-100, 121-193, 216-250, 280-306, 341-384, 400-427, 440-485, 505-543, 569-594, 611-663, 679-707, 751-770, 778-814, 833-897, 914-927, 1014-1025, 1098-1137, 1142-1167, 1178-1212, 1223-1249)

REFERENCES

1. Aaron walsh, Justin couch & Daniel H.Steinberg. 2000. Java 2 Programming, IDG Books India (P) Ltd., New Delhi.
2. Balagurusamy.E. 2000. Programming with Java, Tata Mc-Graw Hill, New Delhi.
3. Herbert Schildt, 2000. Java Complete Reference, Tata McGraw Hill, New Delhi.
4. ISRD Group. 2007. Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. java.sun.com/docs/books/tutorial/
2. www.en.wikipedia.org/wiki/Java
3. www.java.net/

Course Objectives

- To have an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

1. Identify the functions/ services of TCP/IP component and layer
2. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
3. Understand the routing IP datagrams and checksum.
4. Exposed to unicast and multicast routing.
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. Understand about SMTP and SNMP.

UNIT-I

Introduction: WAN, WAN technologies - Internetworking concepts - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT-II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum - ICMP Package

UNIT-III

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT-IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.

UNIT-V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets. Mobile IP : Addressing – Agents – Agent discovery – Registration – Data Transfer - VPN

TEXT BOOK

1. Behrouz A. Forouzan. 2009. TCP/IP Protocol Suite. 4th Edition, Tata McGraw Hill Publication, New Delhi.
(Page Nos: 2-5, 6-38, 69-74, 84-95, 102-121, 160-188, 191-1-201, 221-232, 238-241, 256-279, 299-304, 386-430, 441-444, 457-464, 471-488, 519-542, 561-566, 575-576, 621-632, 637-644, 680-682)

REFERENCES

1. Andrews S. Tanenbaum. 2003. Computer Networks, 4th Edition, Prentice Hall of India Private Ltd., New Delhi.
2. Buck Graham. 2007. TCP/IP Addressing, 2nd Edition, Harcount India Private Limited, New Delhi.
3. Douglas E. Comer. 2000. Computer Networks and Internets, 4th Edition. Pearson Education, New Delhi.
4. William Stallings. 2007. Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Internet_protocol_suite
2. http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
3. www.yale.edu/pclt/COMM/TCPIP.HTM
4. www.w3schools.com/tcpip/default.asp

Course Objectives

- To know the types of mobile wireless technologies that are currently being used
- To know the evolution of Mobile communication and cell concept to improve capacity of the system.
- To know the fading mechanism and types of fading and effect of fading on Mobile communication.
- To know the role of equalization in Mobile communication and to study different types of Equalizers and Diversity techniques.
- To know the types of channel coding techniques, data transmission modes and services of GSM.
- To know the types of channel coding techniques, data transmission modes and services of CDMA

Course Outcomes (COs)

- Know the types of mobile wireless technologies that are currently being used
- Know the evolution of mobile communication and cell concept to improve capacity of the system.
- Know the fading mechanism and types of fading and effect of fading on mobile communication.
- Understand the role of equalization in mobile communication and to study different types of equalizers and diversity techniques.
- Know the types of channel coding techniques, data transmission modes and services of GSM.
- Know the types of channel coding techniques, data transmission modes and services of CDMA

UNIT I

Wireless Communication :Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA –TDMA – CDMA – Cellular Wireless Networks

UNIT II

Wireless Networks : Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX - Wireless Local Loop

UNIT III

Mobile Communication Systems : GSM-architecture-Location tracking and call setup-Mobility management- Handover- Security-GSM SMS –International roaming for GSM- call recording functions-subscriber and service data mgt –Mobile Number portability -VoIP service for Mobile Networks – GPRS –Architecture-GPRS procedures-

attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing

UNIT IV

Mobile Network And Transport Layers : Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols– Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks

UNIT V

Application Layer : WAP Model- Mobile Location based services -WAP Gateway – WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WMLScripts – WTA - iMode- SyncML.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003.
2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, “Principles of Wireless Networks”, First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
3. C.K.Toh, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.

Course Objectives

- To understand the scope and evolution of soft computing
- To learn the various soft computing frame works
- To be familiar with design of various neural networks
- To be exposed to fuzzy sets and fuzzy logic
- To understand fuzzy measures and reasoning
- To learn genetic programming.

Course Outcomes(COs)

1. Understand the scope and evolution of soft computing
2. Learn the various soft computing frame works
3. Be familiar with design of various neural networks
4. Be exposed to fuzzy sets and fuzzy logic
5. Understand fuzzy measures and reasoning
6. Learn genetic programming.

UNIT-I

Introduction : Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Scope and Evolution– Models of Neural Networks – Feed forward Networks – Supervised Learning Neural Networks – Associative memory networks – Unsupervised learning networks – Special Networks.

UNIT-II

Fuzzy Sets and Fuzzy Logic : Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification– Intuition , inference, Rank ordering – Defuzzification – Max-membership principle, centroid method, center of sums, center of largest area.

UNIT-III

Fuzzy Measures and Reasoning: Fuzzy arithmetic and measures – Fuzzy reasoning – approximate reasoning – categorical, qualitative, syllogistic, dispositional – Fuzzy inference systems – fuzzy decision making – individual, multiperson, multi objective, Bayesian – fuzzy logic control system – architecture, model and application.

UNIT-IV

Machine Learning And Genetic Algorithm : Machine Learning Techniques – Machine Learning Using Neural Nets – Genetic Algorithms (GA) – Simple and General GA – Classification of Genetic Algorithm – Messy, Adaptive, Hybrid, Parallel – Holland Classifier System.

UNIT-V

Application and Implementation Soft Computing: Genetic algorithms -. Traveling Salesperson Problem, Internet Search Techniques – Fuzzy Controllers – Bayesian Belief networks for Rocket Engine Control – Neural Network, Genetic algorithm and Fuzzy logic implementation in C++ and Matlab.

TEXT BOOK

1.S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India Ltd., First Indian Edition, 2007

REFERENCES

- 1.Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
4. Amit Konar, “Artificial Intelligence and Soft Computing”, First Edition,CRC Press, 2000.
5. Simon Haykin, “Neural Networks: A Comprehensive Foundation”, Second Edition Prentice Hall, 1999.
6. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
7. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.

WEB SITES

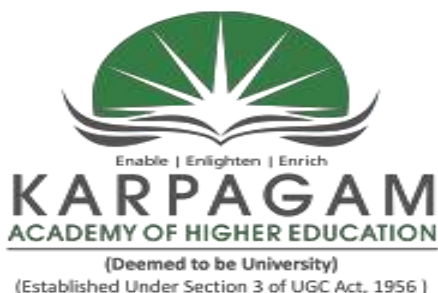
1. www.amazon.in/soft+computing
2. www.soft-computing.de/def.html
3. en.wikipedia.org/wiki/Soft_computing
4. endnote.com/downloads/style/applied-soft-computing
5. www.allbookez.com/soft-computing-lecture-notes/

M.Sc. COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2015 – 2016)



DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Eachanari(Post), Coimbatore – 641 021.

Tamilnadu, India

Phone No. 0422-2980011 - 15 Fax No: 0422-2980022-23

E mail ID: info@karpagam.com

Web: www.kahedu.edu.in

PROGRAM OUTCOMES: Post Graduate student of Computer Science programme will be able to

- a. Apply basic concepts of Computer Science to effectively involve in the research.
- b. Design software to meet required needs with realistic constraints such as economical, environmental, social, ethical and sustainable in the field of Computer Science.
- c. Design and conduct experiments as well as to analyze, interpret data on experiments relevant to Computer Science practice.
- d. implement software designs to provide working solutions, including use of appropriate programming languages, web-based systems and tools, design methodologies, and database systems
- e. To attain in depth knowledge and understanding the principles of programming for applying in broad range of languages and open source platforms.
- f. use IT skills and display mature computer literacy
- g. Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to computer science practice.
- h. Communicate effectively on complex research issues with research community and society, such as, being able to comprehend, write effective reports, design documentation and make effective presentations with clear instructions.
- i. Demonstrate knowledge and understanding of the computer science and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- j. Recognize the need for ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- k. Exhibit an outstanding association and active contribution in their professional including entrepreneurship using the information in Computer Science.
- l. Contribute effectively as a team member/leader using common tools and adopt latest technologies in education and solve real world problems.
- m. Pursue life-long learning and research in specific fields of Computer Science and develop novel and research oriented methodologies in an effective manner.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I: Understand analyze and develop computer programs in the areas related to Database systems and Big data Analytics, cloud computing, soft computing, IoT, Image processing, Green computing, web designing, mobile computing and networking for efficient design of computer based system of varying complexity.

PEO II: Apply standard software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality for business success.

PEO III: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

MAPPING of PEOs and POs

POs	a	b	c	d	e	f	g	h	i	j	k	l	m
PEO1	X		X	X	X	X			X	X		X	X
PEO2	X	X	X	X	X	X	X	X			X	X	
PEO3	X		X	X	X	X			X	X	X		X

DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF ARTS, SCIENCE AND HUMANITIES
PG PROGRAM (CBCS) – M.Sc. Computer Science
(2015–2016 Batch and onwards)

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEO	POs	L	T	P				
								40	60	100
SEMESTER - I										
15CSP101	Web Technology	I	c,d	3	1	0	4	40	60	100
15CSP102	Cryptography and Network Security	I	a,g	4	0	0	4	40	60	100
15CSP103	Data Mining and Warehousing	I	b,c	4	0	0	4	40	60	100
15CSP104	Cloud Computing	III	b,g	4	0	0	4	40	60	100
15CSP105	Wireless and Mobile Computing	I	b	4	0	0	4	40	60	100
		III	g							
		II	c							
15CSP111	Web Technology Lab	I	c,d	0	0	4	2	40	60	100
15CSP112	Data Mining Lab using MATLAB	I	b,c	0	0	4	2	40	60	100
Seminar Presentation		III	h	0	2	0	-	-	-	-
Semester Total				19	3	8	24	280	420	700
SEMESTER – II										
15CSP201	Internetworking with TCP/IP	I	c	4	1	0	5	40	60	100
15CSP202	Cyber Security	I	b,g	5	0	0	5	40	60	100
15CSP203	Software Project Management	I	b,c	5	0	0	5	40	60	100
15CSP204A	Software Testing	I	b,g	5	0	0	5	40	60	100
15CSP204B	Soft Computing	II	c							
15CSP204C	Object Oriented Analysis and Design with UML	I	d							
15CSP204D	Grid Computing	II	c							
15CSP204E	Geographical Information System	I	a,b							
15OEP201	Open Elective - I	I	c	0	0	0	3	-	100	100
15CSP211	Router Configuration Lab	II	d	0	0	4	2	40	60	100
15CSP212	Software Documentation Lab	I	c	0	0	4	3	40	60	100
Seminar Presentation		III	h	0	2	0	-	-	-	-
Semester Total				19	3	8	27	240	460	700
Program Total				44	-	16	48	560	840	1400
SEMESTER – III										

15CSP301	J2EE	I	c,d	3	1	0	4	40	60	100
15CSP302	Open Source Technologies	I, II	dg	4	0	0	4	40	60	100
15CSP303	Digital Image Processing	I	c	4	0	0	4	40	60	100
15CSP304	Network Architecture and Management	I, III	d	4	0	0	4	40	60	100
15CSP305A	Distributed Operating Systems	I	b	4	0	0	4	40	60	100
15CSP305B	Distributed Database Management System	II III	b,d							
15CSP305C	Web Services	II	f							
15CSP305D	Wireless Application Protocol	III	d							
15CSP305E	WAN Technologies	I,II	b							
15CSP311	J2EE Lab	I	c,d	0	0	4	2	40	60	100
15CSP312	Linux Lab	I	dg	0	0	4	2	40	60	100
Seminar Presentation		III	h	0	2	0	-	-	-	-
Semester Total				19	3	8	24	280	420	700
SEMESTER – IV										
15CSP491	Project and Viva Voce	III	i,g	0	0	0	15	80	120	200
Semester Total				0	0	0	15	80	120	200
Program Total				90			90	880	1420	2300
Additional Courses										
15CSP306	Agent Technology	I, II	dg	0	0	0	4	-	100	100
15CSP401	Introduction to Software Architecture	I	c	0	0	0	4	-	100	100

Elective courses*

15CSP204A	Software Testing
15CSP204B	Soft Computing
15CSP204C	Object Oriented Analysis & Design with UML
15CSP204D	Grid Computing
15CSP204E	Geographical Information System

Core Elective – II

15CSP305A	Distributed Operating System
15CSP305B	Distributed Database Management System
15CSP305C	Web Services
15CSP305D	Wireless Application Protocol
15CSP305E	WAN Technologies

Open Elective - I

15OEP201	Multimedia and its Applications
----------	---------------------------------

Course Objectives

- To understand the fundamentals of JavaScript and use different objects
- To know the basics of ASP.NET, its objects and web forms
- To relate SQL Server and ASP.NET through database components
- To develop web application that deals with database and website development.
- To understand XML , Namespace and W3C XML Schema
- To get Familiar with Document Object Model for XML

Course Outcomes(COs)

1. Create a client side scripting web application using forms and Java Script
2. Understand the server side scripting of ASP.NET, its objects and web forms
3. Relate SQL Server and ASP.NET through database components
4. Develop web application that deals with database and website development.
5. Understand XML , Namespace and W3C XML Schema
6. Understand the Document Object Model for XML and JavaScript.

UNIT-I

JavaScript: Introduction to JavaScript – Programming fundamentals – Functions and objects – Navigator object model. Form and form elements – Scripting frames and multiple windows – Event object.

UNIT-II

ASP.NET: ASP & ASP.NET: An Overview – Programming ASP.NET with VB.NET: ASP Data types – operators- Request Object- Response Object – Server object - Web forms and ASP.NET: Web forms

UNIT-III

ASP.NET: ASP.NET Configuration, Scope and State: Configuration – state- application – session object- ASP.NET Objects & Components: Scripting object models- ASP components and controls- ASP.NET and SQL server-Using SQL server, using database in ASP.NET applications, ActiveX data objects

UNIT-IV

Creating Mark up with XML: Introduction – Parsers and well formed XML Documents – Parsing an XML Document - Characters – Mark up – CDATA Sections – XML Namespaces. Document Type Definition – Parsers, Well formed and valid XML documents – Element type declarations – Attribute declarations- Attributes Types. Schemas – Schemas VS DTD's – W3C XML Schema

UNIT-V

Document Object Model: DOM implementations – DOM with JavaScript – Components- Creating nodes – Traversing the DOM. Simple API for XML: DOM vs SAX – SAX based Parsers. XLink, XPointer, XInclude and XBase

TEXT BOOKS

1. Javascript: The Definitive Guide, David Flanagan, 6th Edition, 2011, O'Reilly Media.
2. Danny Goodman, 2000, "Javascript Bible", 3rd Edition, IDG Books India Pvt Ltd. (Page Nos.: 9-16, 24-33, 68-89, 116-130, 151-157, 174-198, 248-252, 323-329, 348-356)
3. Dave Mercer. ASP.NET – Beginner's Guide. 2nd Edition, New Delhi: McGraw Hill, 2010.
4. Rohit Khurana's , 2002, "Javascript Professional edition", 2nd Edition, A.P.H. Publishing company, NewDelhi. (Page Nos.: 1-93, 98-170)
5. Deitel & Deitel. 2001. XML How to Program, 1st Edition, Pearson Education, New Delhi. (Page Nos: 110-127, 134-159, 165-186, 192-227, 232-258, 372-391, 297-314, 319-347, 603-608)

REFERENCES

1. David Flanagan. 2006. JavaScript: The Definitive Guide, O'Reilly.
2. Nicholas C. Zakas, Inc Ebrary and Ebrary. 2005. Professional JavaScript for Web Developers, John Wiley & Sons Inc, New Delhi.
3. Russell Jones A.. 2000. Mastering ActiveServerPages 3, 1st Edition, BPB Publishing, New Delhi.
4. Thau. 2007. The Book of JavaScript: A Practical Guide to Interactive WebPages,
5. Ann Novarro, Chuck White and Linda Burman. 2000. Mastering XML, 1st Edition, BPB Publications, New Delhi.
6. Charles Ashbacher. 2000. XML in 24 hours, 1st Edition, Techmedia Publication, New Delhi.
7. Manish Jain. 2001. XML Complete, 1st Edition, BPB Publications, New Delhi.
8. Steve Holzner. 2000. Inside XML , 1st Edition, TechMedia, New Delhi.
9. Matthew MacDonald. 2013. ASP.NET The Complete Reference, McGraw Hill Education, New Delhi.

WEB SITES

1. www.w3schools.com/
2. www.2createawebsite.com
3. www.javascriptkit.com
4. www.learn-javascript-tutorial.com
5. www.webteacher.com/javascript
6. www.asptutorial.info
7. www.aspfree.com
8. www.aspnetutorials.com

		Semester-I
		L T P C
15CSP102	CRYPTOGRAPHY AND NETWORK SECURITY	4 0 0 4

Course Objectives

This course will provide students with a theoretical knowledge to understand the fundamental principles of access control models and techniques and,

- To understand theory of fundamental cryptography, encryption and decryption algorithms
- To know about various encryption techniques.
- To understand various Block Ciphers, DES and AES algorithms
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on web security, electronic mail security, firewalls

Course Outcomes (COs)

On successful completion of the course the student should be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Understand basic concepts of system level security
6. Build secure authentication systems by use of message authentication techniques.

UNIT -I

Introduction – Security Trends - The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security. Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques - Transposition Techniques – Rotor Machines - Steganography.

UNIT -II

Block Ciphers and Data Encryption Standard –Block Cipher Principles – The Data Encryption Standard - The Strength of DES –Advanced Encryption Standard (AES) – Evaluation Criteria for AES – The AES Cipher – Multiple Encryption and Triple DES – Block Cipher Modes of Operation – Stream Ciphers and RC4- modular Arithmetic and Euclidean Algorithm.

UNIT-III

Confidentiality using Symmetric Encryption – Placement of Encryption Function – Traffic Confidentiality – Key Distribution – Public key Cryptography and RSA – Principles of Public Key Cryptosystems – The RSA Algorithm- Basic prime numbers and Discrete Logarithms •Key Management – Diffie Hellman Key Exchange.

UNIT-IV

Message Authentication and hash functions – Authentication Functions – Message Authentication Codes (MAC's) Functions – Security of Hash Functions and MAC's Digital Signatures and Authentication Protocols – Digital Signatures – Digital Signature Standard

UNIT-V

Network Security Applications - Authentication Applications – KERBEROS – X.509 Authentication Service – Public Key Infrastructure – Electronic Mail Security – Pretty Good Privacy – S/MIME – IP Security.

TEXT BOOKS

1. William Stallings. 2006. Cryptography and Network Security Principles and Practices, 4th Edition, Pearson Education, New Delhi.
(Page Nos. : 6-35, 62-75, 80-135, 199-220, 289-298, 317-340, 377-390, 400-436, 436-457, 483-506)
2. Atul Kahate, 2003. Cryptography and Network Security, 2nd Edition, Tata McGraw Hill, New Delhi.

REFERENCES

1. Ankit Fadia. 1998. Network Security, 1st Edition, McMillan Publications, New Delhi.
2. Bruce Schneir. 1998. Applied Cryptography, 1st Edition, CRC Press, New Delhi.
3. Charlie Kaufman, Radia Perlman and Mike Speciner. 2003. Network Security Private Communication in a Public World, 2nd Edition, Prentice-Hall of India, New Delhi.
4. Menezes .A, Van Oorschot and S. Vanstone. 1997. Hand Book of Applied Cryptography, 1st Edition, CRC Press, New Delhi. (Free Downloadable)

WEB SITES

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. www.flipkart.com/search-books/cryptography+and+network+security+William+stallings+ebook

15CSP103	DATA MINING AND WAREHOUSING	Semester-I L T P C 4 0 0 4			
----------	-----------------------------	----------------------------------	--	--	--

Course Objectives

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.

Course Outcomes (COs)

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modelling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining.
6. Benefit the user experiences towards research and innovation integration.

UNIT-I

Introduction: Fundamentals of data mining - Data Mining Functionalities - Classification of Data Mining systems - Major issues in Data Mining.

Data Warehouse and OLAP Technology: An Overview - Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - From Data Warehousing to Data Mining.

UNIT-II

Data Preprocessing: Needs Preprocessing the Data - Data Cleaning - Data Integration and Transformation - Data Reduction - Discretization and Concept Hierarchy Generation - Online Data Storage.

UNIT-III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts - Efficient and Scalable Frequent item set Mining Methods - Mining various kinds of Association rules – From Association Mining to Correlation Analysis - Constraint-Based Association Mining.

UNIT-IV

Classification and Prediction: Issues Regarding Classification and Prediction - Classification by Decision Tree Induction - Rule-based Classification – Prediction -

Accuracy and Error Measures - Evaluating the Accuracy of a classifier or Predictor - Ensemble Methods - increases the Accuracy - Model Selection.

UNIT-V

Cluster Analysis Introduction : Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods – Density-Based Methods, Grid-Based Methods - Model-Based Clustering Methods - Clustering High-Dimensional Data – Constraint-Based Cluster Analysis - Outlier Analysis.

Applications and Trends in Data mining: Text Mining - Web Mining - Multimedia Mining-Spatial Mining - Visual data mining.

TEXT BOOK

1. Jiawei Han and Micheline Kamber. 2006. Data Mining – Concepts and Techniques, 1st Edition, Morgan Kaufmann Publishers, Mumbai.
(Page Nos: 1-36, 47 -94, 105-148, 227 -267, 289 -306, 318- 322, 354-372, 386-458, 600-640)

REFERENCES

1. Michael J.A. Berry, Gordon S. and Linoff. 2006. Data mining Techniques, 2nd Edition, Wiley Publishing Inc,
2. Arun K Pujari. 2001. Data Mining Techniques, 1st Edition, University Press, New Delhi.
3. Gupta G.K. 2000. Introduction to Data mining with case studies, 1st Edition, Prentice Hall of India, New Delhi.
4. Hillol Kargupta, Anupam Joshi, Krishnamoorthy Sivakumar and Yelena Yesha. 2005. Data Mining Next Generation Challenges and Future Directions, 1st Edition, Prentice Hall of India, New Delhi.
5. Inmon W. H. Building the Data Warehouse, Wiley Dreamtech India, 1st Edition, New Delhi.
6. Michael J.A. Berry, Gordon S. and Linoff. 2000. Mastering Data Mining, 1st Edition, John Wiley & Sons Inc, New Delhi.
7. Margaret H. Dunham. 2000. Data Mining Introductory and advanced topics, 1st Edition, Pearson Education, New Delhi.
8. Paulraj Ponnaiah. 2002. Data Warehousing Fundamentals, 1st Edition, Wiley Student Edition, New Delhi.
9. Ralph Kimball. The Data Warehouse Life cycle Tool kit, 1st Edition, Wiley Student Edition, New Delhi.
10. Sam Anahory and Dennis Murray. Data Warehousing in the Real World, 1st Edition, Pearson Education, Asia.
11. Soman K.P, Shyam Diwakar and V.Ajay. 2006. Insight into Data Mining Theory and Practice, 1st Edition, Prentice Hall of India, New Delhi.

WEB SITES

1. Thedacs.Com
2. Dwreview.Com
3. Pcai.Com
4. Eruditionhome.Com

Course Objectives

To learn about the basic things involved in cloud computing and its architecture.

- To know the basics of cloud computing and its types.
- To know about the services such as IaaS, PaaS, SaaS, IDaaS and CaaS.
- To understand the Virtualization Technologies.
- To understand the Information Security, Privacy and Compliance Risks.
- To learn commercial Google Web services – Open Nebula.
- To portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.

Course Outcomes (COs)

On successful completion of the course the student should be able to:

1. Understand cloud architecture and model.
2. Identify various service models of Cloud computing.
3. Explore cloud infrastructure.
4. Learn Threat issues and Database Integrity Issues.
5. Learn Open Source and Commercial Clouds such as Microsoft Azure, Amazon EC2.
6. Provide a good understanding of the concepts, standards and protocols in Cloud computing

UNIT-I

Introduction to Cloud Computing -Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

UNIT –II

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

UNIT -III

Virtualization Technologies -Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

UNIT-IV

Cloud Information Security Objectives -Confidentiality, Integrity, and Availability -
Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing
Risk Issues -The CIA Triad
Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -
Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks
Architectural Considerations
General Issues- Trusted Cloud Computing -Identity Management and Access Control

UNIT -V

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2-
Google Web services – Open Nebula.

TEXT BOOKS

1. Barrie Sosinsky .2010. Cloud Computing Bible, Wiley- India
2. Rajkumar Buyya, James Broberg, Andrzej M Goscinski. 2011. Tata Mc-Graw Hill, New Delhi.
3. Ronald L. Krutz, Russell Dean Vines. 2010. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley –India

REFERENCES

1. Dr Kumar Saurabh.2012. Cloud Computing, 2nd Edition, Wiley India.
2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. 2010. Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
3. Nikos Antonopoulos, Lee Gillam. 2012. Cloud Computing: Principles, Systems and Applications, Springer.
4. OpenNebula 3 Cloud Computing by Giovanni Toraldo, 2012.

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx

15CSP105	WIRELESS AND MOBILE COMPUTING	Semester-I L T P C 4 0 0 4			
-----------------	--------------------------------------	---	--	--	--

Course Objectives

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications.
- To identify the use of mobile wireless technologies
- To know the types of mobile wireless technologies that are currently being used
- To understand the working of mobile wireless technologies access to network resources.

Course Outcomes (COs)

1. Grasp the concepts and features of mobile computing technologies and applications
2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support
3. Identify the important issues of developing mobile computing systems and applications
4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;
5. Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools;
6. Organize and manage software built for deployment and demonstration.

UNIT-I

Mobile computing applications and Platforms - Introduction – Strengths and Weakness of Wireless – Applications – Platforms to support Mobile Computing Applications –Wireless Networks – Wireless Architecture, Security and Management – Wireless Business

UNIT-II

Mobile Computing Applications - Key Characteristics of Mobile Applications – Messaging for users – Mobile Portals – Special Applications – Mobile agent applications

UNIT-III

Wireless Internet, Mobile IP and Wireless Web - Internet and Web – How it works – Mobile IP – WWW for wireless – Mobile Web Services - **Mobile Computing Platforms** - Introduction – Wireless Middleware – Wireless Gateways and Mobile Application Servers – WAP – I-MODE, Wireless JAVA, MMIT, and BREW – Voice communication

UNIT-IV

Wireless LANs - IEEE 802.11 – MANET – HiperLAN2 - **Wireless Personal Area Networks** - IEEE 802.15 – Home Networks – Blue tooth LANs – Sensor Networks - **Cellular Networks** - Principles – First Generation(1G) Cellular – Paging networks – Second Generation(2G) Cellular – Data over Cellular Networks – Third Generation Cellular (3G) Networks – Beyond 3G

UNIT-V

WML: Formatting Output – Variables – Input Operations – WML Script – WML Libraries.

TEXT BOOKS

1. Amjad Umar. 2004. Mobile Computing and Wireless Communication – Applications, Networks, Platforms Architecture and Security, NGE Solutions INC., New York.
(Page Nos: 1.1- 1.52, 2.3 – 2.51, 3.2 – 3.37, 4.3-4.51, 6.16-6.36, 7.3-7.33, 8.4-8.39)
2. Kris Jamsa. 2001. WML & WML Script, Tata McGraw Hill Publishing, New Delhi
(Page Nos: 61-198, 225-336)

REFERENCES

1. Ashok K.Talukder and Roopa R. Yavagal. 2008. Mobile Computing, Tata Mc-Graw Hill Publishing Company Pvt Ltd, New Delhi.
2. *Jack M. Holtzman and David J. Goodman. 1994. Wireless and Mobile Communications, Kluwer Academic Publishers.
3. *Mischa Schwartz. 2005. Mobile Wireless Communications, Cambridge University Press.

WEB SITES

1. <http://www.networkcomputing.com/netdesign/wireless1.html>
2. <http://www.homeandlearn.co.uk/bc/beginnerscomputing.html>
3. <http://compnetworking.about.com/>
4. http://www.compinfo.co.uk/computer_books.htm#tele

Course Objectives

- To understand the fundamentals of JavaScript and use different objects
- To know the basics of ASP.NET, its objects and web forms
- To relate SQL Server and ASP.NET through database components
- To develop web application that deals with database and website development.
- To understand XML , Namespace and W3C XML Schema
- To get Familiar with Document Object Model for XML

Course Outcomes(COs)

1. Create a client side scripting web application using forms and Java Script
 2. Understand the server side scripting of ASP.NET, its objects and web forms
 3. Relate SQL Server and ASP.NET through database components
 4. Develop web application that deals with database and website development.
 5. Understand XML , Namespace and W3C XML Schema
 6. Understand the Document Object Model for XML and JavaScript.
-
1. Using Javascript change the font color on reloading a webpage.
 2. Generate web page that represents clock-every 60 see the page updated with server current time Using JavaScript.
 3. Design a form and validate it using JavaScript.
 4. Write Database Access program using ASP.NET
 5. Program to retrieve Cookies information using ASP.NET
 6. Program to count web page hits using ASP.NET
 7. Create a menu in XML.
 8. Create a demo for XSLT.
 9. Display XML information in Tree structure format.

		Semester-I
		L T P C
15CSP112	DATA MINING LAB USING MATLAB	0 0 4 2

Course Objectives

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.

Course Outcomes (COs)

1. Understand Data Warehouse fundamentals, Data Mining Principles
2. Design data warehouse with dimensional modelling and apply OLAP operations.
3. Identify appropriate data mining algorithms to solve real world problems
4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
5. Describe complex data types with respect to spatial and web mining.
6. Benefit the user experiences towards research and innovation integration.

List of Programs

1. Write a MATLAB program to do all basic matrix operations in MATLAB for a multidimensional array.
2. Write a MATLAB code to compares and contrasts some similarity and distance measures for the following .
 - (a) Compute the Hamming distance and the Jaccard similarity between the following two binary vectors.

$$x = 0101010001$$

$$y = 0100011000$$
3. a. Plot the graph of $f(x) = \exp(-2x^2 - 3y^2)$. Choose appropriate intervals for x and y.
 b. Plot the graph of $f(x) = \cos(x) \sin(y)$. Choose appropriate intervals for x and y.
4. The number of children for different patients in a database is given with a vector $c = \{3,1,0,2,7,6,3,4,-2,0,0,10,15,6\}$. Find the outliers in the set C using standard statistical parameters mean and variance.
 - a. If the threshold value is changed from ± 3 standard deviations to ± 2 standard deviations, what additional outliers are found?

5. For a given data set X of three-dimensional samples,

$X = \{\{1,2,0\}, \{3,1,4\}, \{2,1,5\}, \{0,1,6\}, \{2,4,3\}, \{4,4,2\}, \{5,2,1\}, \{7,7,7\}, \{0,0,0\}, \{3,3,3\}\}$

a) find the outliers using the distance-based technique if

i) the threshold distance is 4, and threshold fraction p for non-neighbor samples is 3.

ii) the threshold distance is 6, and threshold fraction p for non-neighbor samples is 2.

6. Given the data set X with three input features and one output feature representing the classification of samples

X:	I₁	I₂	I₃	O
	2.5	1.6	5.9	0
	7.2	4.3	2.1	1
	3.4	5.8	1.6	1
	5.6	3.6	6.8	0
	4.8	7.2	3.1	1
	8.1	4.9	8.3	0
	6.3	4.8	2.4	1

Rank the features using a comparison of means and variances

7. A data set for analysis includes only one attribute X:

$X = \{7, 12, 5, 18, 5, 9, 13, 12, 19, 7, 12, 12, 13, 3, 4, 5, 13, 8, 7, 6\}$

a) What is the mean of the data set X?

b) What is the median?

c) What is the mode, and what is the modality of the data set X?

d) Find the standard deviation for X.

e) Give a graphical summarization of the data set X using a boxplot representation.

f) Find outliers in the data set X.

8. Given a data set with two dimensions X and Y.

X	Y
1	5
4	2.75
3	3
5	2.5

a) Use a linear-regression method to calculate the parameters α and β where $y = \alpha + \beta x$.

b) Estimate the quality of the model obtained in a) Using the correlation coefficient r.

9. The following is the data set X:

X:	Year	A	B
	1996	7	100
	1997	5	150

1998	7	120
1999	9	150
2000	5	130
2001	7	150

Create 2D Presentations:

- Show a bar chart for the variable A
 - Show a histogram for the variable B.
 - Show a line chart for the variable B
 - Show a pie chart for the variable A
- Create a MATLAB function to count the number of lines in a text file.
 - Create a structure array for student mark details and print a plot for the marks of the students.
 - The test scores for the three students are given in the following table:

	RDBMS	OracleDBA	WebDesigning	AI
Smith	66	91	95	83
Sam	91	88	80	73
John	80	88	80	78

Find the best student using multifactorial evaluation, if the weight factors for the subjects are given as the vector $W = [0.3, 0.2, 0.1, 0.4]$

15CSP201	INTERNETWORKING WITH TCP/IP	Semester-II L T P C 4 1 0 5			
-----------------	------------------------------------	--	--	--	--

Course Objectives

- To get an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
2. Understand the routing IP datagrams and checksum.
3. Exposed to unicast and multicast routing.
4. Learn about host name resolution and the Domain Name System (DNS).
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. Understand about SMTP and SNMP.

UNIT-I

Introduction: WAN, WAN technologies - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT-II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum.

UNIT-III

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT-IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records

UNIT-V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets. VPN

TEXT BOOK

1. Behrouz A. Forouzan. 2009. TCP/IP Protocol Suite. 3rd Edition, Tata McGraw Hill Publication, New Delhi.
(Page Nos: 2-5, 6-38, 69-74, 84-95, 102-121, 160-188, 191-1-201, 221-232, 238-241, 256-279, 299-304, 386-430, 441-444, 457-464, 471-488, 519-542, 561-566, 575-576, 621-632, 637-644, 680-682)

REFERENCES

1. Andrews S. Tanenbaum. 2003. Computer Networks, 4th Edition, Prentice Hall of India Private Ltd., New Delhi.
2. Buck Graham. 2007. TCP/IP Addressing, 2nd Edition, Harcount India Private Limited, New Delhi.
3. Douglas E. Comer. 2000. Computer Networks and Internets, 4th Edition. Pearson Education, New Delhi.
4. William Stallings. 2007. Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Internet_protocol_suite
2. http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
3. www.yale.edu/pclt/COMM/TCPIP.HTM
4. www.w3schools.com/tcpip/default.asp

Course Objectives

- To state the basic concepts in information security, including security policies, security models, and security mechanisms.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To understand principles of web security.
- To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- To understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
- To provide the learner will be able to examine secure software development practices.

Course Outcomes (COs)

A student who successfully completes this course should at a minimum be able to:

1. State the basic concepts in information security, including security policies, security models, and security mechanisms.
2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
6. The learner will be able to examine secure software development practices.

UNIT-I

Introduction to cybercrime: Introduction-Cybercrime: Definition and Information Security-who are cybercriminals? - Classification of cybercrimes. Cybercrime: The legal perspectives- cybercrimes: An Indian Perspective - cybercrime and the Indian ITA2000: Hacking and the Indian law(s) - A Global Perspective on cybercrimes: cybercrime and the Extended Enterprise - cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

UNIT-II

Cyberoffenses: How Criminals Plan Them: Introduction: categories of Cybercrime -How criminals Plan the Attacks: Reconnaissance, Passive Attacks, Active Attacks, Scanning and Scrutinizing Gathered Information, Attack(Gaining and Maintaining the system

Access) -social Engineering: Classification of Social Engineering - Cyberstalking: Types of stalkers, Cases Reported on Cyberstalking, How stalking Works?, real-life incident of Cyberstalking -Cybercafe and Cybercrimes - Botnets: The Fuel for cybercrime: Botnet - Attack Vector-Cloud Computing: Why cloud computing? Types of Services, Cybercrime and Cloud Computing.

UNIT-III

Cybercrime: Mobile and wireless Devices-Introduction - Proliferation of Mobile and Wireless Devices - Trends in Mobility-Credit Card Frauds in Mobile and Wireless Computing Era: Types and Techniques of Credit Card Frauds - Security challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service security: cryptographic security, LDAP Security, RAS Security, Media Player Control Security, Networking API Security - Attacks on Mobile/Cell Phones: Mobile Phone Theft, Mobile Viruses, Mishing, Vishing, Smishing, Hacking Bluetooth.

UNIT-IV

Mobile Devices: Security Implication for Organizations – Managing Diversity and Proliferation of Hand-Held Devices, Unconventional/ Steath Storage Devices, Threats through Lost and Stolen Devices, Protecting Data on lost devices, Educating the Laptop Users - Organizational Measures for Handling Mobile devices - Related Security Issues: Encrypting Organization Databases, Including Mobile Devices in Security Strategy - Organizational Security Policies and Measures in mobile Computing Era: Importance of Security polices relating to mobile Computing Devices, Operating Guidelines for Implementing Mobile Devices Security Polices, Organizational Policies for the Use of Mobile Hand - Held Devices - Laptops: Physical Security Countermeasures.

UNIT-V

Tools and Methods Used in Cybercrime: Introduction - Proxy Servers and Anonymizers - Phishing: How Phishing Works? - Password Cracking: Online Attacks, Offline Attacks, Strong, Weak and Random Passwords, Random passwords - Keyloggers and Spywares: Software Keyloggers, Hardware Keyloggers, AntiKeylogger, Spywares - Virus and Worms: Types of Virus - Trojan Horses and Backdoors: backdoor, How to protect from Trojan Horses and Backdoors - Steganography: Steganalysis - DoS and DDoS Attacks: DoS Attacks,Classification of DoS Attacks, Types or Levels of DoS Attacks, Tools Used to Launch DoS Attacks, DDoS Attacks, How to Protect from DoS/DDoS Attacks – SQL Injection: Steps for SQL Injection Attacks, How to Prevent SQL Injection Attacks - Buffer Overflow: Types of Buffer Overflow, How to Minimize Buffer Overflow - Attacks on Wireless Networks: Traditional Techniques of Attacks on Wireless Networks, Theft of Internet Hours and Wi-fi-based Frauds and Misuses, How to Secure the Wireless Networks.

TEXT BOOK

Nina Godbole and Sunit Belapure. 2013. CYBER SECURITY. Wiley India Pvt. Ltd.

REFERENCES

1. Charles P. Pfleeger and Shari L. Pfleeger. 2003.

2. Dieter Gollmann . 2006. Computer Security. 2nd Edition . John Wiley & Sons.
3. Godbole, N. (2009) Information Systems Security :Metrics, Frameworks and Best Practices, Wiley India, New Delhi.
4. T. Marther, S. Kumaraswamy and S. Latif (2009). Cloud Security and Privacy: An Enterprise Perceptive on Risk and Complainece, O'Reilly.

WEB SITES

1. <http://www.csc.ncsu.edu/faculty/ning>
2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

15CSP203	SOFTWARE PROJECT MANAGEMENT	Semester-II L T P C 5 0 0 5			
-----------------	------------------------------------	--	--	--	--

Course Objectives

- To introduce the concepts and methods required for the construction of large software intensive systems.
- To develop a broad understanding of the discipline of software engineering and management of software systems.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focuses strongly on Practical techniques.
- To apply proper theoretical, technical, and practical knowledge of software requirements, analysis, design, implementation, verification and validation, and documentation
- To develop appropriate design solutions to a given problem using software engineering approaches that integrates ethical, social, legal, and economic concerns.
- To express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Apply the process to be followed in the software development life-cycle models.
2. Implement communication, modeling, construction & deployment practices in software development.
3. Analyze & design the software models using unified modeling language (UML).
4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
5. Explain the quality management & different types of metrics used in software development.
6. Apply the concepts of project management & planning

UNIT-I

Introduction to Software Project Management – Stepwise: an overview of project planning – Project Evaluation.

UNIT-II

Selection of an appropriate project approach – Software effort estimation – Activity planning – Risk Management.

UNIT-III

Resource Allocation – Monitoring and Control – Managing Contracts.

UNIT-IV

Managing People and Organizing Teams – Software Quality – Small Projects.

UNIT-V

Prince 2 An Overview – BS 6079:1996 An Overview – Programme Management – ISO12207: An Overview.

TEXT BOOK

1. Bob Hughes and Mike Cotterell. 2010. Software Project Management, 5th Edition, Tata McGraw Hill, New Delhi:

REFERENCES

1. Royce.2000. Software Project Management, 1st Edition, Addison Wesley, New Delhi.

WEB SITES

1. http://en.wikipedia.org/wiki/Software_project_management
2. <http://www.onesmartclick.com/engineering/software-engineering.html>
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Course Objectives

- To understand basic software debugging methods.
- To describe the principles and need for various types of testing and understand the essential characteristics of tool used for test automation
- To understand White box and Black box testing methods and techniques.
- To design test plans.
- To differentiate between validation testing and defect testing
- To use various Quality Assurance models.

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
2. Implement various test processes for quality improvement
3. Design test planning.
4. Manage the test process
5. Apply the software testing techniques in commercial environment
6. Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.

UNIT-I

Introduction about testing, Definition about software testing-Principles of testing-Phases of software project-Difference between QC and QA-Testing, Verification and Validation. Life cycle models for Waterfall, Spiral and V model.

UNIT-II

Types of testing-White box testing- Black box testing-Performance testing- Regression testing-Adhoc testing.

UNIT-III

Test planning-Test process-Test reporting-Best practices-Test planning check list-Test plan templates-Test case writing-Techniques for SRS document.

UNIT-IV

Software test automation-Skills needed for automation-What to automate-Scope of automation-Design and architecture for automation. Process model for automation-Selecting test tool.

UNIT-V

Test metrics – Types of metrics – Project metrics-progress metrics-productivity metrics. What is win runner-Methods of testing in win runner.

TEXT BOOK

1. Srinivasan Desikan, GopalaSwamy and Ramesh. 2008. Software testing –Principles and Practices, 1st Edition, Pearson Education, New Delhi.
(Page Nos: 3-22, 25-43, 47-68, 73-104, 169-190, 193-207, 228-248, 351-385, 388-416, 420-456)

REFERENCES

1. Boris Beizer. 2000. Software Testing Techniques, 2nd Edition, Wiley Dreamteach, India, New Delhi.
2. Elfride Dustin. 2007. Effective software testing, 1st Edition, Pearson Education, New Delhi.
3. Louise Tamres. 2002. Introduction to Software Testing, 1st Edition Pearson Education, New Delhi.
4. Ron Patton. 2004. Software Testing, 2nd Edition, Pearson Education, New Delhi.
5. William E. Perry. 2001. Effective methods for Software Testing, 2nd Edition, John Wiley & Sons, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Software_testing
2. www.onestoptesting.com/ -
3. www.ece.cmu.edu/~koopman/des_s99/sw_testing/
4. http://students.depaul.edu/~slouie/wr_tut.pdf (Unit V)

Course Objectives

- To understand the scope and evolution of soft computing
- To learn the various soft computing frame works
- To be familiar with design of various neural networks
- To be exposed to fuzzy sets and fuzzy logic
- To understand fuzzy measures and reasoning
- To learn genetic programming.

Course Outcomes(COs)

1. Understand the scope and evolution of soft computing
2. Learn the various soft computing frame works
3. Be familiar with design of various neural networks
4. Be exposed to fuzzy sets and fuzzy logic
5. Understand fuzzy measures and reasoning
6. Learn genetic programming.

UNIT-I

Introduction : Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Scope and Evolution– Models of Neural Networks – Feed forward Networks – Supervised Learning Neural Networks – Associative memory networks – Unsupervised learning networks – Special Networks.

UNIT-II

Fuzzy Sets and Fuzzy Logic : Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification– Intuition , inference, Rank ordering – Defuzzification – Max-membership principle, centroid method, center of sums, center of largest area.

UNIT-III

Fuzzy Measures and Reasoning: Fuzzy arithmetic and measures – Fuzzy reasoning – approximate reasoning – categorical, qualitative, syllogistic, dispositional – Fuzzy inference systems – fuzzy decision making – individual, multiperson, multi objective, Bayesian – fuzzy logic control system – architecture, model and application.

UNIT-IV

Machine Learning And Genetic Algorithm : Machine Learning Techniques – Machine Learning Using Neural Nets – Genetic Algorithms (GA) – Simple and General GA – Classification of Genetic Algorithm – Messy, Adaptive, Hybrid, Parallel – Holland Classifier System.

UNIT-V

Application and Implementation Soft Computing: Genetic algorithms -. Traveling Salesperson Problem, Internet Search Techniques – Fuzzy Controllers – Bayesian Belief networks for Rocket Engine Control – Neural Network, Genetic algorithm and Fuzzy logic implementation in C++ and Matlab.

TEXT BOOK

1.S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India Ltd., First Indian Edition, 2007

REFERENCES

- 1.Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
4. Amit Konar, “Artificial Intelligence and Soft Computing”, First Edition,CRC Press, 2000.
5. Simon Haykin, “Neural Networks: A Comprehensive Foundation”, Second Edition Prentice Hall, 1999.
6. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
7. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.

WEB SITES

1. www.amazon.in/soft+computing
2. www.soft-computing.de/def.html
3. en.wikipedia.org/wiki/Soft_computing
4. endnote.com/downloads/style/applied-soft-computing
5. www.allbookez.com/soft-computing-lecture-notes/

Course Objectives

- to use an object-oriented method for analysis and design
- To analyse information systems in real-world settings and to conduct methods such as interviews and observations
- To have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other is development methods and techniques
- To know techniques aimed to achieve the objective and expected results of a systems development process
- To know different types of prototyping
- To know how to use UML for notation.

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Understand the concepts and terms used in the object-oriented approach to systems analysis and design
2. Use Unified Modeling Language 2.2
3. Perform object-oriented analysis and design
4. Identify the characteristics of the UML and explain UML is relevant to the process development.
5. Draw class Diagrams, Object Diagram and Interaction Diagram.
6. Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, statechart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.

UNIT-I

The Object Model: The evolution of the object model – Elements of the object model – Applying object model. **Classes and Objects:** The nature of an object – Relationships among objects.

UNIT-II

Classes and Objects: The nature of the class – Relationship among classes – The Interplay of Classes and Objects – On building quality classes and objects. **Classification:** The Importance of proper classification – Identifying proper classes and objects – Key abstraction mechanism.

UNIT-III

The notation: Elements of the notation – class diagrams –state transition diagrams – object diagrams.

UNIT-IV

The Process: First principles – The micro development process – The macro development process.

UNIT-V

UML Overview: UML History – Goals of UML – UML concept areas – Syntax of Expressions and Diagrams.

Nature and purpose of Models: A Model – Levels of Models – Meaning of Model. UML Walkthrough: UML views – Static views – use case view – interaction views – state machine view – activity view – physical view – model management view- extensibility constructs.

TEXT BOOK

1. Grady Booch. 2007. Object Oriented Analysis and Design, 3rd Edition, Addison Wesley, New Delhi.

REFERENCES

1. James Rumbaugh, Ivar Jacobson and Grady Booch. 2003. The Unified Modeling Language Reference Manual, 1st Edition, Addison Wesley, New Delhi.
2. Martin Fowler, Kendall Scott. 2004. UML Distilled, 2nd Edition, Pearson Education, New Delhi.

WEB SITES

1. uml-tutorials.trireme.com/
2. <http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysis-and-Design/>
3. <http://community.sparxsystems.com/tutorials/object-oriented-analysis-and-design>

Course Objectives

- To portray the recent trends in the field of Grid computing and creation and management of Internet-based utility computing infrastructure.
- To introduce the principles underlying the function of distributed systems and their extension to grid computing.
- To introduce students to the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
- To provide a good understanding of the concepts, standards and protocols in Grid computing
- To enable students to be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.
- To perform analysis, design and implementation of ARC grid computing model.

Course Outcomes (COs)

After successful completion of this course, student will be able to

1. Understand and explain the basic concepts of Grid Computing.
2. Explain the principles underlying the function of distributed systems and their extension to grid computing
3. Explain the advantages of using Grid Computing within a given environment.
4. Identify fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
5. Understand Data management and transfer in Grid environments.
6. Perform analysis, design and implementation of ARC grid computing model.

UNIT- I

Introduction: Cluster to Grid Computing – Cluster Computing Models – Grid Models – Mobile Grid Models – Applications. Parset: System-independent Parallel Programming on Distributed Systems –introduction – Semantics of the Parset Construct – Expressing Parallelism through Parsets – Implementing Parsets on a Loosely Coupled Distributed System

UNIT- II

Anonymous Remote Computing Model: Issues in Parallel Computing on Interconnected Workstations – Existing Distributed Programming Approaches – The ARC Model of Computation – The Two-tiered ARC Language Constructs – Implementation. Integrating Task Parallelism with Data Parallelism: A Model for Integrating Task Parallelism into Data Parallel Programming Platforms – Integration of the Model into ARC – Design and Implementation – Applications - Performance Analysis

UNIT- III

Anonymous Remote Computing and Communication Model: Location – Independent Inter-task Communication with DP – DP Model of Iterative Grid Computations – Design

and Implementation of Distributed Pipes. Parallel Programming Model on CORBA: Notion of Concurrency – System Support –Implementation and Performance

UNIT- IV

Sneha-Samuham Grid Computing Model: A Parallel Computing Model over Grids – Design and Implementation – Performance studies. Introducing Mobility into Anonymous Remote Computing and Communication Model – Issues in Mobile clusters and Parallel Computing on Mobile Clusters – Moset Overview – Computation Model – Implementation and Performance

UNIT- V

Distributed Simulated Annealing Algorithms for Job Shop Scheduling - Implementation. Parallel Simulated Annealing Algorithms - Simulated Annealing (SA) Technique – Clustering Algorithm for Simulated Annealing (SA) – Combination of Genetic Algorithm and Simulated Annealing (SA) Algorithm - Implementation. Epilogue : DOS Grid: Vision of Mobile Grids - Mobile Grid Monitoring System – Healthcare Application Scenario.

TEXT BOOK

1. Janakiram .D. 2005. Grid Computing – A Research Monograph, TataMcGraw Hill Publishing Company Limited, New Delhi.

REFERENCES

4. Joshy Joseph and Craig Fellenstein. 2003. Grid Computing, Pearson Education, New Delhi.
5. Prabhu .C.S.R. 2008. Grid and Cluster Computing, Prentice Hall of India, New Delhi.

WEB SITES

1. <http://cseweb.ucsd.edu/classes/sp00/cse225/notes/fran/introweb.html>
2. <http://www.wisegeek.com/what-is-grid-computing.htm>
3. <http://www.cs.kent.edu/~farrell/grid06/lectures/index.html>

		Semester-II			
		L	T	P	C
15CSP204E	GEOGRAPHICAL INFORMATION SYSTEM	5	0	0	5

Course Objectives

- To have a basic, practical understanding of GIS concepts, techniques and real world applications.
- To analyse the basic components of GIS
- To classify the maps, coordinate systems and projections
- To process spatial and attribute data and prepare thematic maps
- To identify and rectify mapping inaccuracies
- To formulate and solve geospatial problems

Course Outcomes (COs)

After successful completion of this course, student will be able to

1. Understand the basic concepts of geography necessary to efficiently and accurately use GIS technology.
2. Understand basic GIS data concepts.
3. Have an ability to perform basic GIS analysis of concepts.
4. Have demonstrated a practical application of GIS.
5. Have practical experience using basic GIS tools.
6. Have an understanding of GIS and its relationship to mapping software development.

Unit I

What is a Geographical Information Systems (GIS) – Geographically referenced data – GIS operations – Geographic Coordinate systems – Map Projections – Commonly used Map Projections – Projected Coordinate Systems – Working with Coordinate systems in GIS.

Unit II

Georelational Vector Data Model – Georelational data model – Representation of simple features – Topology – Nontopological Vector data – Data models for composite features. Object based vector data model – Object based data model – The geodatabase data model – Interface – Topology rules – Advantages of Geodatabase model.

Unit III

Raster Data Model – Elements of Raster Data Model - Raster Data Structure – Data Compression – Data Conversion – Integration of Raster and Vector Data. Data Input – Existing GIS data – Meta Data – Conversion of Existing Data – Creating New Data.

Unit IV

Geometric Transformation – Root Mean Square (RMS) Error – Interpretation of RMS errors Digitized Maps – Re sampling of Pixel Values.

Spatial Data Editing – Location Errors – Spatial Data Accuracy Standards – Topological Errors – Topological Editing – Nontopological Editing – Other Editing operations

Unit V

Data Display and Cryptography – Cartographic Symbolization – Types of Maps – Typography – Map Design – Map Production.

Data Exploration – Attribute and Data Query – Spatial Data Query – Raster Data Query – GIS Applications.

Text Book

1. Kang-tsung Chang. “*Introduction to Geographic Information Systems*”, 3rd Edition, New Delhi: Tata McGraw-Hill, 2006.

Reference Book

1. Ian Heywood, Sarah Cornelius, Steve Carver and Srinivasa Raju. “*An introduction to Geographical Information Systems*”, 2nd Edition, New Delhi: Pearson Education, 2006.

		Semester-II			
		L	T	P	C
150EP201	MULTIMEDIA AND ITS APPLICATIONS	0	0	0	3

Course Objectives

- To learn and understand technical aspect of Multimedia Systems.
- To understand the standards available for different audio, video and text applications.
- To Design and develop various Multimedia Systems applicable in real time.
- To learn various multimedia authoring systems.
- To design different application in M.M and use different tools like adobe Photoshop and macromedia flash.
- To develop multimedia application and analyze the performance of the same.

Course Outcomes (COs)

1. Developed understanding of technical aspect of Multimedia Systems.
2. Understand various file formats for audio, video and text media.
3. Develop various Multimedia Systems applicable in real time.
4. Design interactive multimedia software.
5. Design different application using different tools like Adobe Photoshop and flash.
6. To evaluate multimedia application for its optimum performance.

UNIT-I

Definition of multimedia – Introduction to making multimedia: the stages of a project – Basic software tools-Using Text in multimedia - font editing and design tools – hypermedia and hypertext.

UNIT-II

Introduction to Photoshop 6: Interfaces and Navigation-Tools-Text-Working in Photoshop-Creating new documents-Saving Files.

UNIT-III

Displaying the Images- Using Rulers, Guides and Grids – Making Selections- Layers and Types-Choosing Colors-Creating Brushes- painting & editing Tools- Making and Applying Gradients.

UNIT-IV

Introduction to Flash: Variables & data types- Data types in Action Script-Creating and placing variables – Buttons with text fields.

UNIT-V

Basic Actions: Play, stop, Back & forth- Between frames and scenes – Timelines – External scripts-Loops.

TEXT BOOKS

1. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, DreamTech Press, New Delhi.
(Page Nos : 1-19, 20-36, 51-69)
2. Steve Romaniello. 2001. Mastering Photoshop 6, 1st Edition, BPB Publications, New Delhi.
(Page Nos : 1-16, 21-24, 39-50, 70-79, 107- 122, 195-213, 256-289)
3. Tay Vaughan. 2008. Multimedia making it Work, 7th Edition, Tata McGraw-Hill, New Delhi.
(Page Nos : 1-11, 18-23, 50-56, 262-276)

REFERENCES

1. Dinesh Maidasani. 2006. Flash 8, 1st Edition, Firewall Media Publications, New Delhi.
2. Robert Shufflebotham. 2004. Photoshop CS in Easy Steps, 1st Edition, DreamTech Press, New Delhi.
3. Ze-Nian Li and Mark S. Drew. 2004. Fundamentals of Multimedia, Pearson Education, New Delhi.

WEB SITES

1. en.wikipedia.org/wiki/Multimedia
2. www.arena-multimedia.com/ -
3. www.nextwavemultimedia.com/

15CSP211	ROUTER CONFIGURATION LAB	Semester-II			
		L	T	P	C
		0	0	4	2

Course Objectives

- To get an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
2. Understand the routing IP datagrams and checksum.
3. Exposed to unicast and multicast routing.
4. Learn about host name resolution and the Domain Name System (DNS).
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. Understand about SMTP and SNMP.

List of programs

1. Simple router configuration.
2. Access and utilize the router to set basic parameters.
3. Connect, configure, and verify operation status of a device interface.
4. Implement static and dynamic addressing services for hosts in a LAN environment.
5. Identify and correct common problems associated with IP addressing and host configurations.
6. Configure, verify, and troubleshoot RIPv2.
7. Perform and verify routing configuration tasks for a static or default route given.
8. Configure, verify and troubleshoot NAT operation on a router.
9. Configure and verify a PPP connection between routers.

		Semester-II
		L T P C
15CSP212	SOFTWARE DOCUMENTATION LAB	0 0 4 2

Course Objectives

- To introduce the concepts and methods required for the construction of large software intensive systems.
- To develop a broad understanding of the discipline of software engineering and management of software systems.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focuses strongly on Practical techniques.
- To apply proper theoretical, technical, and practical knowledge of software requirements, analysis, design, implementation, verification and validation, and documentation
- To develop appropriate design solutions to a given problem using software engineering approaches that integrates ethical, social, legal, and economic concerns.
- To express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Apply the process to be followed in the software development life-cycle models.
2. Implement communication, modeling, construction & deployment practices in software development.
3. Analyze & design the software models using unified modeling language (UML).
4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
5. Explain the quality management & different types of metrics used in software development.
6. Apply the concepts of project management & planning

Prepare a more detailed, organized and easy-to-read documentation, for any application software, which should describe the following:

1. User Requirement Documentation (USD)
2. Requirement Analysis Documentation. (RAD)
3. User Interfaces Specification. (UIS)
4. Object Oriented Design (OOD) or Low Level Design (LLD)
5. Code Documentation (CD)
6. Testing Documentation (TD)
7. User's Guide (UG)

15CSP301	J2EE	Semester-III			
		L T P C			
		3 1 0 4			

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

1. Understand the In-depth concepts of JEE
2. Understand the in-depth Life cycle of servlets and JSP.
3. Learn how to communicate with databases using Java.
4. Handle Errors and Exceptions in Web Applications
5. Use NetBeans IDE for creating J2EE Applications
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications

UNIT-I

J2EE Overview: Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – Client Tier, Web Tier, Enterprise Java Beans Tier, Enterprise Information Systems Tier Implementation.

UNIT-II

J2EE Database Concepts: Data – Database – Database Schema. **JDBC Objects:** Driver Types – Packages – JDBC Process – Database Connection – Statement Objects – Result Set – Meta Data.

UNIT-III

Java Servlets: Benefits – Anatomy – Reading Data from Client –Reading HTTP Request Headers – Sending Data to client – Working with Cookies.

UNIT-IV

Enterprise Java Beans: Deployment Descriptors – Session Java Bean –Entity Java Bean Message Driven Bean.

UNIT-V

JSP: What is Java Server Pages? - Evolution of Dynamic Content Technologies – JSP & Java 2 Enterprise Edition; **JSP Fundamentals:** Writing your first JSP- Tag conversions-

Running JSP. **Programming JSP Scripts:** Scripting Languages – JSP tags- JSP directives – Scripting elements – Flow of Control – comments;
Java Remote Method Invocation.

TEXT BOOKS

1. Jim Keogh. 2010. The Complete Reference J2EE, 1st Edition, Tata McGraw Hill, New Delhi.
(PAGE NOS. : 3 - 61 ,23 - 35, 98 – 116,124 – 151, 157 – 159, 350 – 369, 406 – 443, 380 – 395, 486- 490)
2. Duane K. Fields & Mark A.Kolb. 2000 Web Development with Java Server Pages, 1st Edition, Manning Publications, Pune.
(PAGE NOS. : 2 – 15, 46 - 64, 65 – 99)

REFERENCES

1. Joseph J. Bambara et al. 2001. J2EE Unleashed, 1st Edition, Tech Media, New Delhi.
2. Paul J. Perrone, Venkata S. R. Chaganti, Venkata S. R. Krishna and Tom Schwenk. 2003. J2EE Developer's Handbook, Sams Publications, New Delhi.
3. Rod Johnson. 2004. J2EE Development without EJB, 1st Edition, Wiley Dream Tech, New Delhi.
4. Rod Johnson and P.H. Rod Johnson. 2004. Expert One-On-One J2ee Design and Development, John Wiley & Sons, New Delhi.

WEB SITES

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/

Course Objectives

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
4. Develop applications where several processes need to communicate with each other to complete a task.
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
6. Write programs which employs advanced concepts like multithreading.

UNIT-I**History and Overview Of GNU/Linux And FOSS 3**

Definition of FOSS & GNU, History of GNU/Linux and the Free Software Movement, Advantages of Free Software and GNU/Linux, FOSS usage , trends and potential—global and Indian.

UNIT-II**System Administration**

GNU/Linux OS installation--detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands -logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions, PAM authentication ; Introduction to common system configuration files & log files ;

Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line) ; Configuring additional hardware - sound cards, displays & display cards, network cards, modems, USB drives, CD writers ; Understanding the OS boot up process ; Performing every day tasks using gnu/Linux -- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs ; X Window system configuration and utilities--configure X windows, detect display devices ; Installing software from source code as well as using binary packages.

UNIT-III

Server Setup And Configuration

Setting up email servers--using postfix (SMTP services), courier (IMAP & POP3 services), squirrel mail (web mail services) ; Setting up web servers --using apache (HTTP services), php (server-side scripting), perl (CGI support) ; Setting up file services --using samba (file and authentication services for windows networks), using NFS (file services for gnu/Linux / Unix networks) ; Setting up proxy services --using squid (http / ftp / https proxy services) ; Setting up printer services -using CUPS (print spooler), foomatic (printer database) ; Setting up a firewall -Using netfilter and iptables.

UNIT-IV

Programming Tools

Using the GNU Compiler Collection --GNU compiler tools ; the C preprocessor (cpp), the C compiler (gcc) and the C++ compiler (g++), assembler (gas) ; Understanding build systems --constructing make files and using make, using autoconf and autogen to automatically generate make files tailored for different development environments ; Using source code versioning and management tools --using cvs to manage source code revisions, patch & diff ; Understanding the GNU Libc libraries and linker --linking against object archives (.a libraries) and dynamic shared object libraries (.so libraries), generating statically linked binaries and libraries, generating dynamically linked libraries.

Using the GNU debugging tools --gdb to debug programs, graphical debuggers like ddd, memory debugging / profiling libraries mpatrol and valgrind ; Review of common programming practices and guidelines for GNU/Linux and FOSS ; Introduction to Bash, sed & awk scripting.

UNIT-V

Application Programming

Basics of the X Windows server architecture ; Qt Programming ; Gtk+ Programming ; Python Programming ; Programming GUI applications with localisation support.

TEXT BOOK

1. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers; 2005.

REFERENCES

1. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers, 2002.
2. Carla Schroder, Linux Cookbook, First Edition, O'Reilly Cookbooks Series, 2004.

Web Sites:

1. http://www.oreilly.com/catalog/open_sources/book/toc.html
2. http://dsl.org/cookbook/cookbook_toc.html
3. <http://www.tldp.org/guides.html>
4. <http://www.gnu.org/doc/using.html>
5. <http://www.networktheory.co.uk/docs/gccintro/>
6. <http://sources.redhat.com/autobook/>
7. <http://cvsbook.red-bean.com/>
8. <http://www.tldp.org/guides.html>
9. <http://developer.gnome.org/doc/GGAD>
10. <http://www.python.org/doc/current/tut/tut.html>

15CSP303	DIGITAL IMAGE PROCESSING	Semester-III			
		L T P C			
		4 0 0 4			

Course Objectives

- To make the students learn the fundamental theories and techniques of digital image processing.
- To study the mathematical transforms necessary for image processing, image manipulation and a preliminary understanding of Computer Vision.
- To make students to understand the image degradation and enhancement.
- To understand the basic relationships between pixels in an image
- To know various segmentation techniques, and object descriptors.
- To implement pattern recognition to enhance an image.

Course Outcomes(COs)

1. Perform image manipulations and analysis in many different fields.
2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.
3. Implement the understanding in sharpening the image.
4. Perform the image segmentation using the compression method.
5. Understand the image to represent in an region.
6. Analyze the basic algorithms used for image processing & image compression with morphological image processing.

UNIT-I

Introduction: Digital image processing – Origins of digital image processing- Examples of fields that use digital image processing-Fundamental steps in digital image processing- Components of an image processing system-Representing digital image.

UNIT-II

Some Basic relationships between Pixels-Basic gray level transformations- Histogram processing - Basic spatial filtering- Smoothing special filtering- Image Degradation/ Restoration process- Noise Models.

UNIT-III

Image Segmentation: Thresholding - Edge Based Segmentation – Region Based Segmentation – Matching. Image Compression: Error Criterion - Lossy Compression - Lossless Compression.

UNIT-IV

Shape Representation and Description: Region Identification - Contour Based Representation And Description – Region Based Shape Representation And Description

UNIT-V

Image Recognition: Introduction – Statistical Pattern Recognition - Neural Net-Syntactic Pattern Recognition - Graph Matching - Clustering

TEXT BOOK

1. Rafael C. Gonzalez, Richard E. Woods. 2008. Digital Image Processing, 3rd Edition, Pearson Education, New Delhi.

REFERENCES

1. Chanda. B and Dutta Majumder .D. 2000. Digital Image Processing and Analysis, 1st Edition, Prentice Hall of India, New Delhi.
2. Milan Sonka and Vaclav Hlavac and Roger Boyle. 2004. Image Processing, Analysis and Machine Vision, 2nd Edition, Vikas Publishing House, New Delhi.
3. Nick Efford. 2000. Digital Image Processing – A Practical introduction using JAVA, 1st Edition , Pearson Education Limited, New Delhi.

WEB SITES

<http://www.cs.dartmouth.edu/farid/tutorials/fip.pdf>

<http://www.imageprocessingbasics.com/>

http://www.astropix.com/HTML/J_DIGIT/TOC_DIG.HTM

		Semester-III			
		L T P C			
15CSP304	NETWORK ARCHITECTURE AND MANAGEMENT	4	0	0	4

Course Objectives

- To understand the various architecture models and routing strategies of networks.
- To understand the privacy and security needs of a network and formulate a plan.
- To analyze the various case studies of network architecture and management.
- To implement the SNMP protocol in various architectures.
- To use various network management tools and understand their modules.
- To design an architecture with all the network requirements of a client with help of network management tools.

Course Outcomes(COs)

1. Understand the various architecture models and routing strategies of networks.
2. Understand the privacy and security needs of a network and formulate a plan.
3. Analyze the various case studies of network architecture and management.
4. Implement the SNMP protocol in various architectures.
5. Use various network management tools and understand their modules.
6. Design an architecture with all the network requirements of a client with help of network management tools.

UNIT-I

Introduction: Objectives - Component architectures - Reference architecture - Architectural models; Addressing and Routing Architecture: Addressing mechanisms - Routing mechanisms - Addressing strategies - Routing strategies - Architectural considerations; Network Management Architecture: Defining Network Management - Network Management Mechanism - Architectural considerations; Performance Architecture; Developing goals - Performance mechanisms - Architectural considerations

UNIT- II

Security And Private Architecture: Developing a security and privacy plan - Security and privacy Administration & Mechanism - Architectural considerations; Selecting Technologies for the Network Design: Goals - Criteria for Technology Evaluation - Guidelines and constraints on Technology Evaluation - Choices for Network Design; Interconnecting Technologies Within The Network Design: Shared medium - Switching - Routing - Hybrid mechanism - Applying Interconnection Mechanism to the Design

UNIT- III

Case history of Networking and Management: Challenges of Information Technology Managers - Goals, organization and functions - Network and System Management - Network Management System Platform; SNMP, Broadband and TMN Management: Network Management Standards & Model - Organization, Information and

Communication Model – ASN.1 – Encoding structure – Macros – Functional model; Organization and Information Model: Managed Networks – The History of Network Management – Internet Organization and standards – SNMP Model – The Organization and Information Model; Communication and Functional Model: The SNMP Communication Model – Functional Model.

UNIT- IV

SNMPv2 Management: Major changes – System architecture – Structure of Management Information – Management Information Base – SNMPv2 protocol – Compatibility; RMON: Remote monitoring – RMON1 – RMON2 – ATM remote monitoring; Broadband Network Management: ATM Networks - Network and Services – ATM Technology – ATM Network Management; Telecommunication Management Network: Operations systems – Conceptual model – Standards – Architecture – TMN Management service architecture – Integrated view of TMN – Implementation issues.

UNIT- V

Network Management Tools and Systems: Network management tools – Network statistics measurement system – Network Management Systems – System Management; Network Management Applications: Configuration Management - Fault Management - Performance Management – Security Management – Accounting Management – Report Management - Policy Based Management – Service Level Management.

TEXT BOOK

1. James D. Mc Cabe. 2007 . Network Analysis, Architecture and Design, 3rd Edition, Morgan Kaufmann Publishers.
2. Mani Subramanian. 2000. Network Management Principles and Practice, Pearson Education Asia Pvt. Ltd.

REFERENCES

1. William Stallings. 1999. SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd Edition, Pearson Education Asia Pvt. Ltd.

WEB SITES

1. <http://staff.um.edu.mt/csta1//courses/lectures/csm202/os17.html>
2. <http://www.inf.uni-konstanz.de/dbis/teaching/ss06/os/ch14-wrongNumber.pdf>
3. <https://www.cs.columbia.edu/~smb/classes/s06-4118/126.pdf>

Course Objectives

- To understand the hardware and software concepts of distributed operating systems, various design issues like transparency, flexibility etc., and communication and synchronization in distributed operating systems.
- To understand scheduling in distributed operating systems, fault tolerance, real-time distributed systems, and designing of distributed file systems.
- To understand the concept of design and implementation in the context of distributed operating systems.
- To Design and Implement Distributed applications using Technologies like RPC, threads.
- To understand How Distributed Shared Memory is managed.
- To analyze security issues in network and distributed environments

Course Outcomes(COs)

1. Understand the different Distributed Systems and the challenges involved in Design of the Distributed Systems.
2. Understand how computing power is created and synchronized in Distributed systems
3. Design and Implement Distributed applications using Technologies like RPC, threads.
4. Learn how to store data in Distributed File System.
5. Understand How Distributed Shared Memory is managed.
6. Analyze security issues in network and distributed environments

UNIT-I

Fundamentals – message passing – Remote procedure calls : Introduction – the RPC model – transparency of RPC – Implementing RPC mechanism –stub generation – RPC messages – marshaling arguments and results – server management – parameter passing semantics – call semantics.

UNIT- II

Distributed shared memory : Introduction – general architecture of DSM systems – design and implementation of DSM – granularity – structure of shared memory space – replacement strategy – heterogeneous DSM – advantages of DSM.

UNIT- III

Synchronization: Introduction – clock synchronization – event ordering – mutual exclusion. Resource management: Introduction – desirable features of a good global scheduling algorithm – task management approach – load balancing approach – load sharing approach.

UNIT- IV

Distributed file system: Introduction – desirable features of a good distributed file system – file models – file accessing models.

Naming: Introduction – desirable features of a good naming system – fundamental terminologies and concepts.

UNIT- V

Security: Introduction – potential attacks to computer system – cryptography.

TEXT BOOK

1. Pradeep K. Sinha.1997. Distributed Operating Systems Concepts and Design, 1st Edition, Prentice Hall of India, New Delhi.

REFERENCES

1. Paul J. Fortier. 1998. Design of Distributed Operating System concepts and Technology, 1st Edition, Tata McGraw Hill, New Delhi.
2. Andrew S. Tanenbaum. 1995. Distributed Operating System. Pearson Education, New Delhi.

WEB SITES

1. <http://staff.um.edu.mt/csta1//courses/lectures/csm202/os17.html>
2. <http://www.inf.uni-konstanz.de/dbis/teaching/ss06/os/ch14-wrongNumber.pdf>
3. <https://www.cs.columbia.edu/~smb/classes/s06-4118/126.pdf>

Course Objectives

- To expose the students to the architecture, design, and implementation of massive-scale data systems.
- To understand foundational concepts of distributed database theory including design and architecture, security, integrity, query processing and optimization, transaction management, concurrency control, and fault tolerance.
- To know about parallel database systems and their architecture
- To create optimized query execution plan.
- To efficiently distribute and manage the data.
- To manage distributed access control

Course Outcomes(COs)

1. Understand the DDBMS architecture models and complicating factors.
2. Design good performing distributed database schemas.
3. Create optimized query execution plan.
4. Efficiently distribute and manage the data.
5. Manage distributed access control
6. Know how to make security to the databases.

UNIT I

Introduction: Distribute Data Processing- What is Distributed Database System?- Promises of DDBMSs -Complicating Factors -Problem -Distributed DBMS Architecture- DBMS Standardization- Architectural Models for DDBMSs - DDBMSs Architecture.

UNIT II

Distributed Database Design: Design Strategies- Top-Down Design Process- Bottom Up Design Process-Distribution Design Issues – Fragmentation-Allocation -Semantic Data Control-View Management- Data Security- Semantic Integrity Control- Centralized Semantic Integrity Control- Distributed Semantic Integrity Control.

UNIT III

Query Processing: Query Processing Problem- Objectives of Query Processing- Complexity of Relational Algebra Operations-Characterization of Query Processors- Layers of query processing-Query decomposition and data Localization- Query Optimization –Centralized query optimization –Join ordering in Fragment Queries – Distributed query optimization Algorithms.

UNIT IV

Transaction Management: Definition of a Transaction-Properties of Transaction- Types of Transaction- Distributed Concurrency Control- Serialization Theory- Taxonomy of Concurrency Control Mechanisms- Locking Based Concurrency Control Mechanisms-

Timestamp –Based Concurrency Control Mechanisms-Optimistic Concurrency Control Algorithms-Deadlock Management-Relaxed Concurrency Control-Distributed Reliability DBMS Reliability - Reliability Concepts and Measures-Failures and Fault Tolerance in Distributed Systems-Failures in Distributed DBMS-Local Reliability Protocols-Distributed Reliability Protocols –Dealing With Site Failures- Network Portioning

UNIT V

Parallel Database Systems: Database Servers-Parallel Architectures –Parallel DBMS Techniques –Parallel Execution Problems-Parallel Execution For Hierarchical Architecture-Distributed Object Database Management Systems –Fundamental Object Concepts And Object Models- Object Distribution Design-Architectural Issues- Object Management –Distributed Object Storage-Object Query Processing-Transaction Management.

TEXT BOOK

1. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition , Pearson Education.

REFERENCES

1. Ceri.1985.Distributed Databases Principles and Systems , 1st Edition Mchraw Hill Pub.
2. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition , Pearson Education.

WEB SITES

1. en.wikipedia.org/wiki/Distributed_computing
2. www.webopedia.com/TERM/D/distributed_computing.html
3. www.tech-faq.com/distributed-computing.shtml

Course Objectives

- To describe basic standards that enable web services: SOAP, WSDL, and UDDI
- To know the role of web services in commercial applications
- To understand the principles of web service provision
- To design of web services and applications to use them within a service-oriented architecture.
- To use of BPEL (Business Process Execution Logic) and WSDL (Web Service Description Language) for implementing web services
- To develop a web service using Apache Axis Soap Server and Tomcat application Server.

Course Outcomes(COs)

1. Understand the basic standards that enable web services: SOAP, WSDL, and UDDI
2. Analyze the role of web services in commercial applications
3. Understand the principles of web service provision
4. Design of web services and applications to use them within a service-oriented architecture.
5. Use of BPEL (Business Process Execution Logic) and WSDL (Web Service Description Language) for implementing web services
6. Develop a web service using Apache Axis Soap Server and Tomcat application Server.

UNIT-I

Introduction: What are Web Services – Importance of web services – Web services and enterprises. XML Fundamentals: XML Documents - Namespaces – Schema – Processing XML.

UNIT-II

SOAP: SOAP Model – messages – Encoding – RPC – Alternative SOAP encodings – Document, RPC, Literal, Encoded – SOAP, Web Services and the REST Architecture.

WSDL: Structure – Using SOAP and WSDL. UDDI: UDDI Business Registry – Specification – Data Structures – Life cycle Management – Dynamic Access Point Management.

UNIT-III

Advanced Web Services Technologies and Standards: Conversation – Overview – Web Services Conversation Language – WSCL Interface Components. Workflow-Business Process Management – Workflow and Workflow Management systems – BPEL.

Transaction –ACID transaction – Distributed Transaction – OASIS Business-Transaction Protocol.

UNIT-IV

Security – Security Basics – Security Issues – Types of Security Attacks – WS–Security. Mobile and Wireless – Mobile Web Services – Challenges with mobile – Proxy Based Mobile Systems -Direct Mobile Web service access - J2ME Web Services.

UNIT-V

Building Real World Enterprise Web Service and Applications: Real World Web Service Application Development – Development of Web services and Applications onto Tomcat application Server and Axis Soap Server.

TEXT BOOK

1. Sandeep Chatterjee, James Webber. 2010. Developing Enterprise Web Services: An Architect's Guide, 3rd Edition, Pearson Education, New Delhi.
(Page Nos: 1-11, 17-67, 69-94, 98-117, 119-138, 145-163, 175-221, 249-262, 271-283, 305-335, 377- 415)

REFERENCES

1. Eric A Marks and Mark J Werrell. 2003. Executive Guide to Web Services, 1st Edition, John Wiley and Sons, New Delhi.
2. Keith Ballinger. 2003. NET Web Services: Architecture and Implementation with .Net.1st Edition, Pearson Education, New Delhi

WEB SITES

1. www.w3schools.com/webservices/default.asp
2. en.wikipedia.org/wiki/Web_service
3. www.webservices.org/

Course Objectives

- To Expose students to software and hardware capabilities of wireless applications.
- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To appreciate the contribution of Wireless Communication networks to overall technological growth.
- To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
- To design a wireless application using WML

Course Outcomes(COs)

1. Understand software and hardware capabilities of wireless applications.
2. Analyze Wireless Communication networks area and its applications in communication engineering.
3. Appreciate the contribution of Wireless Communication networks to overall technological growth.
4. Explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
5. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
6. Design and Develop a wireless application using WML

UNIT-I

Mobile Data Introduction: The Rise of Mobile Data-Key Services for the Mobile Internet- Overview of the WAP-The origins of the WAP- WAP architecture-WAP Internal Structure-Components of the WAP Standards- WAP Gateways-Network Infrastructure Services Supporting WAP Clients-WAP Architecture Design Principles – Relationship with other standards.

UNIT-II

The Wireless Markup Language: Overview-The WML Document Model-WML Authoring-URLS Identity Content-Mark Up Basics- WML Basics-Basic Content-Events, Tasks and Binding.

UNIT-III

Variables –Other Content you can include-Controls-Miscellaneous Markup- Sending Information-Application Security-Other Data; The Meta element- Document Type Declarations- Errors and browsers Limitations-Content generation- WML Version Negotiation.

UNIT-IV

User Interface Design: Making Wireless Applications, Easy to Use- Website Design- Computer Terminals Vs Mobile Terminals-Designing a usable WAP site-structured usability method-user interface design guidelines- Design guidelines for selected WML Elements.

UNIT-V

Wireless Telephony Applications: Overview of the WTA Architecture- WTA Client Frame Work –WTA Server and Security- Design Considerations- Application Creation Tool Box- Future of WTA Enhancements.

The Mobile Internet Future: Better Content- Easier Access-Beyond Browsing – Beyond Cellular- Mobile Data Unleashed.

TEXT BOOK

Sandeep Singhal et al, 2007.The Wireless Application Protocol, 1st Edition. Pearson Education, New Delhi.

Charles Arehart-Nirmal Chidambarametal.Professional WAP, 1st Edition. Shroff Publishers & Distributers Pvt Ltd, New Delhi.

REFERENCES

Dale BulBrook. 2004. WAP –A Beginner’s Guide, 1st Edition. TMH Publication, New Delhi.

Ruseyev S. 2003. WAP Technology &Applications ,1st Edition. Eswar Publications, New Delhi.

Web Sites :

www.en.wikipedia.org/wiki/Wireless_Application_Protocol

www.wap.com

www.w3schools.com/wap/

Course Objectives

- To describe common WAN protocols and interfaces like PPP.
- To demonstrate basic routing and network troubleshooting.
- To understand Frame delay and congestion control mechanisms
- To learn about ISDN and ISDN devices
- To analyze about VPN and its mechanisms
- To understand Asynchronous Transfer Mode (ATM) and VoIP standards and Devices

Course Outcomes(COs)

Upon successful completion of this course, the student will be able to:

1. Describe common WAN protocols and interfaces.
2. Demonstrate basic routing and network troubleshooting.
3. Understand Frame delay and congestion control mechanisms
4. Learn about ISDN and ISDN devices
5. Analyze about VPN and its mechanisms
6. Understand Asynchronous Transfer Mode (ATM) and VoIP standards and Devices

Unit I

Introduction to WAN Technologies: Point To Point Links – Circuit & Packet Switching – Virtual Circuits – Dialup Services – WAN Devices. Dialup Technology: Background – Dialup Connectivity – Dialup Methods – Benefits and Drawbacks.

Unit II

Point-To-Point Protocol: PPP Encapsulation – Link Operation – LCP Packet Formats – LCP Configuration Options. X.25: Devices and Protocol Operation – Protocol Suite – LAPB Frame Format – X.21 Address Format.

Unit III

Frame Relay: Frame Relay Devices – Virtual Circuits – Congestion Control Mechanisms – Local Management Interface – Frame Format. Integrated Services Digital Network: ISDN Devices – ISDN Channels – Services – ISDN Interfaces – ISDN Specification – Signaling System 7. Virtual Private Networks: Background – Layer 2 Tunneling Protocol – Operational Mechanisms – Adding More Security.

Unit IV

Asynchronous Transfer Mode: Standards – ATM Devices and the Network Environment – Cell Header Format – ATM Services – Switching Operations – Reference Model – Addressing – Connections – ATM and Multicasting – Quality of Service – Signaling and Connection Establishment – Connection Management Messages – PNNI – Integrated

Local Management Interface – LAN Emulation – Multiprotocol Over ATM – Physical Layer Architecture. MPLS/Tag Switching: Operations – Switching Architecture – Hierarchical Routing – Multicast Routing – Label Switching With ATM – Quality of Service and Traffic Engineering.

Unit V

Voice/Data Integration Technologies: Introduction – Advances in Applications – Voice Networking – Voice Over ATM – Voice Over Frame Relay – VOIP Standards – VOIP Technology and Future Communications – SGCP – The Simple Control Interface – Gateway Control Interface – Gateway Control Functions – Encoding of the Session Description – SGCP Transmission Over UDP – Security Requirements – Cash Flows – MGCP Overview – General SIP Tutorial. Digital Subscriber Line: ADSL, Signaling and Modulation – DSL Technologies.

Text Books

1. Ed Taylor. “*Networking Handbook*”, 1ST Edition, New Delhi: Tata McGraw Hill, 2000 (Chapter 5,6,9,10)
2. CISCO Systems. “*Internetworking Technologies Handbook*”, New Delhi: Techmedia, 2001.(Chapter 3,10,12, 15,17,18,19, 21, 27,28)

Reference Book

1. Behrouz A. Forouzan. “*Data Communication and Networking*”, 3rd Edition, New Delhi: Tata McGraw Hill, 2003

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

1. Understand the In-depth concepts of JEE
2. Understand the in-depth Life cycle of servlets and JSP.
3. Learn how to communicate with databases using Java.
4. Handle Errors and Exceptions in Web Applications
5. Use NetBeans IDE for creating J2EE Applications
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications

List of Programs

1. Create a sign in form in servlets.
2. Write a servlet Program to lock a server.
3. Write a servlet program that returns list of information in table format.
4. Design a counter that counts number of times user has visited the site in current browsing session.
5. Write a program to retrieve cookies information
6. Build a JAVA Bean for opening an applet from JAR file.
7. Write a program to add controls in BEAN.
8. Design a counter in JAVA BEAN.
9. Write a program to stream contents of a file using JSP.
10. Write a program to insert an applet into JSP page.

Course Objectives

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
4. Develop applications where several processes need to communicate with each other to complete a task.
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
6. Write programs which employs advanced concepts like multithreading.

List of Programs

1. To write a Linux program to display process deadlock state.
2. To write a program to display the allocated memory.
3. To write a program to simulate the DOS Command-Copy.
4. To write a program to implement signal handling.
5. To write a simple Linux program using thread.
6. To write a program to display the date & time using TCP Sockets.
7. To write a program to display the date & time using UDP Sockets.
8. To write a program to display the cpu scheduling
9. To write a Linux program to create a lock file.
10. To write a program to display the user information

Course Objectives

- to list the defining characteristics of an intelligent agent and how an agent differs from an object
- to understanding Agent architectures at Micro and Macro level
- to Develop agent understanding with different kinds of Ontologies and how they work together
- to understand how multiagents interact using pure and mixed strategy, Nash equilibria; zero-sum and other interactions; how cooperation Occurs in the Prisoner's dilemma.
- to understanding Coalition formation in Multiagent Environment using coalitional games; coalition structure generation
- to understanding allocation of scarce resources through auction types; combinatorial auctions and winner determination

Course Outcomes(COs)

After completing the course the students should:

1. be able to use important tools and technologies used in artificial intelligence and multi agent systems
2. be able to develop intelligent multi-agent systems
3. be able to assess the value of, and to a suitable extent utilize, existing solutions as a part of a programming project
4. Be able to model, analyze and critically evaluate distributed systems using agent-based abstractions and related concepts.
5. understand how multiagents interact using pure and mixed strategy, Nash equilibria; zero-sum and other interactions; how cooperation Occurs in the Prisoner's dilemma.
6. understanding Coalition formation in Multiagent Environment using coalitional games; coalition structure generation

UNIT I

Introduction – Intelligent Agents – Environments – Intelligent agents – Agents and Objects – Agents and Expert Systems – Agents as Intentional Systems – Abstract Architectures for Intelligent Agents – How to tell an agent what to do – Synthesizing Agents

UNIT II

Deductive Reasoning Agents – Agents as Theorem Provers – Agent-Oriented Programming – Concurrent MetateM

Practical Reasoning Agents – Proactical Reasoning Equals Deliberation Plus Means-Ends Reasoning – Means-Ends Reasoning – Implementing a Practical Reasoning Agent - Homer – The Procedural Reasoning System
Reactive and Hybrid Agents- Brooks and the Subsumption Architecture – The Limitations of Reactive Agents – Hybrid Agents

UNIT III

Multiagent Interactions – Utilities and Preferences – Multiagent Encounters – Dominant Strategies and Nash Equilibria – Competitive and Zero-Sum Interactions – The Prisoner’s Dilemma – Other Symmetric 2 x 2 Interactions – Dependence Relations in Multiagent Systems

Reaching Agreements – Mechanism Design – Auctions – Negotiation – Argumentation Communication – Speech Acts – Agent Communication Languages – Ontologies for Agent Communication – Coordination Languages

UNIT IV

Cooperative Distributed Problem Solving – Task Sharing – Combining Task and Result Sharing – Handling Inconsistency – Coordination – Multiagent planning and Synchronization

UNIT V

Methodologies – Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents, Applications of Agents

TEXT BOOK

1. Michael Wooldridge.2002. An Introduction to Multiagent Systems, John Wiley & Sons Ltd.

REFERENCE BOOKS

1. Gerhard Weiss. Multi-agent Systems – A Modern Approach to Distributed Artificial Intelligence, MIT Press
2. Walter Brenner et al, Intelligent Software agents, Springer Verlag
3. Nicholas R. Jennings, Michael Wooldridge, Agent Technology: Foundations, Applications and markets, Springer Verlag Publishing.

	Semester-IV
	L T P C
15CSP401 INTRODUCTION TO SOFTWARE ARCHITECTURE	0 0 0 4

Course Objectives

- To introduce basic concepts and principles about software design and software architecture.
- To understand design issues followed by coverage on design patterns.
- To get an overview of architectural structures and styles.
- to know practical approaches and methods for creating and analyzing software architecture are presented.
- To analyze the interaction between quality attributes and software architecture.
- To gain experiences with examples in design pattern application and case studies in software architecture.

Course Outcomes(COs)

A student who successfully completes this course should at the minimum be able to:

1. Design and motivate software architecture for large scale software systems
2. Recognize major software architectural styles design patterns and frameworks
3. Understand design issues followed by coverage on design patterns.
4. Generate architectural alternatives for a problem and select among them
5. Use well-understood paradigms for designing new systems
6. Identify and assess the quality attributes of a system at the architectural level

UNIT I

Introduction – Software Architecture – Software Design levels – An Engineering Discipline for Software – The status of Software Architecture – Architectural styles – Pipes and filters – Data Abstraction and Object-oriented organization – Event based, implicit invocation – Layered systems – Repositories – Interpreters – Process Control – Other Familiar Architecture – Heterogeneous Architectures.

UNIT II

Case studies - Key word is Context – Instrumentation Software – Mobile Robotics – Cruise Control – Three Vignettes in Mixed Style

UNIT III

Shared Information Systems – Database Integration – Integration in Software Development Environments – Integration in the Design of Buildings – Architectural structures for shared Information Systems

UNIT IV

Guidance for User-Interface Architectures – The quantified Design Space – The value of Architectural formalism – Formalizing the Architecture of a specific system –

Formalizing an Architectural Style – Formalizing an Architectural Design Space –
Towards a Theory of Software Architecture – Z Notation

UNIT V

Requirements for Architecture – Description Languages – First class connectors –
Adding Implicit Invocation to Traditional Programming Languages – Tools for
Architectural Design – UniCon – Exploiting Style in Architectural Design Environments
– Beyond definition/Use: Architectural Interconnection

TEXT BOOKS

1. Mary Shaw, David Garlan, Software Architecture – Perspectives on an Emerging Discipline, Prentice Hall of India, Eastern Economy Edition.
2. Software Architecture: Foundations, Theory and Practice, Richard N. Taylor, Nenad Medvidovic, Eric M. Dashofy, 2010, Wiley India Pvt. Limited.

REFERENCES

Boris Beizer. 1990. Software Testing Techniques (2nd Edition) , Van Nostrand Reinhold.

15LSU101	தமிழ் முதல் தாள்	Semester-I			
		L	T	P	C
		5	-	-	5

கற்பகம்உயர்கல்விகலைக்கழகம்
பகுதி - I தமிழ்ப்பாடத்திட்டம் (2015 - 2016)
முதல்பருவம்

(இளநிலை அறிவியல் பட்டவகுப்புகளுக்குரியது)
 (For I-UG Science Degree Classes) 15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன்விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள்வரிசையும்தேர்வுச்செயல்திட்டமும்பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	4	3	40 / 60	100	4

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்த்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்த்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்த்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

15ENU101	ENGLISH - I	Semester-I			
		L	T	P	C
		4	-	-	4

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

- Learn to reflect on the literary works and communicate flexibly.
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

PRESCRIBED TEXT

1. Rao, G. Chandralekha and et al. Spring 2013. Emerald Publishers: Chennai.

REFERENCES

2. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

15ECU101	ELECTRONIC DEVICES AND CIRCUITS	Semester-I			
		L	T	P	C
		5	1	-	6

COURSE OBJECTIVES

- Ability to design different types of Electronic Circuits such as Amplifiers and Oscillators.
- To understand and implement the advanced electronic circuits such as amplifiers etc with the help of theoretical and practical problem solving.
- Ability to analyze the different types of configurations and applications of Transistor.
- Ability to determine the stability of feedback amplifiers and their steady state performance.
- To analyze the Circuits in time and frequency domain
- Calculation and measurement of parameters for electronic circuits, to introduce the students to the advanced concepts of electronics.

COURSE OUTCOMES

- Know the characteristics of diodes and transistors
- Design simple circuits and know the benefits of feedback in amplifier
- Apply their knowledge in analyzing Circuits by using network theorems.
- Measure the characteristics of electronic circuits and present experimental results
- Compare and classify oscillators
- Analyze electrical circuits and calculate the main parameters

UNIT I - Passive Circuit Components

Introduction – Resistors: Fixed & Variable resistor – Colour coding – Tolerance - Series and Parallel connection. Capacitors: Basic structure and symbol – Fixed & Variable capacitors – Dissipation factor – Series and parallel connection. Inductors: Inductance of the coil – Fixed & Variable inductors – Inductive reactance – Energy stored in an inductor – Q factor – Mutual inductance – Series and Parallel connection

UNIT II - Network Theorems

Basics of Ohm's law – Kirchoff's law– Superposition theorem – Thevenin's theorem – Thevenizing a circuit with two Voltage Source – Thevenizing a bridge circuits – Norton theorem – Thevenin's Norton conversion – Conversion of Voltage and Current source – Millman's theorem – Maximum Power transfer theorem

UNIT III - Semiconductor Devices and Special Diodes

Introduction - Atom- electron-orbit – Energy level -Conductor – Semiconductor – Insulator– Intrinsic semiconductor – Extrinsic semiconductor – P type and N type semiconductor– PN junction diode –V-I characteristics - Zener diode - V-I characteristics- Schottky diode-Tunnel diode-Varactor diode- UJT- Photo diode- Construction and Operation of transistors – Characteristics of CE , CB,CE .

UNIT IV - Wave Shaping and Switching Circuits

Introduction and Design of Wave shaping and Switching Circuits - Clipping, Clamping circuits – Half wave, full wave and bridge rectifiers – Average value – RMS value – Ripple factor – Rectification efficiency. Filters: Capacitors, Inductors, LC and PI filter Transformers - Types–Zener as Voltage Regulator - Regulated Power Supplies using Zener Diode.

UNIT V- Amplifiers and Oscillators

Introduction– Transistor as an Amplifier -Single Stage- RC coupled amplifiers- Power amplifiers: Class A, B& AB power amplifiers-Push pull amplifiers- Oscillators – RC phase shift-Hartley Oscillator- Colpitts Oscillator-Wein Bridge Oscillator.

TEXT BOOKS

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar & A.Vallavaraj, Tata Mc Graw-Hill publishing Company Limited,Third Edition, 2012.
2. Electronic Devices and Circuits, David.A. Bell, Oxford University Press Fifth Edition, 2008.

REFERENCES

1. Electronic Devices and Circuits, Jacob Millman,Christos.C.Halkias&Satyabrata Jit,Tata Mc Graw–Hill Edition ,Third Edition, 2010.
2. Electronic Devices and Circuits I.U.A.Bakshi.A.P.Godse,Technical Publications, 2010.

15ECU102	ALLIED MATHEMATICS – I	Semester-I			
		L	T	P	C
		4	2	-	4

OBJECTIVE

- This course provides a deep knowledge to the learners to understand the basic concepts of Matrices, Sequences, Complex Variable, Complex Function, First Order Ordinary Differential Equations, Power series method
- To provide students with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
- To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
- To build the strong foundation in Mathematics of students needed for the field of electronics and Telecommunication Engineering
- Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis.
- Vector differentiation and integration required in Electro-Magnetics and Wave theory.

COURSE OUTCOMES

- Able to solve qualitative problems based on vector analysis and matrix analysis such as linear independence and dependence of vectors, rank etc
- Understand the concepts of limit theory and nth order differential equations and their applications to our daily life
- Able to solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables
- Come to know the applications of double and triple integration in finding the area and volume
- Know about qualitative applications of Gauss, Stoke's and Green's theorem
- Use Vector differentiation and integration required in Electro-Magnetics and Wave theory

UNIT I

Complex Numbers: Definition of complex number – Argand Diagram –rectangular form-polar form-Conversion of rectangular form into polar form and vice versa- Addition, subtraction, Multiplication and Division by using polar and Rectangular forms- Applications of Demoivre's theorem – $\cos n\theta$, $\sin n\theta$, $\tan n\theta$ - Expansions of $\cos n\theta$, $\sin n\theta$ – Expressions of $\sin\theta$, $\cos\theta$, $\tan\theta$ in powers of θ (simple problems only)

UNIT II

Vector Calculus :Concepts of vector and scalar fields- the Del operator – Divergence of a vector – Curl of a vector- Laplacian Operator – Gauss' s theorem, Green's theorem.(statements & simple problems only).

UNIT III

Matrices : Different types of matrices – Inverse of a matrix – Solution of simultaneous equations by Inverse matrix method- Unitary and Orthogonal matrices –Its properties. Cayley-Hamilton theorem (Statement only)-Verification.

UNIT IV

Differential Equations: Types of Linear Linear differential equations with constant coefficients – Simultaneous differential equations with constant coefficient.

UNIT V

Numerical Methods: Solving simultaneous equations.-Gauss Elimination method, Gauss Jordan method, Gauss – Seidel Process. Numerical Integration – Trapezoidal Rule, Simpson's

Rule.

TEXT BOOKS

1. A.Singaravelu, 2001, “Engineering Mathematics”, Meenakshi Agency, Chennai.(Unit I – IV)
- 2.Venkataraman M.K., 2001. Numerical methods in science & Engineering, National Publication co. Chennai. (Unit V)

REFERENCES

1. Venkataraman.M.K, 1998. “Engineering Mathematics”. The National Publications & Co. Chennai.
2. Veerarajan , T.Ramachandran “ Numerical methods with programs in C”, Tata McGraw-Hill publishing Ltd , New Delhi.
3. S. Narayanan and T.K. Manicavachagam Pillai. 2002. “ Calculus”, S.V Publications. Chennai.
4. Kandasamy, K. Thilagavathy, K.Gunavathy, 2000, “Numerical Methods”, S.Chand and Company LTD, New Delhi.

15ECU111	PRACTICAL -I ELECTRONIC DEVICES AND CIRCUITS LAB	Semester-I			
		L	T	P	C
		-	-	5	3

COURSE OBJECTIVES

- To identify and test various electronic components
- To use DSO for various measurements
- To plot the characteristics of diode and transistor
- To design and implement feedback amplifier circuits
- To measure the frequency of oscillators.
- To design and test regulated power supplies

COURSE OUTCOMES

- Verify the rectifier circuits using diodes and implement them using hardware
- Design the biasing circuits like self biasing
- Understand the construction, operation and characteristics of FET which can be used in the design of amplifiers
- Design simple circuits
- Know the benefits of feedback in amplifier
- Compare and classify oscillators.

(Any 12 Experiments)

1. Study of CRO and Colour coding of Resistors.
2. Verification of Ohms law
3. Verification of Kirchoffs Law
- 4.Verification of Thevenins Theorem
5. Verification of Superposition Theorem
6. Verification of Maximum Power transfer Theorem
7. VI Characteristics of Junction diode
8. VI Characteristics of Zener diode
9. Clipping and Clamping circuits
- 10.Half wave rectifier and Full wave rectifier.
- 11.Zener diode as Voltage regulator
- 12.RC coupled Amplifier
13. Phase shift Oscillator
14. Transistor characteristics of CE
15. Transistor characteristics of CB

15FCA101	FOUNDATION COURSE – A VALUE EDUCATION	Semester-I			
		L	T	P	C
		2	-	-	1

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

COURSE OBJECTIVES

- To improve the integral development of human beings
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom
- To provide a backdrop for the development of their creative talents
- To give students a deeper understanding about

COURSE OUTCOMES

- Students will understand the importance of value based living
- Students will gain deeper understanding about the purpose of their life
- Students will understand and start applying the essential steps to become good leaders.
- Know about philosophy of life and individual qualities
- To learn and practice social values and responsibilities
- The students fit for the future time and to develop a sense of competitive spirit, co-operation, leadership, diligence, punctuality, and team-spirit

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

15SSD101	SOFT SKILL DEVELOPMENT - I	Semester-I			
		L	T	P	C
		2	-	-	-

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

COURSE OBJECTIVES

- To improve the integral development of human beings
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom
- To provide a backdrop for the development of their creative talents
- To give students a deeper understanding about

COURSE OUTCOMES

- Effectively communicate through verbal oral communication
- Improve the listening skills
- Write precise briefs or reports and technical documents
- Actively participate in group discussion, meetings and presentations
- Become more effective individual through goal target setting , self motivation and practicing creative thinking
- To impact knowledge on both Aptitude and Soft skills to the students

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

15LSU201	தமிழ் இரண்டாம் தாள்	Semester-I			
		L	T	P	C
		5	-	-	5

கற்பகம்உயர்கல்விகலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப்பாடத்திட்டம் (2015 - 2016)
இரண்டாம்பருவம்
(இளநிலை அறிவியல் பட்டவகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப்பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கைமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள்வரிசையும்தேர்வுச்செயல்திட்டமும்பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
இரண்டு	II	4	3	40 / 60	100	4

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

- நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை,
ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.
2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

- குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.
2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

- ஐங்குறுநூறு : 1. நுண்ணோர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

- அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச. ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

15ENU201	ENGLISH - II	Semester-II			
		L	T	P	C
		4	-	-	4

Course Objectives:

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

- Learn to enjoy the ecstasy of literature.
- The select literary pieces will develop the confidence level of the learners.
- To get the social values.
- To know the importance of communication
- Get sound knowledge in English
- Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

PRESCRIBED TEXT

1. Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

REFERENCES

2. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

15ECU201	DIGITAL ELECTRONICS	Semester-II			
		L	T	P	C
		5	1	-	6

COURSE OBJECTIVES

- To enable the students to represent numerical values in various number systems and perform number conversions between different number systems.
- To analyze and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- To design sequential digital circuits like flip-flops, registers and counters.
- To acquaint the students with the fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
- To lay the foundation for further studies in areas such as communication, computer, microprocessor.
- To understand number representation and conversion between different representation in digital electronic circuits.

COURSE OUTCOMES

- Use the basic logic gates and various reduction techniques of digital logic circuit in detail.
- Design combinational and sequential circuits.
- Design and implement hardware circuit to test performance and application.
- Implement combinational and sequential circuits
- Classify different semiconductor memories
- Analyze, design and implement sequential logic circuits

UNIT I -Number Systems & Boolean Algebra

Review of Binary, Octal, & Hexadecimal and Decimal number systems-Representation of Signed Numbers-Floating point number representation-BCD-ASCII-EBCDIC-Excess 3 codes Gray code-Error Detecting & Correcting Codes. Boolean Algebra: Postulates & Theorems of Boolean Algebra –Canonical Forms –Simplification of Logic Functions using Karnaugh map.

UNIT II- Combinational Logic Design

Logic gates –Implementation of Combinational Logic Functions – Encoders & Decoders –Multiplexers & Demultiplexers –Code Converters – Comparator - Half Adder, Full Adder – Parallel Adder – Binary Adder – Parity Generator/Checker – Implementation of Logical Functions using Multiplexers.

UNIT III -Counters &Registers

RS, JK, JK Master–slave, D&T flip flops – Level Triggering and Edge Triggering – excitation tables –Asynchronous & Synchronous Counters – Modulus Counters–Shift Register – Johnson Counter- Ring Counter – State Diagram-State Table

UNIT IV-D/A, D/A Converter and Memories

Digital to Analog Converter: Resistive Divider type and Ladder type – Accuracy and Resolution - Analog to Digital Converter: Counters - Ramp type - Simultaneous Conversion – Dual slope type – Successive Approximation type – Memories and their types.

UNIT V-Logic Families and Programmable Logic Devices

Logic Families: RTL, DTL, TTL families, Schottky– Clamped TTL, Emitter Coupled (ECL), MOS Inverters, CMOS Inverters, Comparison of performance of Various Logic families. Introduction to PLD's – PAL – PLA

TEXT BOOKS

1. Digital Electronics and its principles, Salilvahanan, McGraw Hill Education (India) Private Limited, 2014, Tenth Edition.
2. Digital Principles and Application, Albert Paul Malvino, Donald P. Leach and Goutam Saha, Tata McGraw Hill, Seventh Edition 2010.
3. Digital Design: With an Introduction to Verilog HDL, Morris Mano, Pearson Education, Fifth Edition, 2013.

REFERENCES

1. Modern Digital Electronics, Jain R.P, Tata McGraw Hill Company, Fourth Edition, 2012.
2. Integrated Circuits, Botkar K.R, Khanna Publications, 2008, Third Edition.

15ECU202	ALLIED MATHEMATICS – II	Semester-I			
		L	T	P	C
		4	2	-	4

- This course provides a deep knowledge to the learners to understand the basic concepts of Matrices, Sequences, Complex Variable, Complex Function, First Order Ordinary Differential Equations, Power series method
- To provide students with mathematics fundamentals necessary to formulate, solve and analyses complex engineering problems.
- To prepare student to apply reasoning informed by the contextual knowledge to engineering practice.
- To build the strong foundation in Mathematics of students needed for the field of electronics and Telecommunication Engineering
- Linear differential equations of higher order using analytical methods and numerical methods applicable to Control systems and Network analysis.
- Vector differentiation and integration required in Electro-Magnetics and Wave theory.

COURSE OUTCOMES

- Gain a clear knowledge about the necessity, properties and applications of Fourier series, Fourier Transform, Laplace Transform and the concept of Statistics and the usage of them
- Able to solve qualitative problems based on vector analysis and matrix analysis such as linear independence and dependence of vectors, rank etc
- Understand the concepts of limit theory and nth order differential equations and their applications to our daily life
- Able to solve the problems of differentiation of functions of two variables and know about the maximization and minimization of functions of several variables
- Know about qualitative applications of Gauss, Stoke's and Green's theorem
- Use Vector differentiation and integration required in Electro-Magnetics and Wave theory

UNIT I

Fourier series – Definition – Finding Fourier coefficients for a given periodic function with period 2π – Odd and Even functions – Half Range Series.

UNIT II

Definition of Fourier Transform - Properties of Fourier Transform - Inverse Fourier transform - Convolution theorem - Finite Fourier Sine & Cosine Transform – Parseval's theorem.

UNIT III

Definition of Laplace Transform - Properties of Laplace Transform, Inverse Laplace Transform. Application of Laplace Transform.

UNIT IV

Measures of central tendency – Arithmetic Mean, Median, Mode. Measures of dispersion – Range, Standard deviation and Coefficient of variation.

UNIT V

Probability : Concept of Probability - Addition theorem – Multiplication theorem- Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

TEXT BOOKS

1. T.K.Manicavachagom Pillay, 1996, "Calculus Vol II", S. Viswanathan (Printers and

- Publishers), PVT., LTD. (Unit I – III).
2. R.S.N.Pillai, V.Bagavathi, 2002, “Statistics”, S. Chand & Company Ltd, New Delhi. (Unit IV and V).

REFERENCES

1. V.Sundaram, R.Balasubramanian, K.A. Lakshminarayanan, 2001, “Engineering Mathematics Vol. III”, Vikas publishing house PVT., LTD, New Delhi.
2. M.K.Venkataraman. 2001. “Engineering Mathematics Vol. II”. National Publishing Company. Chennai.
3. P.Kandasamy, K.Thilagavathy, K.Gunavathy, 2007, “Engineering Mathematics Vol. III”, S. Chand & Company Ltd, New Delhi.

15ECU211	PRACTICAL II - DIGITAL ELECTRONICS LAB	Semester-II			
		L	T	P	C
		-	-	5	3

COURSE OBJECTIVES

- Learn and understand the basics of digital electronics, Boolean algebra, and able to design the simple logic circuits and test/verify the functionality of the logic circuits
- Provide hands-on experience in digital circuits, which can be constructed by using standard integrated circuits (ICs)
- Investigate the operation of several digital circuits combinational and sequential
- To model complex digital systems at several level of abstractions; behavioral and structural, synthesis and rapid system prototyping.
- To develop and simulate register-level models of hierarchical digital systems
- To design and model complex digital system independently or in a team

COURSE OUTCOMES

- Identify the various digital ICs and understand their operation.
- Apply Boolean laws and K-map to simplify the digital circuits
- Understand the function of elementary digital circuits under real and simulated environment
- Describe and explain the operation of fundamental digital gates
- Analyze the operation of a flip-flop and examine relevant timing diagrams
- Analyze the operation of counters and shift registers

(Any 12 Experiments)

1. Realization of logic gates using diodes and transistors
2. Verification of Logic Gates using IC
3. Realization of logic gates using universal gates
4. Code converters
5. Realization of Multiplexer using basic gates
6. Encoder and Decoder
7. Realization Half and Full adders
8. Realization of Subtractor
9. Realization of Parity generator
10. Flip-Flop Circuit
11. 4 bit Binary adder
12. Ring Counters
13. A/D converter
14. D/A converter
15. Comparator

15FCB201	FOUNDATION COURSE – B ENVIRONMENTAL STUDIES	Semester-I			
		L	T	P	C
		2	-	-	1

COURSE OBJECTIVES

- Creating the awareness about environmental problems among people.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and improvement.
- Recognize the interconnectedness of multiple factors in environmental challenges
- Engage constructively with diverse forms of knowledge and experience
- Recognize and apply methodological approaches of the social sciences, natural sciences, and humanities

COURSE OUTCOMES

- Understand key concepts in the life and physical sciences and will apply them to environmental issues
- Apply knowledge of the sciences within an interdisciplinary context in solving environmental issues such as environmental health, food and agriculture, energy, waste and pollution, and loss of biodiversity.
- Possess the intellectual flexibility necessary to view environmental questions from multiple perspectives, prepared to alter their understanding as they learn new ways of understanding.
- Solve problems systematically, creatively, and reflexively, ready to assemble knowledge and formulate strategy
- Identify, interpret, and apply basic measures (metrics and formulae) of social system variables to assess socio-environmental conditions.
- Analyze and evaluate ideological and philosophical approaches used to understand environmental relationships

NIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
 2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
 3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
 4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
- Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

15ENU301	ENGLISH - III	Semester-III			
		L	T	P	C
		4	-	-	4

Course Objectives

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcomes (COs)

- Students learnt the basics and purposes of listening skill.
- Students understand importance of speaking.
- Students developed the speaking skills on telephone, business and also in travel
- Learnt some effective vocabulary learning strategies.
- Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

REFERENCES

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. "Let's Communicate – Basic English for Everyone", Vaigarai Publications, First Edition, Dindigul 2007.

15ECU301	PRINCIPLES OF COMMUNICATION SYSTEMS	Semester-III			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To learn the designing procedure and operation of circuits used for communication.
- To understand the basic concepts of AM, FM, and PM transmission and reception.
- To assess and evaluate different modulation and demodulation techniques.
- To evaluate the influence of noise on communications signals.
- To introduce students to various modulation and demodulation techniques of analog communication
- To analyze different parameters of analog communication techniques

COURSE OUTCOMES

- Apply or a create suitable algorithm to solve a particular problem
- Understand and identify the fundamental concepts and various components of analog communication systems
- Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
- Describe analog pulse modulation techniques and digital modulation technique
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Use of different modulation and demodulation techniques used in analog communication

UNIT I -Modulation Techniques

Introduction to Communication Systems – Information – Transmitter – Channel – Noise –Receiver – Need for Modulation Band Width requirement – Amplitude Modulation: AM Theory– Frequency spectrum of AM wave – Representation of AM – Power relations in AM wave –AM Transmitter block diagram – Frequency modulation: System description – Mathematical representation – Frequency Spectrum – Generation of FM – Direct and Indirect methods.

UNIT II - Wave Propagation

EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Tropospheric Scatter Propagation – Structure of Atmosphere – Virtual height – MUF – LUF – Skip Distance – Ionospheric abnormalities- Duct Propagation

UNIT III -Antenna Theory

Electro Magnetic radiations – Elementary doublet – Current and Voltage Distribution – Resonant antennas, Radiation patterns and Length calculations – Non resonant antennas – Antenna gain and Effective radiated power – Antenna resistance – Bandwidth, Beam width and Polarization – Grounded and Ungrounded antennas – Impedance matching – Dipole Arrays - Yagi Uda antenna – Parabolic antenna – Horn and Lens antenna .

UNIT IV- Receiver

Introduction – Super heterodyne Receiver – Choice of IF and Oscillator Frequencies – Image Rejection – Adjacent Channel Selectivity – Spurious Response - Tracking – AGC – Double conversion receiver

UNIT V - Modulation Types Analog & Digital Modulation

Introduction to PAM, PPM, PWM and PCM-Binary Phase Shift Keying - differential phase shift keying – differentially encoded PSK - Quadrature Phase Shift Keying – Quadrature amplitude shift keying – Binary frequency shift keying.

TEXT BOOKS

1. Electronic Communication Systems, Kennedy and Davis, Tata McGraw Hill, Fifth Edition, 2012.
2. Electronic Communications, Dennis Roddy and John Coolen, Pearson Education, Fourth Edition, 2008.
- 3 Antenna Wave Propagation, K.D. Prasad and Satyaprakahan, Pearson Education, Indian Reprint, Fourth Edition, 2012.

REFERENCES

1. Principles of Communication Engineering, Anok Singh & A K Chhabra, S.Chand Publications, Seventeenth Edition, 2010.

15ECU302	LINEAR INTEGRATED CIRCUITS	Semester-III			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To develop an in-depth knowledge on IC fabrication technology
- To understand the basic concepts of operational amplifier and its various applications
- To understand the basics of PLL and its practical applications
- To know about analog multipliers
- To know about various analog switches and different A/D and D/A convertors
- To understand the concepts of switched capacitor filters, Voltage regulator and various amplifiers

COURSE OUTCOMES

- Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Develop skills to design simple circuits using OP-AMP
- Gain knowledge about various multiplier circuits, modulators and demodulators
- Gain knowledge about PLL
- Learn about various techniques to develop A/D and D/A convertors
- Develop skills to develop simple filter circuits and various amplifiers and can solve problems related to it.

UNIT I - IC Fabrication Technology

Introduction to Integrated Circuit Fabrication – Classification – Integrated Circuit chip size and circuit complexity - Fundamentals of Monolithic Integrated Circuit technology –Basic planar process –Fabrication of a Typical circuit – Active and Passive Components Integrated Circuits - Thin and Thick film technology – Technology Trends

UNIT II - Operational Amplifier

Introduction to Operational Amplifiers – Parameters of Operational Amplifiers – Inverting and Non-Inverting amplifier– Summing Amplifier – Differential Amplifier – Integrator – Differentiator – Instrumentation Amplifier – Voltage to Current Converter –Current to Voltage Converter – Frequency to Voltage and Voltage to Frequency Converter –Wein bridge and RC Phase Shift Oscillator – Collpitts Oscillator –Triangular and Square waveform Generators - Multivibrators.

UNIT III - Comparators and Filters

Introduction to Comparator – Symbol and Characteristics – Effect of Positive Feedback – Difference between Op-amp and Comparator – Voltage Level Detector – Zero Crossing Detector - Schmitt trigger – Level Detector – Window and Peak Detectors – Sample and Hold Circuits.-Active Filters: LPF, HPF, BPF and BRN using Op-Amp.

UNIT IV - Voltage Regulator

Introduction – Series OP-AMP Regulator – IC voltage regulators – Fixed voltage series regulator – Fixed regulator using as adjustable regulator - Block schematic of regulator IC 723 - Regulated power supply using IC 723 - Switching Regulator – Regulator using 78xx, 79xx, and LM 317.

UNIT V - Timer and PLL

Introduction to Timer- Description of Functional block diagram of 555 timer – Monostable operation – Applications: – Linear ramp generator – Pulse width modulator – Frequency Divider - Astable operation – Applications: Schmitt trigger –Pulse Position Modulator - FSK Generator Introduction to Phase locked loop –Basic Principles –VCO

TEXT BOOKS

1. Linear Integrated Circuits, Roy Choudhury. D, Shail Jain, New Age International Ltd, Fourth Edition, 2014.
2. Linear Integrated Circuits, Salivahanan, Tata Mc-Graw Hill Publications, Fourth Edition, 2008.

REFERENCES

1. Integrated Circuits, Botkar K.R, Khanna Publications, 2008.
2. Linear Integrated Circuits, J.S.Chitode, Pune Technical Publications, Sixth Edition,2010.

15ECU311	PRACTICAL – III COMMUNICATION LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- Convert analog signals to digital format and describe Pulse and digital Modulation techniques
- To introduce students to various modulation and demodulation techniques of analog communication.
- To analyze different parameters of analog communication techniques
- It also focuses on pulse modulation and demodulation
- To understand the concept in communication system to use it in solving the global complex problems.
- Evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of additive white noise.

COURSE OUTCOMES

- Able to identify and describe different analog modulation techniques.
- Able to understand basic theories of Digital communication system in practical
- Able to design and implement different modulation and demodulation techniques
- Able to analyze digital modulation techniques by using various tools.
- Able to identify and describe different techniques in modern digital communications, in particular in source coding using various tools
- Implement different types of Amplitude, Frequency, Phase and Pulse modulation and demodulation schemes

(Any 10 Experiments)

1. AM Modulation and Demodulation
2. FM Modulation and Demodulation
3. Pulse Amplitude Modulation and Detection
4. Pulse Width Modulation and Detection.
5. Pulse Position Modulation and Detection
6. Pulse Code Modulation and Detection
7. Amplitude Shift Keying and Detection
8. Frequency Shift Keying and Detection
9. Audio Amplifier using TBA 810.
10. IF Amplifier
11. Study of Yagi uda Antenna
12. IF amplifier

15ECU312	PRACTICAL – IV LINEAR INTEGRATED CIRCUITS LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To Gain the practical hands-on experience on 741 Op-Amp applications
- To understand the basic concepts of operational amplifier and its various applications
- To Gain the practical hands-on experience on 555 Timer applications.
- To Gain the practical hands-on experience on Voltage Regulator and Three terminal voltage regulators
- To know about various analog switches and different A/D and D/A convertors
- To understand the concepts of switched capacitor filters, Voltage regulator and various Amplifiers

COURSE OUTCOMES

- Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Develop skills to design simple circuits using OP-AMP
- Able to utilize items such as decibels, Bode plots, and negative feedback for circuit analysis.
- Gain knowledge about various multiplier circuits, modulators and demodulators
- Gain knowledge about PL
- Develop skills to develop simple filter circuits and various amplifiers and can solve problems related to it.

(Any 10 Experiments)

1. Op-amp: Adder and Subtractor
2. Op-amp: Integrator and Differentiator
3. Op-amp: Schmitt trigger
4. Voltage to Current Converter and Current to Voltage Converter
5. Instrumentation Amplifier
6. Low Pass and High Pass Filters using Op-amp
7. Square and Triangular wave Generator
8. Astable multivibrator using 555
9. Monostable multivibrator using 555
10. Regulated power supply using IC 723
11. VCO using IC 555.
12. Function Generator using 8038

15ECU303A	OFFICE AUTOMATION	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- Amplifiers Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Exchange of Information
- Management of Administrative Documents
- Handling of Numerical Data
- Meeting Planning and Management of Work Schedules
- Introduce the students into the various aspect of office automation from primitive method employed in the office in carrying out daily system of office management to the modern day in- office automated system

COURSE OUTCOMES

- Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Working with Lists, Databases and Pivot tables
- Creating Worksheet Charts
- Analyze business data
- Formatting Forms and Reports
- Setting-Up and Publishing the slide show

UNIT I

Getting started with MS-Word - Entering and Editing Text in a word document - Formatting a word document - Customizing Styles and Templates - Arranging text in Columns and Lists - Using Word's Proofing tools - Designing pages.

UNIT II

Working with Word in Workgroups - Writing Long Documents - Using word to Automate Mailing. Menus – Tables – Windows.

UNIT III

MS-Excel: Building a Worksheet - Editing a Worksheet - Formatting a Worksheet - Using Workbooks to organize information - Customizing Excel to work the way you do - Using formulas and functions to crunch numbers - Creating Worksheet Charts -Working with Lists, Databases and Pivot tables - Analyzing business data - Using Excel to publish to the Web.

UNIT IV

Getting started using MS-PowerPoint - Entering and Editing Text - Formatting text - Inserting Tables, Graphics, and Drawings - Adding special effects and Internet Links - Perfecting your presentation – Setting-Up and Publishing the slide show -Running the slide show.

UNIT V

MS-Access: Understanding Data basics - Creating tables and relationships - Using datasheets to enter and view data - Using Forms to enter and view data – Using Queries to get answer - Using Wizards to generate reports - Formatting Forms and Reports.

TEXT BOOK

1. Running Microsoft Office2000, Halvorson. M and Young. M. First Edition, Washington: Microsoft Press, 1999.

REFERENCES

1. Taxali. R.K. PC Software for Windows Made Simple. 6th Edition, New Delhi: Tata McGraw Hill, 2000.

15ECU303B	C PROGRAMMING	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To understand various features in C
- To help students to understand the implementation of C language
- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C
- To understand the fundamental algorithms such as searching, and sorting

COURSE OUTCOMES

- Analyze unstructured problems and design computer solutions
- Apply or a create suitable algorithm to solve a particular problem
- An ability to apply knowledge of computing and mathematics appropriate to the discipline
- An ability to analyze a problem and identify the computing requirements appropriate for its solution
- An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs, and use current techniques
- Able to design and analyze the time and space efficiency of the data structure

UNIT-I - Programming and Problem Solving

Introduction to Computer based Problem Solving- Problem definition – Problem Solving- goals and objectives – problem identification and definitions. Algorithms for Problem definition – Program design and Implementation issues. Programming Environment – Computer Programming Languages – Types of Programming Languages – Compilers – interpreters.

Construct algorithms for the following: Addition and Multiplication of Two numbers – Check for Odd or Even numbers – Check for Prime numbers – Summation of Set of Numbers.

UNIT-II - Introduction to C

Introduction - An Overview of C – Keywords and Identifier – Variables - Declarations of Variables - User Defined Type Declarations - Typedef – Enum - Constants – Data Types – Operators – Expressions - C Formatted I/O Operations. Decision Making and Branching Statements – Decision Making and Looping Statements - Arrays-Strings - String Handling Functions.

UNIT-III - Functions, Structures and Union

Functions - Introduction - Definition of Functions - Function Declaration - Category of Functions - Nesting of Functions – Recursion - Passing Arrays to Function. Structures and Unions – Introduction - Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Arrays of Structure – Unions.

UNIT-IV - Pointers

Pointers – Introduction – Declaring Pointer Variables - Pointer and Arrays - Pointers and Strings – Array of Pointers - Functions and Pointers - Function Returning Pointers -Pointers to functions - Pointers and Structures

UNIT-V - File Management

File Management in C – Introduction - Opening a File - Closing a file – Input/output operations on files - Error handling during I/O Operations - Random Access to Files - Command Line Arguments.

TEXT BOOKS

1. Balagurusamy .E. 2007. Programming in ANSI C. 4th Edition, Tata McGraw Hill Publishers, New Delhi.[Unit – I (23-81), Unit – II (114-259), Unit – III (262-348), Unit – IV (351-388), Unit – V (389-442)]

REFERENCES

1. Ashok N. Kamthane. 2004. Programming with ANSI and Turbo. 1st Edition, Pearson education, New Delhi. .[Unit – I (7-60), Unit – II (63-277), Unit – III (318-446), Unit – IV (281-315), Unit – V (451-525)]
2. Yeswanth Kanetkar. 2007. Let Us C. 8th Edition, BPB Publications, New Delhi.[Unit- I (1-39,489-513), Unit – II (49-312,335-362), Unit – III (155-392), Unit – IV (155-198), Unit – V (423-462)]
3. Karthikeyan.E . 2008. Textbook on C: Fundamentals, data structure & Programming, First Edition , PHI Publications, New Delhi. .[Unit – I (3-31), Unit – II (57-141), Unit – III (147-176,233-254), Unit – IV (191-229), Unit – V (261-287)]

WEB SITES

1. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
2. <http://www2.its.strath.ac.uk/courses/c/>
3. <http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

15ECU303C	VISUAL PROGRAMMING	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To have a fundamental understanding of Language Basics, Programming Fundamental and OOP's Concepts
- Understanding the platform; Determinism and concurrency; Handling input and output securely; Safe error handling and logging; Engineering for security features; Software security in operations.
- Grasp the fundamentals of a programming language
- To know the basic differences between programming languages Program logics and different platforms to build effective software
- To Choose the architecture based on the problem to be solved
- To build, compile, and execute a VB program

COURSE OUTCOMES

- Students list the Visual Programming concepts
- Express constraints and arithmetic operations
- Knowledge on program logics and different platforms to build effective software Analyze unstructured problems and design computer solutions
- Apply or a create suitable algorithm to solve a particular problem
- Choose the architecture based on the problem to be solved
- Distinguish and compose events and methods

UNIT I

Introduction to Windows and visual basic - customizing forms - properties window - tool box - creating controls - name property - properties of command button - event procedures for command button - access keys - image controls - text boxes – labels - message boxes - grid.

UNIT II

Statements– variables – data types – strings – operator – constants - determinate & indeterminate loops –conditionals - built in functions - string function - numeric function - date & time function - financial function.

Function procedures - sub procedures – arrays - control arrays- - adding & removing controls in control array-using arrays with function and procedures.

UNIT III

Intrinsic controls : Pointer , Label , Frame , Checkbox, Combo box, Hscroll Bar, Timer, DirListbox , Shape , Image OLE, Picture Box. List box, Text box, Command button, Option button, Vscrollbar, Drive List box, Line controls usage and properties.Tree View Control – List View Controls.

UNIT IV

Project with multiple forms - MDI forms - list box - combo box - option button - check box - scroll bars – timers - menu editor - line & shape control - creating objects - building classes.

UNIT V

DDE – Methods, Properties, Events – Database Programming: Data Tools – DAO, ADO, OLEDB and RDO Data base Connections – ActiveX commands.

TEXT BOOK

1. Gary Cornell. Visual Basic 6 from the ground up. 1st Edition, New Delhi: Tata McGraw Hill Publication, 2005.

REFERENCES

1. Eric A. Smith, Valor Whisher, Hank Marquis. Visual Basic 6 Programming Bible, First Edition USA: Valor Whisler Hank Marguis Inc, 1998.

15ECU313 A	OFFICE AUTOMATION LAB	Semester-III			
		L	T	P	C
		3	-	-	2

COURSE OBJECTIVES

- To have a fundamental understanding of Language Basics, Programming Fundamental and OOP's Concepts
- Understanding the platform; Determinism and concurrency; Handling input and output securely; Safe error handling and logging; Engineering for security features; Software security in operations.
- Grasp the fundamentals of a programming language
- To know the basic differences between programming languages Program logics and different platforms to build effective software
- To Choose the architecture based on the problem to be solved
- To build, compile, and execute a VB program

COURSE OUTCOMES

- Students list the Visual Programming concepts
- Express constraints and arithmetic operations
- Knowledge on program logics and different platforms to build effective software Analyze unstructured problems and design computer solutions
- Apply or a create suitable algorithm to solve a particular problem
- Choose the architecture based on the problem to be solved
- Distinguish and compose events and methods

(Any 10 Programs)

MS-WORD

1. Type a paragraph and perform the following.
 - Change the font size
 - Bold, italics, underline
 - Line spacing
 - Changing of background color and text color
 - Inserting footer and header
 - Alignment – left, right, justified, center
2. Type a document and perform the following operations.
 - Change the text into THREE columns
 - Check spelling and grammar
 - Bullets and numbering list items
 - Find and replace
3. Prepare the department timetable using MS-Word.
4. Prepare the job application letter enclosing your Bio-data.
5. Using Mail Merge to prepare an interview calls letter.

MS-EXCEL

6. To link an Excel worksheet into a word document using Object.

7. An excel worksheet contains monthly sales details of five companies. Find the monthly and quarterly average sales of each company.
8. Draw a line chart showing the sales turnover of five different companies over a period of ten years.
9. Draw a pie chart showing particular class student semester result.

MS-ACCESS

10. Create a database and maintain the address of your classmates with the following constraints.
 - Roll number should be the primary key.
 - Names should not be empty
 - Maintain at least 10 records.
 - Recall information according to place, city.
11. Create an item table with the following structure.
Item number, Item name, Quantity, Net price.
 - Find the net price for all records.
 - Display only the item number, item name for net price > 10000
 - To increase the rate by 10% for all records.
 - Display all the details for item name = “nut” and quantity >10.

POWER POINT

12. Prepare a power point presentation with atleast three slides for Department Inaugural Function.
13. Draw an organization chart with minimum three hierarchical slides.
14. Design an advertisement campaign with minimum three slides.

15ECU313 B	C PROGRAMMING LAB	Semester-III			
		L	T	P	C
		3	-	-	2

COURSE OBJECTIVES

- To make the student learn a programming language and to understand various features in C
- To develop skills to design and analyze simple linear and non linear data structures
- To learn problem solving techniques.
- To write programs in C and to solve the problems.
- Gain knowledge in practical applications of data structures
- Analyze unstructured problems and design computer solutions

COURSE OUTCOMES

- Able to design and analyze the time and space efficiency of the data structure
- Be capable to identify the appropriate data structure for given problem
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given algorithm
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
- Write programs that perform operations using derived data types.

(Any 10 Programs)

1. Write a program to find factorial of a given number using recursive and non recursive
2. Write a program to generate Fibonacci series.
3. Write a program to print Multiplication table using for and Do While Loops
4. Write a program to find Maximum number without using arrays
5. Write a program to convert a given number into words
6. Write a program
 - (i) to find the length of a string
 - (ii) concatenation of two strings
7. Write a program to reverse the given string
8. Write a program to count the vowels in a given sentence
9. Write a program to check the given string is palindrome or not
10. Write a program to perform matrix multiplication
11. Using any one sorting method to sort given 'n' numbers using pointers.
12. Write a program to prepare an employee pay slip using structures
13. Write a program for Electricity Bill Preparation using files
14. Write a program for the Odd and even numbers are stored in separate files the original files.

15ECU313 C	VISUAL PROGRAMMING LAB	Semester-III			
		L	T	P	C
		3	-	-	2

COURSE OBJECTIVES

- To have a fundamental understanding of Language Basics, Programming Fundamental and OOP's Concepts
- Understanding the platform; Determinism and concurrency; Handling input and output securely; Safe error handling and logging; Engineering for security features; Software security in operations.
- Grasp the fundamentals of a programming language
- To know the basic differences between programming languages Program logics and different platforms to build effective software
- To Choose the architecture based on the problem to be solved
- To build, compile, and execute a VB program

COURSE OUTCOMES

- Students list the Visual Programming concepts
- Express constraints and arithmetic operations
- Knowledge on program logics and different platforms to build effective software Analyze unstructured problems and design computer solutions
- Apply or a create suitable algorithm to solve a particular problem
- Choose the architecture based on the problem to be solved
- Distinguish and compose events and methods

(Any 10 Programs)

1. Write a program to convert the number entered by the user to its equivalent decimal, octal, and hexadecimal
2. Write a program to perform arithmetic operations getting input from the user through input box.
3. Write a program to perform geometrical calculations
4. Write a program to accept user name and age .if age is greater than 18 displays “eligible to vote”, else display how many years he has to wait to vote.
5. Write a program to check whether accepted string is palindrome or not.
6. Write a program to calculate the simple interest and compound interest
7. Write a program to calculate the total marks of student and print grade.
8. Write a program to perform string operations.
9. Write a program to add, remove, clear item from the list box.
10. Write a calculator program to perform arithmetic operations.
11. Write a program to create menu bar with title color and size. color menu allows selection of color from menu and fills program with the selected color. color menu has menu items fill color and exit. when fill color menu is clicked another menu should popup with list of colors. size menu contains menu item small and large. when small & large is clicked form should be minimized and maximized.
12. Write a program to illustrate the drag and drop operations of mouse.

15SSD301	SOFT SKILL DEVELOPMENT - II	Semester-III			
		L	T	P	C
		2	-	-	1

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

COURSE OBJECTIVES

- To impart knowledge on both Aptitude and Soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- Reinforcing competencies in soft skills which are crucial in a social setting
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills

COURSE OUTCOMES

- Effectively communicate through verbal oral communication
- Improve the listening skills
- Write precise briefs or reports and technical documents
- Actively participate in group discussion, meetings and presentations
- Become more effective individual through goal target setting , self motivation and practicing creative thinking
- To impart knowledge on both Aptitude and Soft skills to the students

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

15ENU401	ENGLISH - IV	Semester-IV			
		L	T	P	C
		4	-	-	4

Course Objectives:

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

- Students have acquired proficiency in communication.
- Students have become adept in written communication and presentation skills.
- Developed the skill of writing in English and that of public speaking.
- Establish and maintain social relationships.
- Develop communication skills in business environment.
- Enhanced communication competency through LSRW skills

UNIT I

Concept of Communication – Barrier to Communication – Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II

Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III

Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV

Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V

Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

PRESCRIBED TEXT

1. Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCES

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007.Anuradha Publications: Kumbakonam

3. Mohan, Krishna and Meenakshi Raman.2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

15ECU401	INDUSTRIAL AND POWER ELECTRONICS	Semester-IV			
		L	T	P	C
		5	1	-	6

COURSE OBJECTIVES

- To know the fundamental concept of Power Electronics and its Applications
- To teach fundamental principles of thyristor family.
- To become familiar with power devices and their application in various fields
- Learners are expected to understand various controllers , converters , inverters and choppers
- To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications
- To provide strong foundation for further study of power electronic circuits and systems

COURSE OUTCOMES

- Apply basic concept of digital fundamentals to Microprocessor based personal computer system
- Demonstrate an understanding of fundamentals of thyristor family.
- Analyze the various applications and circuits based on thyristor .
- Build and test circuits using power devices such as SCR, IGBT and MOSFET.
- Analyze and design controlled rectifier, DC to DC converters, DC to AC
- Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices

UNIT I - Thyristors and UJT

Principles, Construction & characteristics of SCR – Two transistor model – Rectifier circuits using SCR – Operation and Characteristics of TRIAC – DIAC – GTO – SCS – LASCR. UJT & PUT– UJT as Relaxation Oscillators.

UNIT II - Turn On/Off Mechanisms

Types of turn on methods: AC gate triggering – R triggering – RC triggering – DC gate triggering – Pulse triggering – Types of turn off methods: Natural commutation – Forced commutation: Self commutation – Complimentary commutation – Auxiliary commutation – External pulse commutation—Line commutation.

UNIT III - Controlled Rectifiers & Inverters

Half wave controlled rectifiers with resistive load – HWCR with inductive load – HWCR with Freewheeling Diode – Full wave controlled rectifiers with resistive, inductive loads – FWCR with freewheeling diode. INVERTERS: Single phase half & full bridge voltage inverters— Step-Up & Step-Down choppers.

UNIT IV - Convertors and Power MOSFET

Introduction – Single phase centre tapped step-up Cycloconverter – Single phase Bridge type step-up Cyclo-converter – Single phase centre tapped step-down Cycloconverter –N-channel planner Enhancement MOSFET – N- channel VDMOS Power MOSFET—Features and Characteristics of VDMOSFET.

UNIT V - Applications

Introduction – Electric resistance welding & types –Electric Arc welding – Sequence timer – Synchronous weld control.— SMPS & UPS – Static switches – Time delay & Fan regulator using TRIAC - Burglar alarm-Automatic lamp dimmer.

TEXT BOOKS

1. Power Electronics –Circuit, Device and application, Muhammed H.Rashid Pearson Education, Third Edition, 2014.
2. Industrial and Power Electronics, Harish C. Rai, Umesh Publications, Millennium Edition, 2013.

REFERENCES

1. Power Electronics, J.S.Chitode, Technical Publications, Fourth Edition, 2009.
2. Power Electronics, Dr.P.S.Bimbhra, Khanna Publications, Third Edition, 2012.

15ECU402	MICROWAVE AND SATELLITE COMMUNICATION	Semester-IV			
		L	T	P	C
		5	1	-	6

COURSE OBJECTIVES

- To know the fundamental concept of Power Electronics and its Applications
- To know the fundamental concepts of Microwave Waveguides.
- To Learn the Microwave Standards and RADAR Technology
- To provide a strong knowledge about of Spread Spectrum and Communication in Space.
- To represent a digital signal using several modulation methods
- Draw signal space diagrams compute spectra of modulated signals and apply redundancy for reliable communication.

COURSE OUTCOMES

- Understand the basics of information theory, source coding techniques and calculate Entropy of source
- To know the various types of noises in communication systems and reduction techniques
- Describe and determine the performance of line codes and methods to mitigate inter symbol interference
- Learn the generation and detection of base band system
- Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques
- Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

UNIT I – Electro-magnetics and Waveguides

Introduction to microwaves and electromagnetic – Maxwell's equation – wave equations – TEM/TE/TM/HE – Wave definitions: Waveguides: Types of Waveguides – Propagation of wave in rectangular waveguides – Propagation of TEM waves – TE and TM modes – Propagation of TM waves in rectangular waveguides – TM mode in rectangular waveguide.

UNIT II - Microwave Tube Circuits and Antennas

Microwave Transistors - Klystrons – Traveling Wave Tube (TWT) – Backward wave oscillator – Magnetrons – Microwave Antennas: Horn Antennas – Parabolic reflectors – Lens Antennas – Slot Antenna – Micro strip Antenna.

UNIT III - Radar

Introduction – Block Diagram of Simple RADAR – Classification – Free space radar range equation – Maximum unambiguous range – Pulsed RADAR system – Target detection – Scanning and Tracking with radars – Frequency diversity - Doppler Effect – CW Doppler radar – MTI Radar – Frequency modulated CW radar

UNIT IV - Orbital Mechanics and Launchers

Introduction: History of satellite communication – Overview of satellite communication – Orbital mechanics – Look angle determination – Orbital perturbations – Orbit determination – Orbital effects in communication systems performance.

UNIT V - Satellite and Link Design

Satellite subsystems – Attitude and orbital control system – Telemetry, Tracking, Command and monitoring – Power systems – Communication subsystems– Equipment

reliability and space communication.-Basic transmission Theory – Design of Downlinks – Uplink design

TEXT BOOKS

1. Microwave and Radar Engineering, M. Kulkarni, Umesh Publications, Fourth Edition, 2008.
2. Satellite Communications, Timothy Pratt, Charles Bostian and Jeremy Allnut, Wiley India Publications, Second Edition, 2012

REFERENCES

1. Fundamentals of Microwave and Radar Engineering, K. K. Sharma, S. Chand Publishers, First Edition, 2011.

15ECU411	PRACTICAL – V POWER ELECTRONICS LAB	Semester-IV			
		L	T	P	C
		-	-	5	3

COURSE OBJECTIVES

- To provide the students a deep insight in to the working of different switching devices with respect to their characteristics
- To analyze different converters and control with their applications
- To develop an overall approach for students from construction of control rectifier , inverter, choppers, study its specification, the functionality, design and practical applications
- To become familiar with power devices and their application in various fields
- To understand various controllers , converters , inverters and choppers
- To Know the advanced converters and switching techniques implemented in recent technology

COURSE OUTCOMES

- Express the design and control of rectifiers, inverters
- Design of power electronic converters in power control applications.
- Ability to express characteristics of SCR, BJT, MOSFET and IGBT
- Ability to express communication methods
- Ability design AC voltage controller and Cyclo Converter
- Ability to design Chopper circuits

(Any 12 Experiments)

1. Characteristics of SCR
2. Characteristics of TRIAC
3. Characteristics of MOSFET
4. Characteristics of UJT
5. Characteristics of DIAC
6. Commutation of Thyristors
7. Single Phase Inverter
8. Speed Control of DC Motor.
9. Burglar Alarm
10. Automatic Street Light Controller
11. UJT as Relaxation Oscillator
12. TRIAC Flashes
13. Lamp dimmer
14. Thyristor Chopper
15. Automatic battery charger

15ECU403A	WEB TECHNOLOGY	Semester- IV			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- This course enables students to understand web page site planning, management and maintenance
- To evaluate website quality, learn how to create and maintain quality web pages learn to create and manipulate images.
- To have programming experience in Visual Basic & Relational Database Management System
- To gain the skills and project-based experience needed for entry into web design and development careers.
- Develop awareness and appreciation of the many ways that people access the web,
- To create standards-based websites that can be accessed by the full spectrum of web access technologies.

COURSE OUTCOMES

- Knowledge about history and development of World Wide Web and associated btechnologies
- Able to develop a dynamic webpage
- Able to write formats and languages in modern web pages
- Able to write a well framed and valid XML document
- Development of web pages and web applications
- Use of development tools

UNIT – I Introduction to HTML

Introduction-html browsers-history of html and sgml- html command tags-quotation marks-spacing-special symbols-tags with automatic line breaks-urls-understanding domain names-links-defining web page-main body of text- headers-adding paragraph-formatting text-font type, size, predefined fonts, bold, italic-setting colors-text color, superscripts and subscripts-underlining text-preformatted text-blinking text-block quotes-margins-line breaks-ordered and unordered list-links-scaling an image-images alignment

UNIT – II HTML, Forms, Frames

HTML : Working with Forms-Creating Forms-Working with Menus-Working with Radio Buttons-Check Boxes-Text Boxes-Text Areas-Password Boxes-Submit Button-Resetting the Form-Working with Frames-Creating Frameset-Creating Columns-Creating Rows and Columns-Combining Framesets-Giving Colors to the Borders-Space between Frames-Nesting Framesets-Showing or Hiding Scrollbars-Alternatives to Frames

UNIT – III eXtensive Markup Language

Introduction-Features of XML-XML Support and Usage-Compatibility of XML with Others-Structure of XML Document-Common Errors-Structures in XML-Creating Document Type Declarations-Flow Objects-Length-Colour and Background Properties

UNIT – IV ASP

How Active Server Pages Really Work?-Variables-Procedures-ASP Forms-Date Types-Operators. More on ASP: Introduction to Object Hierarchies-Getting Information from the Visitor-Sending Information to Visitors-ASP Applications-Getting in at the Top (Server Object)-Response Object Methods.

UNIT – V Java Script and VB Script

Java Script: Introduction-Operators-Assignments-Comparisons-Reserved Words-Browsers to Use-Software Requirement-Starting with Java Script-Using Quotes, Alert-Functions-Eval Function-Using Statements in Java Script-Working with Objects-Properties-Browser objects-Date object-Math Object-String Object-Defining Objects-Handling Events in Java Script-Event Handling Attributes-Window Events-Working with Forms-Form Elements-User Actions-windows and Frames.

VB Script: Introduction-Adding VB Script code to HTML- Adding VB Script code to Documents-Data Types-Getting the Message Across.

TEXT BOOKS

1. Thomas A.Powell 2010. The Complete Reference HTML and CSS, 5th Edition, Tata MC-Graw Hill Publications, New Delhi.
2. Ramesh Bangia. 2008. Web Technology, 1st Edition, Firewall Media Publications, New Delhi.

REFERENCES

1. Rohit Khurana. 2002.JavaScript, 1st Edition, A.P.H Publishing, New Delhi.
2. Xavier C. 2008. World Wide Web With HTML, 1st Edition, Tata MC-Graw Hill Publications, New Delhi.
3. Danny Goodman. 2003. Javascript Bible 3rd Edition, IDG Books India(p) Ltd. New Delhi.
4. ED Tittle.2004. Theory and Problems of XML, 1st Edition, Tata MC-Graw Hill Publications, New Delhi.
5. Web Technologies by Godbole, Tata Mc Graw .Web programming Building Internet Applications, Chris Bates, Wiley
6. Web Technology & Design - Xavier C., New Age Publication.Java Script,D.Flanagan,O'Reilly,SPD.

WEB SITES

1. www.w3schools.com/
2. www.htmlcodetutorial.com/
3. alexle.net/archives/category/web-technology
4. jmarshall.com/easy/

15ECU403B	C++ PROGRAMMING	Semester- IV			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To make the student learn a programming language and to understand various features in C Language
- The objective of this course is to provide the student with the fundamental knowledge and skills to become a proficient C++ programmer.
- The student will learn to transpose the physical problem domain into a hierarchy of objects.
- To learn problem solving techniques.
- To write programs in C and to solve the problems.
- Analyze unstructured problems and design computer solutions

COURSE OUTCOMES

- Able to design and analyze the time and space efficiency of the data structure
- Be capable to identify the appropriate data structure for given problem
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given algorithm
- Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
- Write programs that perform operations using derived data types.

UNIT – I Introductions

Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOP – Applications of OOPs – Structure of C++ Program C++ Tokens – Control Statement – Decision Making Statements- Loop Statements - Inline Functions – Function Overloading.

UNIT – II Control Structure, Functions and Constructors

Classes and Objects: Specifying a class – Creating Objects – Accessing Class Members – Defining Member Functions – Static Data Members – Static Member Functions - Array of Objects – Friend Functions. Constructors and Destructors:- Constructors – Parameterized Constructors - Multiple Constructors in a Class – Constructors with Default Arguments - Copy Constructor - Dynamic Constructor – Destructors.

UNIT – III Operator Overloading and Inheritance

Operator overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends.

Inheritance: - Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

UNIT – IV Pointers and I/O Operations

Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual functions- Pure Virtual Functions. Managing console I/O operations :- C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

UNIT – V File Management

Files: Classes for file stream operations – Opening and Closing a file – sequential input and output operations – updating a file random access – Command Line Arguments. Templates :- Templates – class templates – function templates – member function templates

TEXT BOOK

1. Balagurusamy. E. 2007. Object Oriented Programming with C++. 3rd Edition, Tata . McGraw Hill publishing company Ltd, New Delhi. [Unit-I(7-14, 26 – 27, 32-52, 59-82), Unit-II(88-147), Unit-III(151-207), Unit-IV(222-270),Unit V(277-340)].

REFERENCES

1. Yashavant Kanetkar. 2000. Let Us C++, 2nd Edition, BPB Publications. [Unit-I(2-13, 19-80), Unit-II(87-96,177-182), Unit-III(187-197,261-304), Unit-IV(321-360),Unit V(385- 463,540-566,571-586)].
2. Nabajyothi Barkakoti. 2001. OOPS in C++, 2nd Edition, Tata McGraw Hill Publishers. [Unit-I(3-39), Unit-II(161-179,189-206), Unit-III(209-223,231-254), Unit-IV(277-289),Unit V(295-325)].
3. Pearl software.2002, First Edition, OOP in C++,Khanna Book Publishing co(p) Ltd. Delhi. [Unit-I(1-67,83-92), Unit-II(185-220,223-237), Unit-III(241-247,251-265,293-307), Unit-IV(269-289),Unit V(309-319,321-333,337-345,347-369)].

WEB SITES

1. www.daniweb.com
2. www.eships.com
3. www.allexperts.com

15ECU403 C	.NET PROGRAMMING	Semester- IV			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To have a fundamental understanding of Language Basics, Programming Fundamental and OOP's Concepts
- Understanding the platform; Determinism and concurrency; Handling input and output securely; Safe error handling and logging; Engineering for security features; Software security in operations
- Understanding of Microsoft Windows 2000, XP, or Vista. Students are expected to have basic knowledge in Graphical User Interface and object oriented programming.
- Understand code solutions within .NET framework
- Design and Implement database connectivity using NET in window based application
- Identify industry defined problem and suggesting solutions using .NET application.

COURSE OUTCOMES

- Knowledge about MS.NET framework developed by Microsoft.
- Able to using XML in C#.NET specifically ADO.NET and SQL server 3
- Able to understand use of C# basics, Objects and Types, Inheritance
- Develop, implement and creating Applications
- Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services
- Understand and be able to explain Security in the .NET framework and Deployment in the .NET.

(Any 8 Experiments)

UNIT-I

Introduction to .NET, .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser.

The environment: Editor tab, format tab, general tab, docking tab. visual development & event drive Programming -Methods and events.

UNIT-II

The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Collections, Subroutines, Functions, Passing variable Number of Argument Optional Argument, Returning value from function – Message box – Input box.. Control flow statements: conditional statement, loop statement. MsgBox & Inputbox.

UNIT – III

Working with Forms : Loading, showing and hiding forms, controlling One form within another. GUI Programming with Windows Form: Textbox, Label, Button, Listbox, Combobox, Checkbox, PictureBox, RadioButton, Panel, scroll bar, Timer, ListView, TreeView, toolbar, StatusBar. There Properties, Methods and events. OpenFileDialog, SaveFileDialog, FontDialog, ColorDialog, PrintDialog. Link Label. Designing menus : ContextMenu, access & shortcut keys.

UNIT-IV

Object oriented Programming: Classes & objects, fields Properties, Methods & Events, constructor, inheritance. Access Specifiers: Public Private, Protected. Overloading, My Base &

My class keywords. Menus , Dialog box

Files : Introduction – Classification of files – Processing files – handling files and folder using class – Directory class – file class.

UNIT–V

Database programming with ADO.NET – Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using CrystalReportViwer.

TEXT BOOKS

1. Shirish Chavan, “ Visual Basic.Net”, Pearson education, New Delhi, I Edition, 2007.
- 2.Duncan Mackenzie, Kent Sharkey, “ Sams Teach Yourself Visual Basic.Net” , Techmedia, New Delhi, I Edition, 2006.

REFERENCES

1. BurrowssW.E and.Langford. D. Learning programming using Visual Basic .Net. First Edition, New Delhi: McGraw Hill, 2003
2. Bryan Newsome, 2012, Beginning Visual Basic 2012, John Wiley & Sons, Inc.

15ECU412A	WEB TECHNOLOGY LAB	Semester- IV			
		L	T	P	C
		-	-	3	2

COURSE OBJECTIVES

- This course enables students to understand web page site planning, management and maintenance
- To evaluate website quality, learn how to create and maintain quality web pages learn to create and manipulate images.
- To have programming experience in Visual Basic & Relational Database Management System
- To gain the skills and project-based experience needed for entry into web design and development careers.
- Develop awareness and appreciation of the many ways that people access the web,
- To create standards-based websites that can be accessed by the full spectrum of web access technologies.

COURSE OUTCOMES

- Knowledge about history and development of World Wide Web and associated technologies
- Able to develop a dynamic webpage
- Able to write formats and languages in modern web pages
- Able to write a well framed and valid XML document
- Development of web pages and web applications
- Use of development tools

(Any 10 Programs)

1. Create a simple HTML document about yourself or a topic of your choice using the basic tags such as Bold, Italic, Heading, images, horizontal rule and images.
2. Create a HTML document which includes an unordered list, ordered list, definition list to your document and create a link to Yahoo
3. Develop static pages (using only HTML) of an online Book store. The pages should resemble: www.amazon.com . The website should consist the following pages.
 - a. Home page
 - b. Registration and user login
 - c. User profile page
 - d. Items catalog
 - e. Shopping cart
 - f. Payment by credit card
 - g. Order confirmation
4. Create a table in HTML document with following formats
 - table with no borders
 - display table headers
 - to handle cells that have no content

- table cells that span more than one row or one column

- Adding background image to a table

5. Create and save an XML document at the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
6. Creation of a XML document of 20 students of III IT. Add their roll numbers, marks obtained in 5 subjects, total and percentage and save this XML document at the server. Write a program that takes students' roll number as an input and returns the students marks, total and percentage by taking the students' information from the XML document.
7. Write an XML file which will display the Book information which includes the following:
 - a. Title of the book
 - b. Author Name
 - c. ISBN number
 - d. Publisher name
 - e. Edition
 - f. Price

Write a Document Type Definition (DTD) to validate the above XML file.

8. Develop a Web page using Java script to perform the following information
 - Input student information.
 - Display student results for a given roll number.
9. Develop a web page for online exam using Java Script
10. Create a web page using two image file which switch between one another as the mouse pointer moves over the image. Use the On Mouse over and On Mouse event handler
11. Using VBScript create a calculator.
12. Create a HTML form that has number of text boxes when the form runs in the browser fill the textboxes with data. Write a Java script that verifies that all text boxes have been filled, if a text box has been left empty pop up an alert message indicating which box has been left empty. When Alerts OK button is clicked, set focus to that specific text box. If all the text boxes are filled, display thank you.

15ECU412 B	C++ PROGRAMMING LAB	Semester-IV			
		L	T	P	C
		-	-	3	2

COURSE OBJECTIVES

- To make the student learn a programming language and to understand various features in C
- To develop skills to design and analyze simple linear and non linear data structures
- To learn problem solving techniques.
- To write programs in C and to solve the problems.
- Gain knowledge in practical applications of C Language
- Analyze unstructured problems and design computer solutions

COURSE OUTCOMES

- Able to design and analyze the time and space efficiency of the data structure
- Be capable to identify the appropriate data structure for given problem
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given algorithm
- Implement Programs with pointers and arrays, perform pointer arithmetic and use the pre-processor.
- Write programs that perform operations using derived data types.

(Any 10 Programs)

1. Create a class **Patient** with necessary data members. In the main () program, have the facility to
 - Store the details of n inpatients and outpatients
 - Display the details in a neat format
2. Create two classes **British** and **Metric** to store the measurements of distance in the British (feet and inches) and Metric (meters and centimeters) systems respectively.
In the main () program, perform the following:
 - Get two measurements: one in British and the other in Metric
 - Ask the user in which system (British or Metric) (s) he wants the output.
3. Add two input measurements and print the result according to the user's choice Create a class **Date** whose data members are Day, month, and Year. Write necessary member functions and perform the following operations using overload operator.
 - Increment a date by a day
4. Create a class **Date** whose data members are Day, month, and Year. Write necessary member functions and perform the following operations using overload operator.
 - Compares two dates
5. Create a class **String** that has a character array as a data member and perform the following operations using overloaded operators.
 - '+' To add two strings

- '==' To compare two strings
6. Create a class **Computer** and derive two classes **Client** and **Server** from it. In the main () program, get the data about n clients and servers and print it back in a neat format.
 7. Create a class **Shape** that contains two data members of type double to hold the two dimensions of the shape. Derive 3 more classes' **Circle**, **Rectangle** and **Triangle** from the class Shape. Using appropriate member functions, get the values, calculate and print the area of different shapes using dynamic binding.
Hint:- Write 2 member functions in all the derived classes: one to set the data and the other to calculate and display the area.
 8. Create a class **Staff** that contains the name, designation, and years of experience of a staff member of a college. Using containership, create two more classes **TeachingStaff** and **NonTeachingStaff** according to the following specifications. In addition to the properties of the staff class, the TeachingStaff class should contain the highest qualification, the staff member possesses and the departments he belongs to. The NonTeachingStaff class needs to contain the properties of Staff only. In the main (), get data about some of the teaching and NonTeachingStaff members of your college and print the details in neat format.
 9. Create a class Address as whose data members are Name, Street, City, Pincode and Phone Number of a person. In the main () program, using array of pointers, get addresses of n persons, sort it in alphabetical order of names and display it back in a neat format.
 10. Create a class that copies the content of a text file into another file. Write the program in such a way that the program accepts command line arguments and make the program to execute in a way exactly the copy command in DOS.
 11. Create a class **Student** that could have the name, register number and marks in the subjects of the semester. Have the program to perform the following operations:
 - Store the data about n students in a data file.
 - Print the mark list of each student whenever requested.
 - Add details about some more students at any time.
 12. Sort an integer and a floating –point array using function template.

15ECU412C	.NET PROGRAMMING LAB	Semester-IV			
		L	T	P	C
		-	-	3	2

COURSE OBJECTIVES

- To have a fundamental understanding of Language Basics, Programming Fundamental and OOP's Concepts
- Understanding the platform; Determinism and concurrency; Handling input and output securely; Safe error handling and logging; Engineering for security features; Software security in operations
- Understanding of Microsoft Windows 2000, XP, or Vista. Students are expected to have basic knowledge in Graphical User Interface and object oriented programming.
- Understand code solutions within .NET framework
- Design and Implement database connectivity using NET in window based application
- Identify industry defined problem and suggesting solutions using .NET application.

COURSE OUTCOMES

- Knowledge about MS.NET framework developed by Microsoft.
- Able to using XML in C#.NET specifically ADO.NET and SQL server 3
- Able to understand use of C# basics, Objects and Types, Inheritance
- Develop, implement and creating Applications
- Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web 6
- Understand and be able to explain Security in the .NET framework and Deployment in the .NET. 7.

(Any 10 programs)

1. Write a VB.NET program to calculate Simple interest and compound Interest
2. Write a VB.NET program to find mouse events and coordinates where the mouse is clicked.
3. Write a VB.NET program to implement Calculator.
4. Write a VB.NET program to implement Notepad
5. Write a VB.NET program to draw several shapes and fill with color.
6. Write a VB.NET program to perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
7. Write a VB.NET program to calculate the days elapsed between the given two dates.
8. Write a VB.NET program to create Menu and link multiple forms with different colors.
9. Write a VB.NET program to animate the picture using animation control.
10. Write a VB.NET program to check whether given string is a Palindrome or not.
11. Write a VB.NET program to generate Fibonacci series for the input given using Input box.

12. Write a program to calculate the total marks of the student and print the grade
13. Write a VB.NET Program to maintain details of students. Use Crystal Report to generate report.
14. Write a VB.NET Program to implement Employee Payroll.
15. Write a VB.NET program to create and manipulate a File.

15ECU501	MICROPROCESSOR AND MICROCONTROLLER	Semester-V			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To know the fundamental concept of microprocessor 8085 and microcontroller architecture and to program in assembly language.
- To learn the interfacing of different peripherals for various typical applications
- To develop background knowledge and core expertise of microcontroller
- To know the importance of different peripheral devices and their interfacing to microcontrollers
- To know the design aspects of microcontrollers.
- To provide a strong practical knowledge in the application areas.

COURSE OUTCOMES

- Apply basic concept of digital fundamentals to Microprocessor based personal computer system.
- Identify a detailed s/w & h/w structure of the Microprocessor.
- Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.
- Distinguish and analyze the properties of Microprocessors & Microcontrollers.
- Analyze the data transfer information through serial & parallel ports
- Train their practical knowledge through laboratory experiments.

UNIT I – Introduction To 8085

Pin Diagram – Architecture – Instruction set – Addressing modes – Demultiplexing the bus – Generation of control signals – Bus structure – Simple programs.

UNIT II – 8085 Peripheral Devices

Introduction to Programmable Peripheral Interface 8255 —Programmable Interval Timer 8254 -8259 Interrupt Controller – 8237 DMA Controller – 8279 Keyboard Display Interface- 8251 USART.

UNIT III – 8051 Microcontroller

Introduction to microcontrollers – Pin Diagram – Architecture – 8051 Instruction Set - Addressing Modes- Introduction to 8051 Assembly–I/O Port Programming.

UNIT IV - 8051 Interrupts & Peripherals

Basic registers of Timer – Programming 8051 Timer – Counter Programming – Basics of Serial Communication –8051 Serial Communication Programming – 8051 Interrupts – Programming External Hardware Interrupts.

UNIT V – Real World Applications

Interfacing LCD to 8051 – Interfacing ADC to 8051 – Interfacing DAC to the 8051- interfacing sensors to 8051 – interfacing Stepper motor to the 8051 –interfacing keyboard to 8051.

TEXT BOOKS

1. Microprocessor Architecture, Programming & Application, R.Gaonkar, Wiley Publications, Fourth Edition, 2009.
2. The 8051 Microcontroller, Kenneth Ayala, PI Publications, Third Edition, 2007.
3. Microprocessor Architecture, Programming and its Applications with 8085, Ramesh S.

Gaonkar, Penram International Publishing, Fifth Edition Reprint, 2011.

4. The 8051 Microcontroller and Embedded Systems, Muhammed Ali Mazidi, Janice Gillispie Mazidi, Rolin D. Mckinlay, Third Edition, 2011.

REFERENCES

1. Microprocessors and Microcontrollers, Nagoor Kani.A, Tata Mc Graw Hill Publications, Second Edition, 2012.
2. Advanced Microprocessor & Peripherals, Ray & Bhurchnadi, Tata Mc-Graw Hill Publications, Sixth Edition, 2008.

15ECU502	DIGITAL AND FIBER OPTIC COMMUNICATION	Semester-V			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To enable the students to learn the digital and cellular technology
- To identify the functions of different components
- Learn about theoretical bounds on the rates of digital communication system
- To represent a digital signal using several modulation methods
- To know the fundamental concept of Digital and Fiber Optic Communications and Shift keying operations.
- To learn the operations of the circuits used for Digital and Fiber Optic Communications and Network Protocols.

COURSE OUTCOMES

- Understand the basics of information theory, source coding techniques and calculate Entropy of source
- To know the various types of noises in communication systems and reduction techniques
- Describe and determine the performance of line codes and methods to mitigate inter symbol interference
- Learn the generation and detection of base band system
- Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques
- Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

UNIT I – Data Communication

Introduction to Networks – Protocol and Standards – Network Models – Layered tasks – The OSI model – Different types of layers – TCP/IP Protocol - Analog and Digital Signals – Transmission Impairments – Data rate limits.

UNIT II – Digital and Analog Transmission

Basics of Digital - to – Digital Conversions – Line Coding – Line coding schemes – Block coding - Scrambling – Analog – to – Digital Conversions – PCM – DM – Transmission Modes - Introduction to Multiplexing – FDM – WDM –TDM.

UNIT III – Wireless LAN's

Introduction to Wireless LAN technology: Overview-Infrared LANs-Spread Spectrum LANs-Narrowband Microwave LANs. IEEE 802.11 Wireless LAN Standard: IEEE 802 Protocol architecture-IEEE 802.11 Architecture and services-IEEE 802.11 Medium Access control-IEEE 802.11 Physical layer-Bluetooth

UNIT IV – Optical Fiber communication

A basic fiber optic system – Frequencies – Fiber optic Cables – Refraction – Numerical Aperture – Graded index cables – Single mode – Multi mode – Cable Constructions – Cable Losses – Connectors – Light Sources – Light Detector – System Components – Advantages and Disadvantages.

UNIT V – Optical Sources and Detectors

Laser –Basic Concepts-Optical Emission from Semiconductors - Semiconductor Injection Laser. LED – LED power and efficiency - LED structures-LED characteristics. Photo

Detectors – Photo Detector Noise – Response Time - Double Hetero Junction Structure - Photo Diodes – Compare of Photo Detectors.

TEXT BOOKS

1. Electronic Communication Systems , Kennedy and Davis, Tata McGraw Hill, Fifth Edition, 2012
2. Wireless Communications and Networks, William Stallings, Pearson Education Singapore Ltd. Second Edition, 2009

REFERENCES

1. Principles of Communication Engineering, Anok Singh & A.K.Chhabra ,S.chand Publications, Seventeenth Edition, 2010
2. Optical Fiber Communication, Gerg Keiser, Tata McGraw Hill Publishing Company Ltd, Fourth Edition. 2008.

15ECU503	BIOMEDICAL INSTRUMENTATION	Semester-V			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To know the fundamental concept of origin of Bio-electric signals and recording it with highly precision equipment.
- To learn the various medical equipment used for diagnosis and therapeutic purpose.
- To provide a large number of quality trained Medical Electronics professionals for preventive and maintenance work needed to maintain hi-tech medical equipments in hospitals to ensure good health care.
- To explore the human body parameter measurements setups
- To give basic ideas about how multimedia evidences are useful in crime investigation.
- Understanding basic principles and phenomena in the area of medical diagnostic instrumentation, theoretical and practical preparation enabling students to maintain medical instrumentation.

COURSE OUTCOMES

- Understand the fundamental concept of origin of Bio-electric signals and recording it with highly precision equipment.
- Differentiate and analyze the biomedical signal sources.
- Identify common biomedical signals and distinguish characteristic features.
- Ability to study various transducers
- Identify common signal artifacts, their sources and formulate strategies for their suppression.
- Familiarize with patient safety issues related to biomedical instrumentation

UNIT I - Bioelectric Signals

Physiological Systems of the body – Man Instrument System – Bioelectric signals – Cells and their structures - Transport of ions through cell membrane - Resting and Action Potential – Propagation of Action potential – Bioelectric potentials (ECG, EEG, EMG)

UNIT II –Electrodes and Transducers

Basic Electrode Theory – Bio-potential Electrodes – Biochemical Electrodes – Electrical Conductivity of electrode jellies and creams – Transducers and Transduction Principles: Transducers for Biomedical Applications – Biosensors and Smart Sensors

UNIT III - Biomedical Recording and Patient Monitoring System

Electrocardiography (ECG) – ECG Lead Configuration – ECG Amplifiers – ECG Recorder – Electro Encephalo Graphy (EEG) – EEG Recorder – Electro Myo Graph (EMG) – Electro Retino Graphy(ERG) – Electro Oculo Graphy (EOG) Patient Monitoring System Concepts –Measurement of Heart Rate – Blood Pressure Measurement – Respiration Measurement

UNIT IV - Diagnostic and Therapeutic Equipments

X-ray imaging - Radio fluoroscopy - Image Intensifiers - Angiography - Endoscopy – Pacemakers – Energy requirements to excite hear muscle – Methods of stimulation – Different modes of operation – Pacemaker batteries – Defibrillators – Different type of defibrillators. - Anesthesia Machine – Ventilators - Diathermy.

UNIT V - Advancements in Medical Instrumentation

Lasers in Medicine - Computerized Axial Tomography (CAT) Scanner - Ultrasonic

scanner - Magnetic Resonance Imaging - Computer based Patient Monitoring System.
Biotelemetry - Elements of telemetry system - Radio telemetry system.

TEXT BOOKS

1. Introduction to Biomedical Instrumentation, Mandeep Singh, PHI Learning Private Limited, 2010.
2. Electronics and Medicine and Biomedical Instrumentation, Nandini.K.Jog, Prentice Hall of India, Private Limited, First Edition, 2013
3. Biomedical Instrumentation and Measurements, Leslie Cromwell, Fred. J. Weibell, Erich A. P. Feiffer, Prentice Hall of India, Second Edition, 2010

REFERENCES

1. Biomedical Instrumentation Application and Design, John G Webster, Wiley India Pvt Ltd 2012.
2. Handbook of Biomedical Instrumentation, R.S.Khandpur, Tata McGraw Hill, 2004.

15ECU504	VHDL Programming	Semester-V			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To learn the basics of language elements.
- To provide a strong knowledge about the VHDL Modeling.
- To introduce a hardware description language (HDL) for the specification, simulation, synthesis
- Implementation of digital logic systems.
- Design practice sessions and implementing digital logic systems with commercial electronic design (EDA) tools
- To know the features of programming and simulation techniques.

COURSE OUTCOMES

- Building simulation module as per system specification for e.g. VHDL model for ASIC design
- Understanding types of design such as high level design, operative part design, control part design, memory design etc
- Functioning and specifying the tools used for design as per requirement
- Creation of code, verification, testing software
- Testing various examples on the system
- Understanding the synthesis and simulation process of code

UNIT I – Introduction And Basic Terminology

VHDL - History-Capabilities-Hardware Abstraction –Basic Terminology-Entity Declaration-Architecture Body-Configuration Declaration-Package Body-Model Analysis-Simulation.

UNIT II –Basic Language Elements

Identifiers-Numbers-Characters-Strings-Bit Strings-Data Objects-Data Types- Integer Types-Physical Types-Floating Point Types-Enumeration Types-Arrays-Operators: Arithmetic Operators-Relational Operators-Logical Operators.

UNIT III – Behavioral Modeling

Entity Declaration-Architecture Body-Process Statements-Variable Assignment Statement-Signal Assignment Statement-Wait Statement-If Statement-Case Statement-Null Statement-Loop Statement-Exit Statement-Assertion Statement-Report Statement.

UNIT IV – Dataflow Modeling

Concurrent Signal Assignment statement-Concurrent Versus sequential Signal Assignment-Delta Delay Revisited-Multiple Drivers-Conditional Signal Assignment Statement-Selected Signal Assignment Statement –The Unaffected Value-Block Statement-Concurrent Assertion Statement-Value of a signal.

UNIT V – Structural Modeling

An Example of Component declaration - Component Instantiation - Other Examples-Resolving Signal Values – Signal Packages.

TEXT BOOKS

1. A VHDL Primer, J.Bhasker , Pearson Education. Third Edition, 2008.
2. Digital Logic Design and VHDL, A.A.Phadke, S.M.Deokar, Tata Mc-Graw Hill Publications, Fourth Edition, 2009.
3. Fundamentals of Digital Logic with VHDL Design, Stephen Brown,Zvonko Vranesic , Tata

Mc-Graw Hill Publications, Fourth Edition,2008.

REFERENCES

1. Principles of VLSI Design, S.Sumathi, Scitech Publications (India) Pvt., Ltd, 2005.
2. VHDL, Douglas L.Perry, Tata McGraw Hill Publications, Fifth Edition, 2011.
3. VLSI Design, K. Lal Kishore, and V. S. V. Prabhakar, I.K. International Publishing House Pvt Ltd, Third Edition, 2008.

15ECU505A	VLSI DESIGN	Semester-V			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To learn the fabrication techniques of Integrated Circuits.
- To know the fundamental rules of layout design.
- To design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout
- Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication
- Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters
- The issues associated with Mixed Signal VLSI Circuits.

COURSE OUTCOMES

- Realize logic circuits with different design styles.
- Understand working principle of operation of different types of memories.
- Familiarize with the fabrication techniques of Integrated Circuits.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Express the layout of simple MOS Circuit using Lambda based design rules.
- Design an application using Verilog HDL

UNIT I - Introduction to MOS Technology

MOS technology & VLSI – Basic MOS transistor – Depletion & enhancement type – NMOS & CMOS Transistors fabrications – Electrical properties of MOS circuits – characteristics – Threshold voltage – transconductance – Pass transistors – NMOS Inverter – pull-up pull-down ratio for NMOS Inverter driven by NMOS Inverter & through one or more pass transistors – CMOS Inverter.

UNIT II -Layout Design

Mos & cmos layers – stick diagram – design rules & layout – subsystems design: switch logic – gate logic – other forms of logic – combinational logic design example: passing generator – bus arbitration logic multiplexers – gray to binary code converter –sequential circuit example: two phase clocking – dynamic shift register – pre charged bus concept .

UNIT III -Design of System

PLA – Finite state machine – PLA based finite state machine design – design of 4-bit shifter – design of ALU subsystem: adders – multiplexers – memory: dynamic shift register – dynamic RAM cells – one transistor dynamic memory cell – 4*4 bit register array – RAM array.

UNIT IV -Tools for Design

Grounds rules for successful design – design styles & philosophy – CAD tools for design & simulation: textual entry layout language – graphical entry layout – design verification – design rule checkers – simulators – tests & testability.

UNIT V -CMOS Design Projects & Fast VLSI Circuits

Incremental/decremental – left/right – serial/parallel shift register – comparator – GaAs device – layout design for GaAs devices.

TEXT BOOKS

1. Basic VLSI Design, Pucknell D.A., & Eshraghian K., PHI, Third Edition, 2009.
2. Principles of VLSI Design, S.Sumathi, ScitechPublications,2011.

REFERENCES

1. VLSI Design, K. Lal Kishore, and V. S. V. Prabhakar, I.K. International Publishing House Pvt Ltd, Third Edition, 2008.
2. Digital Logic Design and VHDL, A.A.Phadke, S.M.Deokar, Tata Mc-Graw Hill Publications, Fourth Edition, 2009.

15ECU505B	PCB DESIGN AND FABRICATION	Semester-V			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To make familiar with PCB design and various processes involved.
- To provide in-depth core knowledge in design, performance analysis and fabrication of Printed Circuit Boards.
- To gain knowledge on PCB fabrication process and factors affecting PCB performance
- Understand the need for PCB Design and steps involved in PCB Design and Fabrication process.
- Familiarize Schematic and layout design flow using Electronic Design Automation (EDA) Tools
- Recognize the technologies used in electronic industry through the practical experience gained in the course

COURSE OUTCOMES

- Students can explore different aspect of Printed Circuit Board Design and fabrication
- Students can learn various types of PCBs. Schematic Design. entry Rules for Schematic Entry, Component Layout methods
- Placement Rules, Routing Techniques for Single Sided Board.
- Post Processing of design and Fabrication documents.
- After completing this course students can design and fabricate their own PCB for their Project and can also work in PCB Designing and Fabrication area
- Understand the steps involved in schematic, layout, fabrication and assembly process of PCB design

UNIT I - Types of PCB

Single sided board – double sided – Multilayer boards – Plated through holes technology – Benefits of Surface Mount Technology (SMT) – Limitation of SMT – Surface mount components: Resistors, Capacitor, Inductor, Diode and IC's.

UNIT II - Layout and Artwork

Layout Planning – General rules of Layout – Resistance, Capacitance and Inductance – Conductor Spacing – Supply and Ground Conductors – Component Placing and Mounting – Cooling requirement and Package Density – Layout check - Basic artwork approaches – Artwork taping guidelines – General artwork rules –Artwork check and Inspection.

UNIT III -Laminates and Photo Printing

Manufacture of copper clad laminates – Properties of laminates – Types of Laminates – Manual cleaning process – Basic printing process for double sided PCB's – Photo resists – wet film resists – Coating process for wet film resists – Exposure and further process for wet film resists – Dry film resists.

UNIT IV - Etching and Soldering

Introduction – Etching machine – Etchant system. Soldering: Principles of Solder connection – Solder joints – Solder alloys – Soldering fluxes. Soldering Tools: Soldering, De soldering tools and Techniques – Man Soldering – Solder mask – Safety, health and medical aspects in Soldering practice.

UNIT V - Design Rules and Automation

Reflection – Crosstalk – Ground and Supply line noise – Electromagnetic interference from pulse type EM fields and automation – Automated artwork drafting – CAD.

TEXT BOOKS

1. PCB Design and Technology, Walter C.Bosshart, Tata McGraw Hill Publications, 2007
2. Printed circuits Handbook, Clyde F.Coombs, Tata McGraw Hill Publications, Sixth Edition, 2008

REFERENCES

1. Printed Circuit Board, Lambert M. Surhone, Miriam T. Timpledon, Susan F. Marseken, Vdm Verlag Dr. Mller Ag & Co. Kg, 2010.

15ECU505C	PSPICE PROGRAMMING	Semester-V			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To gain familiarity with PSPICE, and to review in greater detail.
- To investigate the use of the industry-standard circuit simulation tool PSpice.
- To impart practical working knowledge of Electrical and Electronics Simulation and Analysis
- To Solve, Simulate and Analyze basic Electrical and Electronics Circuits and Applications by writing Ohm's law, KCL and KVL Mathematical Equations and Programs
- To develop hands on working experience with reference to Solve, Simulate and Analyze Electrical & Electronics Circuits
- Recognize the technologies used in electronic industry through the practical experience gained in the course

COURSE OUTCOMES

- Understand the main features and importance of the PSpice Programming environment
- Apply working knowledge of PSpice package to simulate and solve Electrical, Electronics circuits and Applications
- Solve, Simulate and Analyze various DC circuits
- Solve, Simulate and Analyze various Analog and Digital Electronics circuits.
- Solve, Simulate and Analyze simple Transformer and DC Generator circuits
- Design and Simulate circuits

UNIT I - Introduction

Introduction – Descriptions of Spice – Types of Spice – Types of Analysis – Simulation software tools – Pspice Platform – Pspice schematic Vs OrCAD Capture – Limitations of PSpice. – Circuit Description: Input files –Element values – Nodes – Circuit Elements – Sources

UNIT II - DC Circuit Analysis

Output Variables – PSpice Output Commands – Format of Output Files – Examples of Spice Simulation – OrCAD Capture – Layout – PSpice A/D – Probe – Importing – DC Circuit Analysis: Resistors – Modeling of Elements – Operating Temperature – Independent DC Sources – Dependent Sources – DC Output Variables – Types of Output – Types of DC Analysis

UNIT III - Transient Analysis

Capacitors and Inductors – Modeling of Transient Sources - Transient Sources – Transient Output Variable – Commands – Transient Analysis – Switches - AC Circuit Analysis: AC Output Variables – Independent AC Sources – AC Analysis.

UNIT IV - Semiconductor Devices

Diode Characteristics in SPICE – BJT Characteristics in SPICE – JFET Characteristics in SPICE - MOSFET Characteristics in SPICE.

UNIT V - Operational Amplifier

Inverting and Non-inverting Amplifier – Active Filters: Low Pass Filters - High Pass Filters – Band Pass Filters – Band Reject Filters.

TEXT BOOKS

1. Introduction to PSpice using OrCAD for Circuits and Electronics, Muhammad H. Rashid, Prentice Hall of India Private Limited, New Delhi, Third Edition, 2005.
2. PSpice: Introduction with Applications, Amos Gilat, Siversion(WSE Series), Fourth Edition,

2012.

REFERENCES

1. Fundamentals of Electric Circuits with Pspice, Dr. A.S Aravina murthy, Pearson Education, 2011.
2. Introduction to PSpice and its Applications, M.S.Tyagi, Third Edition, 2008.

15ECU511	PRACTICAL – VI MICROPROCESSOR AND MICROCONTROLLER LAB	Semester-V			
		L	T	P	C
		-	-	5	3

COURSE OBJECTIVES

- To expose students to the operation of typical microprocessor and microcontroller.
- To prepare the students to be able to solve different problems by developing different programs
- To develop the quality of assessing and analyzing the obtained data
- To illustrate the architecture of 8085 a microprocessors.
- To understand the interfacing circuits for various applications of 8051 microcontroller
- To introduce the architecture of advanced microprocessors and microcontrollers

COURSE OUTCOMES

- Identify relevant information to supplement to the Microprocessor and Microcontroller course
- Set up programming strategies and select proper mnemonics and run their program on the training boards
- Practice different types of programming keeping in mind technical issues
- Develop testing and experimental procedures on Microprocessor and Microcontroller analyze their operation under different cases
- Prepare professional quality textual and computational results, incorporating accepted data analysis and synthesis methods, simulation software, and word-processing tools
- Illustrate the organization of registers and memory in microprocessors

(Any 12 Experiments)

Microprocessor Lab

1. Addition of 8/16-bit and array of data.
2. Multiplication and Division.
3. Fill and transfer an array of data.
4. Ascending/Descending of an array.
5. Data Transfer using Parallel Ports.
6. DC Motor Controller.
7. Counter using Seven Segment Display.
8. Digital to Analog Converter Interface.

Microcontroller Lab

9. Digital Clock.
10. LCD Interfacing.
11. A/D converter interface.
12. Stepper motor interface.
13. Traffic light controller.
14. Wave Generation.
15. Lamp Dimmer.

150EU501	BASIC ELECTRONICS	Semester-IV			
		L	T	P	C
		-	-	-	3

COURSE OBJECTIVES

- To learn the fundamentals of operation of the basic electronic devices.
- To understand the basic parameters of electronic devices, their performance, and limiting factors.
- To understand the basic principles of electronic device operation with emphasis on bipolar transistors, and unipolar microwave devices.
- Acquire the fundamental knowledge and expose to the field of semiconductor theory and devices and their applications.
- To give knowledge about semiconductor and discuss working and applications of basic devices, including p-n junctions, BJTs and FETs
- Introduce students to the physics of semiconductors and the inner working of semiconductor devices.

COURSE OUTCOMES

- Apply the knowledge of basic circuit law and simplify the network using reduction techniques
- Apply the knowledge of semiconductors to illustrate the functioning of basic electronic devices.
- Demonstrate the switching and amplification application of the semiconductor devices.
- Demonstrate the control applications using electronic devices.
- Apply concepts of semiconductor devices to design and analyze circuits.
- Ability to understand and analyze the inner working of semiconductor p-n diodes

UNIT I – Passive Components

Introduction – Resistors: Fixed & Variable resistor – Colour coding – Tolerance - Series and Parallel connection. Capacitors: Basic structure and symbol – Fixed & Variable capacitors – Dissipation factor – Series and parallel connection. Inductors: Inductance of the coil – Fixed & Variable inductors

UNIT II - Semiconductor Devices and Special Diodes

Introduction – Atom - Electron - orbit – Energy level - Conductor – Semiconductor – Insulator – Intrinsic semiconductor – Extrinsic semiconductor – P type and N type semiconductor – PN junction diode –V-I characteristics - Zener diode - V-I characteristics- Schottky diode -Tunnel diode - Varactor diode- UJT- Photo diode

UNIT III - Digital Electronics

Review of binary, octal, & hexadecimal and decimal number systems - Representation of signed numbers - Floating point number representation – BCD – ASCII – EBCDIC - Excess 3 codes gray code - Error detecting & Correcting codes. Boolean Algebra –Simplification of logic functions using Karnaugh map.

UNIT IV - Amplifiers & Oscillators

Classification of amplifiers- Single stage RC coupled amplifier - Oscillators –Types of oscillators: Hartley oscillator, Colpitts Oscillator & RC Phase shift oscillator.

UNIT V -.Operational Amplifiers

Introduction to Op-amp- Inverting and Non-Inverting configuration - Applications – Adder – Subtractor – Integrator - Differentiator and Comparator.

TEXT BOOKS

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar & A.Vallavaraj, Tata Mc Graw-Hill publishing Company Limited,Third Edition,2012.
2. Electronic Devices and Circuits, David.A. Bell, Oxford University Press Fifth Edition, 2008.
3. Digital Electronics and its principles, Salilvahanan, McGraw Hill Education (India) Private Limited, 2014, Tenth Edition.

REFERENCES

1. Electronic Devices and Circuits, Jacob Millman,Christos.C.Halkias&Satyabrata Jit,Tata Mc Graw –Hill Edition ,Third Edition,2010.
2. Electronic Devices and Circuits I.U.A.Bakshi.A.P.Godse,Technical Publications 01-Jan-2010.

15ECU601	EMBEDDED SYSTEMS	Semester-VI			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.
- To develop the next generation technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices
- To provide a broad overview of both theoretical and practical aspects of a design flow for To understand the need and applications of Microcontrollers n embedded system.
- To understand architecture and features of typical Microcontroller.
- Learn interfacing of real world input and output devices
- To study various hardware and software tools for developing applications embedded systems

COURSE OUTCOMES

- Understand hardware and software design requirements of embedded systems.
- Acquire knowledge about embedded processors and their applications
- Analyze the embedded systems specification and develop software programs.
- Ability to design an Embedded System, component or process to meet desired needs within realistic constraint
- Evaluate the requirements of programming embedded systems and tool chain for embedded systems.
- Explore the features of the microcontroller and provide solutions for embedded applications

UNIT I – PIC 16F87x Microcontrollers

Device overview – architecture – memory organization – status register – option register –INTCON register – PCON register – I/O ports – data EEPROM – instruction set: Byte oriented operations – Bit oriented operations – Literal and Control operations- Addressing Modes.

UNIT II – Peripheral Features of 16F87x Microcontrollers

TIMER0 Module – TIMER1 Module – TIMER2 Module – Capture/Compare/PWM Modules –Protocols: I²C,SPI , USART – ADC Module - Special features of the CPU : oscillator selection – power on reset – power up timer – oscillator start up timer – brown out reset – interrupts – watchdog timer – SLEEP

UNIT III - Introduction to PIC Peripherals and Interfacing

Introduction to PIC Peripherals and Interfacing: PIC16imer programming in assembly and C - Serial Port programming in assembly and C - Interrupt programming in assembly and C - ADC and DAC interfacing - CCP and ECCP programming - DC Motor interfacing and PWM.

UNIT IV - ARM Processor Fundamentals

ARM Design philosophy - Embedded System Hardware - Embedded System Software - Registers, Program Status Register – Pipeline – Exceptions – Interrupts - and the Vector table - Core Extensions - Architecture revisions - ARM Processor families.

UNIT V – Real Time Operating Systems

Survey of Software Architecture: Round Robin- Round Robin with Interrupts-Function –

Queue Scheduling Architecture-Introduction of RTOS-RTOS Architecture-Task and Task States – Task and Data – Semaphores and Shared Data – Message Queues, Mailboxes and Pipes-Timer Function-Events-Memory Management-Device Management-System Organization & Implementation.

TEXT BOOKS

- 1 Programming and Customizing the PIC Microcontroller, Myke Predko, Tata McGraw - Hill Education, Third Edition, 2010.
2. Arm Microcontroller Interfacing: Hardware and Software, Warwick A Smith, Gazelle Book Services, 2010.

REFERENCES

1. 123 PIC Microcontroller Experiments for the Evil Genius, Myke Predko, Tata McGraw - Hill Education, First Edition, 2005.
2. ARM System Developer's Guide –Designing and Optimizing System Software, Andrew N. Sloss, Dominic Symes & Chris Wright, Morgan – Kaufmann Publishers, First Edition, 2011.

15ECU602	MOBILE COMMUNICATION	Semester-VI			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To know the fundamental concept of Mobile Communication.
- To understand the concept of Protocol standards and security tasks.
- Provides the concept of Cellular Networks, GPRS, Wi-Fi, WiMax Systems
- Encompasses the various Mobile Communication Technologies and the Structure of Protocols
- To make students familiar with fundamentals of mobile communication systems 2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc
- To identify the requirements of mobile communication as compared to static communication

COURSE OUTCOMES

- Understand hardware and software design requirements of embedded systems
- To make students familiar with various generations of mobile communications
- To understand the concept of cellular communication
- To understand the basics of wireless communication
- Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations
- Acquire knowledge about embedded processors and their applications

UNIT I – Cellular Networks

Cellular systems -Frequency Management and Channel Assignment - Types of handoff and their characteristics - FDMA – TDMA – CDMA –Cellular Wireless Networks.

UNIT II - GPRS

Introduction-GPRS and Packet-Data Network - GPRS Network Architecture - GPRS Network operations – Data Service in GPRS - Applications for GPRS - Limitations of GPRS - Billing and Charging in GPRS.

UNIT III - WiFi and WLL

Introduction WiFi-802.11b-802.11g-802.11a-802.16-WLL –overview –WLL Configurations-Benefits-Highlights-Propagation Considerations-Standards of IEEE 802.16.

UNIT IV - WiMax

Introduction-WiMax Architecture-MAC layer-IEEE 802.16 Protocol –channel Acquisition –IP Connectivity –Radio Link Control (RLC) –Interferences –Security in WiMax Networks-PKM Protocol.

UNIT V - Data Services

SMS: Strength of SMS –SMS Architecture:SMMT-SMMO –SMS as an information bearer-Operator –Centric full-Operator Independent pull-Value added service through SMS.

MMS: MMs Architecture – MMS Transaction flows-SMIL –MMS Inter connection.Interoperability and Roaming-MMs device management and configurations-GPRS application.

TEXT BOOKS

1. Mobile Communications, Jochen Schiller, Second Edition, Pearson Education, 2010.
2. Wireless Communications and Networks, William Stallings, Pearson Education, 2002.

REFERENCES

1. Principles of Wireless Networks, Kaveh Pahlavan, Prasanth Krishnamoorthy, First Edition, Pearson Education, 2009
2. Principles of Mobile Computing, Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, Springer, 2010
3. AdHoc Mobile Wireless Networks, C.K.Toh, First Edition, Pearson Education, 2002.
4. Mobile Computing ,Asoke K.Talukder and Roopa R Yavagal, 2005, Tat McGraw –Hill Publishing Company Ltd.New Delhi.
5. Mobil Computing and Wireless Communications ,Amjad Umar , ,NGS Solutions.
6. 3G Wireless Networks ,Clint Smith ,P.E Daniel Collins, ,Second Edition,McGraw Hill International Edition.

15ECU603A	ROBOTICS AND AUTOMATION	Semester-VI			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To learn the basic configuration of Robotics
- To understand the various types of Robots.
- To get an exposure in Robot control systems
- To acquire the knowledge on advanced algebraic tools for the description of motion
- To develop the ability to analyze and design the motion for articulated systems.
- To develop an ability to use software tools for analysis and design of robotic systems

COURSE OUTCOMES

- Understand the relationship between mechanical structures of industrial robots and their operational workspace characteristics.
- Illustrate the kinematics and dynamics of robotics.
- Implementation of related instrumentation and control in robotics
- Ability to solve inverse kinematics of simple robot manipulators
- Able to do the path planning for a robotic system
- Identify a Robot for a specific application.

UNIT I - Fundamentals of Robotic Technology

Robot Anatomy – Work Volume – Robot drive System – Control System and dynamic performance – Precision of Movement – end effectors – Robotic Sensors – Robot Programming and work cell control

UNIT II – Control System and Components

Basic control system concept and models – Controllers – Robot activation and feedback components – Position Sensor – Velocity Sensor – actuators – Power transmission System.

UNIT III - Robot Effectors

Types of end effectors – Mechanical grippers – Tools as End effectors – The Robot / End effectors interface.

UNIT IV – Sensors and Vision Systems

Sensors – Transducers and Sensors – Sensors in Robotics – Tactile Sensor – Proximity Sensor and sensor based system – Use of sensor in robotics – Introduction to Vision system - The sensing and digitizing function in machine vision.

UNIT V - Robot Motion Analysis and Control

Introduction to manipulator kinematics – Robot dynamics configuration of a robot controller – Flexible Manufacturing System Concept – Transfer system – Processing operation – Assembly and inspection

TEXT BOOKS

1. Industrial Robotics: Technology, Programming, and Applications, Mikell P Groover, Tata McGraw Hill Publishing Company Limited. Second Edition, 2012.
2. Introduction to Robotics Mechanics and Control, John J. Craig, Tata McGraw Hill Publishing Company Limited. Third Edition, 2008.

REFERENCES

1. Introduction to Robotics: Analysis, Control, Applications, Saeed B. Niku, Wiley India Pvt Ltd, Second Edition, 2012.

15ECU603B	INSTRUMENTATION AND CONTROL SYSTEMS	Semester-VI			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To know the fundamental concept of signals and production for controlling equipment or machines.
- To learn the various closed loop control systems current output is taken into consideration and corrections are made based on feedback
- To introduce different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form to interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis
- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions
- Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system
- Formulate different types of analysis in frequency domain to explain the nature of stability of the system

COURSE OUTCOMES

- Understand the concept of time response and frequency response of the system.
- Analyze feedback characteristics of linear control systems to reduced the disturbance.
- Analyze time response of first and second order control systems for different standard test signals.
- Perform frequency domain analysis of linear control system using nyquist stability criterion.
- Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system.
- Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions.

UNIT I - Transducers and Measurements

Transducer: Resistive transducer- Inductive transducer –Capacitive transducer – Load cell-Piezoelectric – Photo electric transducers – Temperature Transducer. Measurement: Measurement standards-Measurement of Linear Displacement using LVDT –Measurement of rotary displacement using RVDT – Hall Effect Principle, Operation and Application.

UNIT II - Digital Instruments

Performance Characteristics of instruments- Digital Multi meter – Digital frequency meter – Digital measurement of time - Digital measurement of mains frequency – Digital taco meter – Digital phase meter – Digital capacitance meter- Storage Oscilloscope.

UNIT III - Concepts of Control Systems

Introduction to Control Systems-Human elements in control systems-block diagram fundamentals -open loop control system-closed loop control systems- Linear and Nonlinear Systems- Effect of feedback on Overall gain, Stability, Sensitivity and Noise.

UNIT IV - Introduction to Block diagrams

Block diagram reduction-Signal flow graph-Signal flow graph algebra-construction of signal flow graph from block diagram- Mason's gain formula-Time Response Analysis of First and second order systems-Steady state Error.

UNIT-V - Stability Analysis of Control System

Bode plot- Routh Hurwitz criterion-Root Locus-Nyquist Criterion- Principles of P – PI – PD - PID Controllers - Cascade and feedback compensation, lag, lead, lag-lead Compensation.

TEXT BOOKS

1. Electronic Instrumentation, H.S.Kalsi, Tata McGraw Hill, Third Edition, 2010.
2. A Course in Electrical and Electronic Measurements & Instrumentation, A.K.Sawhney, Dhanpat Rai Publication, 2013.
3. Control Systems Engineering, R.Ananada Natrajan, P. Ramesh Babu, SCITECH Publications, Fourth Edition, 2010

REFERENCES

1. Automatic Control Systems, Anoop K.JaiRath,ANE Publications, 2013.
2. Control Systems Engineering, R.Ananada Natrajan, P. Ramesh Babu, SCITECH Publications, Fourth Edition, 2010

15ECU603C	MATLAB PROGRAMMING	Semester-VI			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To introduce the MATLAB for numerical computations to know the basic concepts.
- To familiarize basic commands through the Command window and output through the Graph window
- Introduce the MATLAB software environment
- Apply a variety of common numeric techniques to solve and visualize engineering-related computational problems
- To program scripts and functions using the Matlab development environment.
- To use basic flow controls (if-else, for, while).

COURSE OUTCOMES

- Understand the concept of time response and frequency response of the system
- Use MATLAB effectively to analyze and visualize data
- Apply numeric techniques and computer simulations to solve engineering-related problems
- Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives
- Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results,
- Demonstrate understanding and use of fundamental data structures (classes). 6. Create and control simple plot and user-interface graphics objects in MATLAB.

UNIT I - Introduction

Matlab environment – Help future – Types of files – Platform – Search path – Matlab commands – Constants, Variables and Expressions: Character set – Data types – Constants and Variables – Operators – Hierarchy of operators – Built-in functions – Assignment statement.

UNIT II - Vectors and Matrices

Scalars and vectors – Entering data in matrices – Line continuation – matrix subscripts/indices – Multidimensional matrices and arrays – Matrix manipulation – Generation of special matrices – Matrix and array operations – Functions with array inputs – Structure arrays – Cell arrays.

UNIT III - I/O Statements and Graphics

Data input – Interactive inputs – Reading/Storing file data – Output commands – Low level input-output functions - Mat lab Graphics: Two dimensional plots – Multiple plots – Style options – Sub plots – Specialized two dimensional plots – Three dimensional plots.

UNIT IV - Control Structures and MATLAB Programming

Loops – Branches control structures – Matlab Programming: Matlab Editor – Matlab Programming – Function Subprograms – Types of functions – Function handling – Errors and Warnings – Matlab debugger.

UNIT V - Simulink

Introduction – Starting simulink – Simulink modelling – Solvers – Simulating a model – Using variables from matlab – Data import/export – State space modelling and simulation – Simulation of non-linear systems – obtaining state space model – Creating subsystems – Masked subsystems.

TEXT BOOKS

1. MATLAB and its Applications in Engineering, Rajkumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson Education, First Edition, 2009.
2. Technology and Engineering Applications Simulink, Subhas Chakravarty, Intech, Third Edition, 2012.
3. MATLAB Programming for Engineers, Chapman, Cengage Learning India PVT Ltd, Fourth Edition, 2011.

REFERENCES

1. Matlab Applications for the Practical Engineer, Kelly Bennett, InTech, Tenth Edition, 2014.
2. Matlab: An Introduction with Applications, Amos Gilat, Siversio(WSE Series), Fourth Edition, 2012.

15ECU611	PRACTICAL – VII EMBEDDED SYSTEMS LAB	Semester-VI			
		L	T	P	C
		-	-	5	3

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Competent to evaluate the data transfer response
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools. 4. Develop interfacing to real world devices.

(Any 12 Experiments)

1. Writing and testing programs involving arithmetic, logical and BIT oriented instructions
2. LED interfacing
3. Data transfer program with parallel port
4. Key interfacing and Seven segment display interface
5. Stepper motor controller interface
6. Speed control of DC motor
7. PWM generation
8. Waveform generation
9. A/D converter interface
10. D/A converter
11. LCD interface
12. Programming using interrupts
13. Solid State Relay
14. I2C Interface
15. Serial Communication Interface

15ECU506	ELECTRONIC INSTRUMENTATION	Semester-VI			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To understand operation of different instruments
- To provide basic knowledge about the various sensors. and data acquisition systems applied in Wireless sensor network
- To provide fundamental concepts of control system.2 such as mathematical modeling, time response and frequency response
- To develop concepts of stability and its assessment.3 criteria.
- Explain basic concepts and definitions in measurement
- to find transfer functions for given system

COURSE OUTCOMES

- Able to understand operation of different instruments.
- Understand the principles of various types of transducers and sensors
- Able to calculate time domain and frequency domain parameter for given system
- Able to predict stability of given system using appropriate criteria
- Identify the various parameters that are measurable in electronic instrumentation
- Practice the construction of testing and measuring set up for electronic systems.

UNIT I - Electronic Test Instruments

Analog Meters D.C and A.C Voltmeters – Ammeters – Multimeter - Power meter - Q-meter -True RMS meter, Vector Impedance Meter, Vector Voltmeter, Component Measuring Instrument.

UNIT II - Signal Sources Sine wave generator-Frequency synthesized sine wave generator-

Sweep frequency generator, pulse and square wave generator-Function generator-Wave analyzer-Applications - Harmonic distortion analyzer-Spectrum analyzer-Applications-Audio Frequency generator-Noise generator.

UNIT III - Oscilloscopes

General purpose oscilloscope-Screens for CRT graticules-Vertical & horizontal deflection systems- Time base operation, triggers – sweep control, z axis input - Delay lineMultiple trace-Dual beam & dual trace-Probes-Oscilloscope techniques-special oscilloscopes - Storage oscilloscope-sampling oscilloscope-digital CRO.

UNIT IV - Digital Instruments

Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count-Digital voltmeter-Types-Automatic polarity indication, automatic ranging, and auto zeroing-DMM-Microprocessor based DMM-DPM-swept – spectrum analyzer-network analyzer-discharge analyzer- logic probes-logic analyzer.

UNIT V - DISPLAY AND RECORDING DEVICES

Bar graph display-Segmental and dot matrix display-X-Y recorders, magnetic tape recorders-Digital recording-Data loggers-Interference and screening-Electrostatic and electromagnetic interference & earth loops.

TEXT BOOKS

1. Modern Electronic Instrumentation & Measurement Techniques, Albert D. Helfrick &

- William D. Cooper, Prentice Hall of India, 2002.
2. A Course in Electrical and Electronic Measurements & Instrumentation, A.K.Sawhney, Dhanpat Rai Publication, 2013
 3. Digital Instrumentation, A.J.Bouwens, Tata Mc Graw Hill, 1997.
 4. Electronic Test Instruments, Theory and applications, Robert A.Witte, Prentice Hall, 1993.

REFERENCES

1. Electronic Measurements & Instrumentation, B.M.Oliver and J.M.Cage, Mc Graw Hill International Edition, 1975.
2. Elements of Electronic Instrumentation & Measurements, Joseph, J.Carr, Third Edition, Pearson Education, 2003. Anx.34 F - M.Sc., Elect.& Instrumts (Univ dept) 2008-09
3. Instrumentation Devices & systems, C.S.Rangan, G.R.sarma, V.S.V.Mani, Tata Mc Graw Hill, 2002.
4. Electronic Instrumentation and Measurements, D.A.Bell, Prentice Hall of India, 2002.
5. Electronic Measurements and Instrumentation, Rajendra Prasad, Khanna Publishers, Delhi, 2003.
6. Electronics and Instrumentation, B.R.Gupta, S.Chand Co. (P)Ltd., Delhi, 2003.

15ECU604	PROGRAMMABLE LOGIC AND DISTRIBUTED CONTROL SYSTEMS	Semester-VI			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To identify logical process control in automation
- To connect PLC peripherals with PLC for logical functioning.
- To get strong knowledge in the developing of basic PLC programs
- To understand the components of a PLC system To understand how PLCs are used
- To understand the H&S requirements of a PLC- controlled system
- To understand different methods of interfacing with a PLC

COURSE OUTCOMES

- Identify the main parts of programmable logic controller
- Develop logic gate circuits for Boolean expressions
- Able to state basic PLC Terminology
- Identify logical process control, in automation.
- Describe how a programmable logic controller is programmed.
- Describe switching elements on input/output modules

UNIT I - Review of Computers In Process Control

Data loggers: Data acquisition systems (DAS): alarms, computer control hierarchy levels. Direct Digital control (DDC). Supervisory digital control (SCADA). Characteristics of digital data. Controller software. Linearization. Digital Controller modes, Error, Proportional, Integral, Derivative and Composite Controller Modes.

UNIT II - Programmable Logic Controller (PLC) Basics

Definition- overview of PLC systems - Input/ Output modules - Power supplies –ISO slots. General PLC programming procedures - Programming on-off outputs-Auxiliary commands and functions - Creating Ladder Diagrams from process control descriptions. PLC basic functions - Register basics - Timer functions - Counter functions.

UNIT III - PLC Intermediate Functions

Arithmetic functions - number comparison functions - Skip and MCR functions - Data move systems - PLC Advanced intermediate functions- utilizing digital bits - sequencer functions - PLC Advanced functions: alternate-programming languages - operation. PLC-PID functions - PLC installation - trouble shooting and maintenance

UNIT IV - Interface and Backplane Bus Standards for Instrumentation Systems

Field bus: Introduction - concept - international field bus standards. HART protocol: method of operation - structure - operating conditions and applications.

UNIT V - Distributed Control Systems (DCS)

Evolution of DCS - building blocks - detailed descriptions and functions of field control UNITS- operator stations - data highways - redundancy concepts. DCS - supervisory computer tasks and configuration - DCS- system integration with PLC and computers.

TEXT BOOKS

1. Computer based Industrial Control, Krishna Kant, Prentice Hall India, 2010.
2. Programmable Logic Controllers Principles and Applications, John Webb. W. and Ronald Reis, A. Prentice hall Inc, Fifth Edition 2003.

REFERENCES

1. Programmable Logic Controllers, Frank D. Petruzella, Tata McGraw Hill, Third Edition, 2010.

15ECU507	MEMS AND CONTROL ENGINEERING	Semester-II			
		L	T	P	C
		-	-	-	5

COURSE OBJECTIVES

- To identify logical process control in automation
- To learn the various micro fabrication technologies for MEMS
- Understand unique requirements for MEMS fabrication
- To know about the merging of mechanical devices with circuits
- To know about the current trends and future technology for MEMS
- Identify problems and suggest suitable MEMS material/ Devices/Process to get the Requisite Solution for a given application Fundamental Devices and Processes for MEMS

COURSE OUTCOMES

- Identify the main parts of programmable logic controller
- Develop logic gate circuits for Boolean expressions
- Able to state basic PLC Terminology
- Apply fundamental concepts of MEMS to solve real life engineering problems
- Apply advanced MEMS techniques to solve future engineering problems.
- Know about the merging of mechanical devices with circuits

UNIT I - Overview and Working Principles of MEMS

MEMS and Microsystems – Typical MEMS and Microsystems Products – Microsystems and Microelectronics – Miniaturization – Applications of Microsystems – Micro Sensors, Micro Actuation, Micro Grippers, Micro Motors, Micro Accelerometer.

UNIT II - Fabrication & Microsystems Design

Ions and Ionization – Doping – Diffusion Process – Scaling Laws For Electrical Design – Substrate and Wafers – Silicon as a Substrate – Silicon Compounds – Piezo Resistors – Piezo Crystals - Photolithography – Ion Implantation – Diffusion – Oxidation – PVD – Etching – Surface Micro Matching – LIGA Process – Micro System Design Considerations

UNIT III - Concepts of Control System

Introduction – Open and Closed Loop Systems – Examples – Elements of Closed Loop Systems – Linear and Nonlinear System - Effect of Feedback on Overall Gain, Stability, Sensitivity and Noise – Transfer Function of Closed Loop System – Block Diagram Algebra and Reduction – Mason's Gain Formula.

UNIT IV -Time Response Analysis & Stability in Time and Frequency Domain

First Order System: Impulse and Step Input Analysis – Second Order System Analysis – Steady State Error – Stability Analysis: Routh Hurwitz Criterion – Root Locus Method – Construction and Application - Nyquist Stability Criterion – Bode Diagrams – Polar Plot.

UNIT V - Design of Digital Control System

Z Plane Specifications of Control System Design – Digital Compensator Design – Frequency Response Method - State Feedback – Pole Placement Design – State Observers – Digital Filter Properties – Frequency Response – Kalman's Filter.

TEXT BOOKS

1. MEMS & Microsystems Design & Manufacture and Nano Scale Engineering, Tai-Ran Hsu, Wiley Publications, Second Edition, 2011.

2. Control Systems Engineering, R. Ananada Natrajan, P. Ramesh Babu, SCITECH Publications, Fifth Edition, 2012

REFERENCES

1. Digital Control Engineering, M. Gopal, New age International (p) Ltd, Fifth Edition, 2012.

15ECU605	DIGITAL SIGNAL PROCESSING	Semester-III			
		L	T	P	C
		-	-	-	5

COURSE OBJECTIVES

- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To apply design technique for FIR type digital filters
- Understand fundamentals of Digital Signal Processing
- Analyze & compare different signal processing strategies.
- Become aware of some applications of DSP.

COURSE OUTCOMES

- Understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform
- Ability to compute various transform analysis of Linear Time Invariant Systems.
- Implement problem solving strategies to DSP Problems.
- Able to test signal processing algorithms for various applications
- Ability to understand Various applications of DSP such as signal processing and telecommunication.
- Apply design techniques for FIR type digital filters

UNIT I - Structures For Discrete Time Systems

Introduction – Block Diagram and Signal Flow Graph Representation of Linear Co-Efficient Difference Equation – Basic Structures for IIR Systems – Basic Network Structures for FIR Systems – Lattice Structures – Zero Input Cycles in Fixed Point Realization of IIR Digital Filters.

UNIT II - Filter Design Techniques

Introduction – Design of Discrete Time IIR Filters from Continuous Time Filters – Frequency Transformation of Low Pass IIR Filters – Design of FIR Filters by Windowing - Comments on IIR and FIR Digital Filters.

UNIT III - Computation of Discrete Fourier Transform

Introduction – Efficient Computation of DFT – Decimation in Time FFT Algorithms – Decimation in Frequency Algorithms – Implementations of FFT Algorithms – FFT Algorithms for Composite N.

UNIT IV TMS 320 C 6713 Overview

Introduction – TMS320C6713 Overview – Key Features – Architectural Overview – Functional Block Diagram - Internal Memory Organization – CALU – System Control – PLU – Interrupts – Addressing Modes – Instruction Set.

UNIT V -Introduction to MATLAB

Introduction To M-Files – Inline Functions – Control Flow – Relations & Logical Operators – Strings – Cell Arrays – Functions – MATLAB Graphics: - 2d Graphics – 3d Graphics – Animations.

TEXT BOOKS

1. Discrete Time Signal Processing, Oppenheim A.V and Schaffer RW, Buck .C, Prentice Hall

India, Second Edition, 2013.

2. Digital Signal Processing – A computer Based Approach, Sanjith K.Mitra, McGraw Hill, Fourth Edition, 2013.

3. TMS 320 C 671x users guide, Texas instruments, 1993.

REFERENCES

1. Digital Signal Processing, Nagoor Kani.A, Tata McGraw Hill Pvt Ltd, Second Edition, 2012.

15ECP101	ADVANCED DIGITAL SYSTEM DESIGN	Semester-I			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To provide strong knowledge on Programmable Logic Devices and its usage in industrial automation.
- To understand number representation and conversion between different representation in digital electronic circuits.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices, PLA, PAL, CPLD and FPGA and implement digital system using VHDL
- To implement combinational and sequential circuits using VHDL

COURSE OUTCOMES

- Develop a digital logic and apply it to solve circuit problems
- Analyze, design and implement combinational logic circuits
- Classify different semiconductor memories
- Analyze, design and implement sequential logic circuits
- Analyze digital system design using PLD
- Simulate and implement combinational and sequential circuits using VHDL systems

UNIT I - Sequential Logic Circuits

Introduction to Sequential Logic Circuits - Mealy Machine- Moore Machine - State Diagrams - State Table Minimization - Incompletely Specified Sequential Machines - State Assignments - Design of Synchronous and Asynchronous Sequential Logic Circuits - Working in Fundamental and Pulse Mode.

UNIT II - Synchronous Sequential Circuit Design

Introduction of Clocked Synchronous Sequential Networks (CSSN) - Modeling of CSSN - State Table Assignment and Reduction – Design of CSSN - ASM Chart - ASM Realization.

UNIT III - Asynchronous Sequential Circuit Design

Introduction of Asynchronous Sequential Circuits (ASC)-Flow Table Reduction - Races in ASC - State Assignment - Problem and the Transition Table - Design of ASC - Static and Dynamic Hazards -Mixed Operating Mode Asynchronous Circuits.

UNIT IV - Programmable Logic Devices

Basic Concepts - Programming Technologies - Programmable Logic Element(PLE), Programmable Logic Array(PLA) - Programmable Array Logic(PAL) - Complex PLD's(CPLD) - System Design using PLD's - Design of Combinational and Sequential Circuits using PLD's.

UNIT V - Study of FPGA and XILINX

Introduction to Field Programmable Gate Arrays - Types of FPGA – Xilinx XC3000 Series - Logic Cell Array (LCA) - Configurable Logic Blocks (CLB) - Input/Output Block (IOB) - Programmable Interconnect Point (PIP).

TEXT BOOKS

1. Digital Principles and Design, Donald G.Givone, Tata McGraw Hill, First Edition, 2012.
2. Digital Systems: Principles and Applications, Gregory L. Moss, Ronald J. Tocci, Neal S. Widmer, Pearson Education, Tenth Edition, 2013

REFERENCES

1. Logic Design Theory, Nripendra N Biswas Prentice Hall of India, First Edition.2013.

15ECP102	MODERN COMMUNICATION SYSTEMS	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To learn the designing procedure and operation of circuits used for communication.
- To know the elements of modern communication systems
- To understand the basics and to identify the issues in today's communication systems, including satellite communication, Optical Fiber Communication and Digital cellular systems and cellular networks.
- To understand the basic concepts of AM, FM, and PM transmission and reception.
- To assess and evaluate different modulation and demodulation techniques.
- To evaluate the influence of noise on communications signals.

COURSE OUTCOMES

- Apply or create suitable algorithm to solve a particular problem
- Understand and identify the fundamental concepts and various components of analog communication systems
- Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
- Describe analog pulse modulation techniques and digital modulation technique
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Use of different modulation and demodulation techniques used in analog communication

UNIT I -Wave Propagation

EM Waves – Free Space Propagation – Surface Wave Propagation – Sky Wave Propagation – Space Wave Propagation – Tropospheric Scatter Propagation – Structure of Atmosphere – Characteristics of Ionized Regions – Virtual Height – Maximum Usable Frequency - Lowest Usable Frequency – Skip Distance – Optimum Working Frequency – Ionospheric Abnormalities – Duct Propagation.

UNIT II - Satellite Communication

System Description – Telemetry, Tracking and Command – Communication Space Craft – Satellite Orbit – GEO – LEO – MEO – Satellite Position – Linkage – Frequencies – Inside the Satellite: Transponder – Antenna Systems – Power Packages – Station Keeping – Ground Station – Aligning the Satellite Dish.

UNIT III - Optical Fiber Communication

Basic Fiber Optic System – Frequencies – Fiber Optic Cables – Refraction – Numerical Aperture – Graded Index Cables – Single Mode – Multimode – Cable Constructions – Cable Losses – Connector – Light Sources – Light Detector - System Components – Advantages And Disadvantages.

UNIT IV - Digital Cellular Systems

GSM Architecture – Layer Modeling – Transmission – Data Service – Multiple Access Scheme – Channel Coding Interleaving – Radio Resource Management – Mobility Management – Communication Management – Network Management – TDMA Architecture – Transmission and Modulation – CDMA – Terms of CDMA Systems – Call Processing – Handover Procedures.

UNIT V - Intelligent Network for Wireless Communication

Intelligent Cell Concept – Intelligent Micro Cell Operation – Applications – Advanced Intelligent Network (AIN): Evaluation – Architecture – ISDN for AIN – AIN for Mobile – Asynchronous Transfer Mode (ATM) Technology: TM Network Concept – Applications – Wireless Information Super Highway.

TEXT BOOKS

1. Electronic Communication Systems, Kennedy and Davis, Tata McGraw Hill, fifth Edition, 2012.
2. Mobile Cellular Telecommunications, Willian C.Y. Lee, McGraw Hill, Second Edition, 2012

REFERENCES

1. Electronic Communications Modulation and Transmission, Robert J Schoenbeck, PHI, Second Edition, 2011.

15ECP103	SIGNALS AND SYSTEMS	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To understand the process of convolution between signals and able to solve differential equation using Laplace transform techniques.
- To understand the intuitive meaning of frequency domain and the importance of analyzing and processing signals in the frequency domain.
- Able to compute the Fourier series or Fourier transform Z-transform
- To introduce students the concept and theory of signals and systems needed in electronics and telecommunication engineering fields
- Knowledge about basic signal and system modeling concept and definitions
- Knowledge about the application and use of mathematical transforms and state-variables in order to solve electrical engineering problems

COURSE OUTCOMES

- Understand about various types of signals and systems, classify them, analyze them and perform various operations.
- Understand the use of transform to analysis of signals and systems in continuous and discrete time domain
- Implement the concept and theory of signals and systems in electronics and communication field.
- Ability to have idea of signal and system analysis and its characterization in time and frequency domain
- Students can perform mathematical and graphical convolution of signals and systems.
- Compute the Fourier series or Fourier transform Z-transform

UNIT I - Signals and systems

Introduction - CT and DT Signals – Transformation of the Independent Variable – CT and DT Systems – Basic System Properties. LTI System: - Introduction – DT LTI Systems – CT LTI Systems – Properties of LTI System.

UNIT II - Fourier series representation of Periodic signals

Introduction – Fourier Series Representation of CT Periodic Signals – Properties of CT Fourier Series – Fourier Series Representation of DT Periodic Signals – Properties of DT Fourier Series – Fourier Series and LTI System – Filtering.

UNIT III - CT and DT Fourier Transform

Introduction – Representation of Periodic Signals in Continues Time Fourier Transform – Fourier Transforms for Periodic Signals - Properties of the CT Fourier Transform – Convolution Property – Multiplication Property - Discrete Time Fourier Transform - Introduction – Representation of Periodic Signals in DT Fourier Transform – Fourier Transform for Period Signals – Properties of Discrete Time Fourier Transform - Convolution Property – Multiplication Property – Duality.

UNIT IV - Sampling

Introduction - Sampling Theorem – Reconstruction of a Signal From its Samples using Interpolation – Aliasing – DT Processing of a CT Signals – Sampling of DT Signals.

UNIT V - Laplace and Z transform

Introduction – Laplace Transform – Region of Convergence For LT – Inverse Laplace Transform – Properties of Laplace Transform - Z-Transform:- Introduction – Z-Transform – Region of Convergence for Z-Transform – Inverse Z–Transform – Properties of Z-Transform.

TEXT BOOKS

1. Signals and Systems, Alen V. Oppenheim Alan S. Wilsky and Hamid Nawab S, PHI, Second Edition, 2012.
2. Signals and Systems, Simon Haykin and Barry Van Veen, John Wiley & sons Inc. Second Edition, 2012

REFERENCES

1. Signals and Systems, Anand Kumar.A, PHI Learning Press, Third Edition, 2013.

15ECP104	EMBEDDED SYSTEMS	Semester-I			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.
- To develop the next generation technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices
- To understand the need and applications of Microcontrollers in embedded system.
- To understand architecture and features of typical Microcontroller.
- Learn interfacing of real world input and output devices
- To study various hardware and software tools for developing applications embedded systems

COURSE OUTCOMES

- Understand hardware and software design requirements of embedded systems.
- Acquire knowledge about embedded processors and their applications
- Analyze the embedded systems specification and develop software programs.
- Ability to design an Embedded System, component or process to meet desired needs within realistic constraint
- Evaluate the requirements of programming embedded systems and tool chain for embedded systems.
- Explore the features of the microcontroller and provide solutions for embedded applications

UNIT I - PIC 18F Microcontroller

Introduction to Microcontroller: Brief History of The PIC Microcontroller – PIC18 Features and Block Diagram – PIC18 Architecture - Addressing Modes – Instruction Set – PIC I/O Port Programming.

UNIT II – Embedded C Programming

Introduction to C Programming: Data Types in C - I/O Port Programming in C - Bit-Addressable I/O Programming - Logic Operations in C - Data Conversion Programs in C.

UNIT III - PIC Peripherals and Interfacing

Introduction to PIC Peripherals and Interfacing: PIC18 Timer Programming in Assembly and C - Serial Port Programming in Assembly and C - Interrupt Programming in Assembly and C - ADC and DAC Interfacing - CCP and ECCP Programming - DC Motor Interfacing and PWM.

UNIT IV - Introduction to Embedded Systems

Introduction to Embedded Systems Characteristics of Embedded Systems - Software Embedded into a Systems - Device Drivers and Interrupt Servicing Mechanisms - Inter-Process Communication and Synchronization of Process - Tasks and Threads: Multiple Processes in an Application – Data Sharing by Multiple Tasks and Routines – Inter Process Communication.

UNIT V - Embedded Design Process

Embedded Design Life Cycle – Product Specification – Hardware / Software Partitioning – Detailed Hardware and Software Design – Integration – Product Testing – Selection Processes – Microprocessor Vs Micro Controller – Performance Tools – Bench Marking –RTOS Micro Controller Tool Chain Availability – Other Issues in Selection Processes.

TEXT BOOKS

1. Programming and Customizing the PIC Microcontroller, Myke Predko, Tata McGraw - Hill Education, Third Edition, 2010.
2. Embedded Systems Architecture Programming and Design, Rajkamal, Tata McGraw Hill Publications. Third Edition, 2014.

REFERENCES

1. PIC Microcontroller and Embedded Systems using assembly and C for PIC18 –Muhammad Ali Mazidi, Roind D. Mckinay, Danny Causey, Pearson Education, First Edition, 2010.

15ECP105	ADVANCED ELECTRONIC CIRCUIT THEORY	Semester-I			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- Ability to design different types of Electronic Circuits such as Amplifiers and Oscillators.
- To understand and implement the advanced electronic circuits such as amplifiers etc with the help of theoretical and practical problem solving.
- Ability to analyze the different types of configurations and applications of Transistor.
- Ability to determine the stability of feedback amplifiers and their steady state performance.
- To analyze the Circuits in time and frequency domain
- Calculation and measurement of parameters for electronic circuits, to introduce the students to the advanced concepts of electronics.

COURSE OUTCOMES

- Know the characteristics of diodes and transistors
- Design simple circuits and know the benefits of feedback in amplifier
- Apply their knowledge in analyzing Circuits by using network theorems.
- Measure the characteristics of electronic circuits and present experimental results
- Compare and classify oscillators
- Analyze electrical circuits and calculate the main parameters

UNIT I - Semiconductor Devices

Conductor – Semiconductor – Intrinsic Semiconductor – Extrinsic Semiconductor – P Type and N Type Semiconductor – PN Junction Diode – V-I Characteristics - Zener Diode – V-I Characteristics Construction of NPN and PNP Transistors – Operation of NPN, PNP Transistors – Characteristics of CE and CB Transistor Configurations

UNIT II - Circuit Analysis

Mesh Analysis - Mesh Equation by Inspection Method - Nodal Analysis – Source Transformation Technique – Star to Delta Transformation. Network Theorems: Superposition Theorem - Thevenis's Theorem - Norton's Theorem – Reciprocity Theorem – Maximum Power Transfer Theorem – Millman's Theorem.

UNIT III - Analog Electronics

Detailed Analysis of BJT and FET Biasing Circuits - Stability Considerations - Analysis of Single and Multistage Amplifiers - Amplifier with Different types of Feedbacks - Power Amplifiers - Tuned Amplifiers and Oscillators - Linear Integrated Circuits - Process Technology - Differential Amplifiers and Current Mirrors - Op-Amp Details. Op-Amp Circuits and Applications - Active Filters - Functional Amplifiers.

UNIT IV - Thyristors and Special diodes

SCR - Construction – Characteristics – Two Transistor Version – Thyristor ratings -LASER – TRIAC – DIAC - Zener Diode - Avalanche Break Down – Zener Breakdown – Application of Zener - Varactor Diode – Schottky Diode - Tunnel Diode - Gunn Diode – IMPATT Diode - PIN Diode – LASER Diode.

UNIT V - AC Fundamentals

Electrical Sources - AC Waveforms - Frequency, Phase, Amplitude, Peak, RMS, Calculation of Power, Response of Passive Components on AC Waveforms – Impedance in RLC Circuit - Transient Analysis of Electric Circuits - Steady State Analysis of Circuits - Network Theorems(Ac Circuits) - Two Port Networks – Resonance.

TEXT BOOKS

1. Electronic Devices and Circuits, David.A. Bell, Oxford University Press 5th Edition, 2008.
2. Circuit Theory : Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai & Co. Sixth Edition, 2014

REFERENCES

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar & A.Vallavaraj, Tata Mc Graw-Hill publishing Company Limited, Fourth Edition, 2013.

.15ECP111	PRACTICAL – I ADVANCED ELECTRONIC CIRCUITS AND COMMUNICATION LAB	Semester-I			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To identify and test various electronic components
- To use DSO for various measurements
- To plot the characteristics of diode and transistor
- To design and implement feedback amplifier circuits
- To measure the frequency of oscillators.
- To design and test regulated power supplies

COURSE OUTCOMES

- Verify the rectifier circuits using diodes and implement them using hardware
- Design the biasing circuits like self biasing
- Understand the construction, operation and characteristics of FET which can be used in the design of amplifiers
- Design simple circuits
- Know the benefits of feedback in amplifier
- Compare and classify oscillators.

(Any 10 Experiments)

1. Design of Double stage RC coupled amplifier
2. Design of Common Source FET Amplifier
3. Design of Feedback amplifier
4. Design of Wein bridge oscillator
5. Design of Phase shift oscillator
6. Design of Colpitts and Hartley oscillator
7. Design of Schmitt trigger
8. Design of AM Modulation
9. Design of FM Modulation
10. Design of PAM Modulation
11. Design of PPM Modulation
12. Design of PWM Modulation

15ECP112	PRACTICAL – II EMBEDDED SYSTEMS LAB	Semester-I			
		L	T	P	C
			-	4	2

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port with board
- Competent to evaluate the data transfer response
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.

(Any 10 Experiments)

1. Writing and testing programs involving arithmetic, logical and BIT oriented instructions.
2. LED interfacing
3. Data transfer program with parallel port
4. Key interfacing and Seven segment display interface
5. Stepper motor controller interface
6. Speed control of DC motor
7. PWM generation
8. Temperature monitoring and control
9. Waveform generation
10. A/D converter interface
11. D/A converter
12. LCD interface

15ECP201	VLSI DESIGN AND VHDL PROGRAMMING	Semester-II			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- To learn the basics of language elements.
- To provide a strong knowledge about the VHDL Modeling.
- To introduce a hardware description language (HDL) for the specification, simulation, synthesis
- Implementation of digital logic systems.
- Design practice sessions and implementing digital logic systems with commercial electronic design (EDA) tools
- To know the features of programming and simulation techniques.

COURSE OUTCOMES

- Building simulation module as per system specification for e.g. VHDL model for ASIC design
- Understanding types of design such as high level design, operative part design, control part design, memory design etc
- Functioning and specifying the tools used for design as per requirement
- Creation of code, verification, testing software
- Testing various examples on the system
- Understanding the synthesis and simulation process of code

UNIT I - Introduction and Basic Concepts of VHDL

History of VHDL – Capabilities of VHDL – Hardware Abstraction – Basic Terminology – Entity Declaration - Architecture Body Declaration – Basic Language Elements – Identifiers – Data Objects – Data Type Operators.

UNIT II - Behavioral Modeling Techniques of VHDL

Behavioral Modeling: Entity Declaration – Architecture Declaration – Process Statements Variable Assignment Statements – Signal Assignments Statements – Wait Statement – IF Statement – Case Statement – Null Statement – Loop Statement – Exit Statement – Next Statement – Assertion Statement – Report Statements – More On Signal Assignment Statement – Multiple Process – Postponed Process.

UNIT III - Data Flow Modeling Techniques of VHDL

Data Flow Style of Modeling: Concurrent Signal Assignment Statement versus Signal Assignment – Delta Delay Revisited – Multiple Drivers – Conditional Signal Assignment Statement – Selected Signal Assignment Statement – Unaffected Value – Block Statement - Concurrent Assertion Statement.

UNIT IV - Structural Modeling

Component Declaration – Component Instantiation – Resolving Signal Value – Examples – Half Adder – Full Adder – Four to One Multiplexers – Decoders and Encoders.

UNIT V - Advanced Features in VHDL

Generics – Configuration – Configuration Specification – Configuration Declaration – Default Rules – Conversion Functions – Direct Instantiation – Incremental Binding – Sub Programs – Sub Program Overloading - Operator Overloading – Signatures.

TEXT BOOKS

1. A VHDL Primer, J. Bhasker, Pearson Education. Third Edition, 2010.
2. VHDL: Programming by Examples, Douglas.P.Perry,Mc Graw Hill Publications, Fourth Edition,2014.

REFERENCES

1. HDL Programming VHDL and Verilog, Nazeih M. Botros, Wiley India Pvt. Ltd, First Edition, 2012
2. Introductory VHDL: From Simulation to Synthesis, Yalamanchili, 1st Edition, 2011.

15ECP202	ARM MICROCONTROLLER	Semester-II			
		L	T	P	C
		4	1	-	5

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.
- Develop interfacing to real world devices.

UNIT I - Introduction to Embedded System and LPC 2148 ARM Controller

Definition of Embedded System – Features of Embedded System – Types of Embedded System - LPC 2148 ARM Controller – Block Diagram – Memory and On Chip Peripheral Devices – ARM 7 TDMI - S CPU Registers – Modes of Operation – PSW.

UNIT II - Embedded C basics, GPIO (Slow), Timer and Interrupts

Embedded C Basics – GPIO (Slow) Register Map - Pin Connect Block - 8 Bit LED'S – 8 Bit Switches – Buzzer – Relay – Stepper Motor Interfaces -Timer/Counter – Block Diagram – Register Map – Program for Time Delay and Counter Operation - Register Map – External Interrupts - Timer/Counter based Interrupt.

UNIT III - PWM, ADC, DAC and RTC

PWM Features – Block Diagram – Register Map – Program for Generating Single Ended PWM - ADC Feature – Block Diagram – Register Map – Program for ADC and Temperature Sensor LM 35 Interface - DAC Feature – Block Diagram – Register Map – Program for Generating Analog Output - RTC Feature – Block Diagram – Register Map – Program for displaying the Time in LCD Display.

UNIT IV - Serial and Parallel Communication

UART Feature – UART0 Block Diagram – Register Map – Transmission and Reception of Messages for PC – SSP Feature – Register Map.

UNIT V - I2C

Introduction to I2C – I2C Feature in LPC 2148 – Block Diagram – Register Map – I2C Master Mode Operation – Interfacing I2C based I/O Expander PCF 8574 – Interfacing LED – 7 Segment Display – Interfacing I2C based EEPROM – Programs.

TEXT BOOK

1. ARM Microcontroller Interfacing: Hardware and Software, Warwick A. Smith, Gazelle Books Services, Second Edition, 2010.

REFERENCES

1. ARM Microcontroller, B. Shantha Kumar Naik, Sapna Books House, First Edition, 2013.

15ECP203	TELECOMMUNICATION SYSTEMS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the designing procedure and operation of circuits used for communication.
- To understand the basic concepts of AM, FM, and PM transmission and reception.
- To assess and evaluate different modulation and demodulation techniques.
- To evaluate the influence of noise on communications signals.
- To introduce students to various modulation and demodulation techniques of analog communication
- To analyze different parameters of analog communication techniques.

COURSE OUTCOMES

- Apply or a create suitable algorithm to solve a particular problem
- Understand and identify the fundamental concepts and various components of analog communication systems
- Explain signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system.
- Describe analog pulse modulation techniques and digital modulation technique
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Use of different modulation and demodulation techniques used in analog communication

UNIT I - Overview of Telecommunication

Introduction-History of Telecommunication-Telecommunication Network Internet - Classification of Data Network-Telecommunication Standards.

UNIT II - Electronics for Telecommunication

Introduction - Communication System Parameters - FDM – TDM - WDM. Transmission Media: Introduction – Fiber Optic Cables - Cabling Architecture.

UNIT III - Voice Communication

Introduction - Public Telephone Network - Telephone Types - Circuit – Out Going – Incoming Calls - Line Signaling – Intelligent Network Services - Business Telephone Systems.

UNIT IV - Wide Area Network and Broad Band Technologies

Introduction – Packet Switching Network - X.25 Frame Relay – SMDS – ISDN – SONET – ATM – POS – DTM - DSL – CM's - PON.

UNIT V - Network Management

Introduction - Policy Management - Evolution of Network Hardware and Software - Network Administration and Maintenance - Network Security Configuration Management – Telecommunication Management Network.

TEXT BOOK

1. Introduction to Telecommunication, Gokhale, Delmar Publications, First Edition, 2011.

REFERENCES

1. Telecommunication Switching, Traffic Networks, JE Flood, Pearson Education, Tenth Edition, 2011.
2. Telecommunication Switching Systems and Networks, Thiyagarajan Viswanath, Prentice Hall of India, Second Edition, 2010.

15ECP204A	MEMS AND CONTROL ENGINEERING	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the various micro fabrication technologies for MEMS
- To understand unique requirements for MEMS fabrication
- To know about the current trends and future technology for MEMS
- To employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions
- Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system
- Formulate different types of analysis in frequency domain to explain the nature of stability of the system

COURSE OUTCOMES

- Ability to describe MEMS fabrication technologies
- Apply fundamental concepts of MEMS to solve real life engineering problems
- Identify problems and suggest suitable MEMS material/ Devices/Process to get the Requisite Solution for a given application
- Apply advanced MEMS techniques to solve future engineering problems. Capability to critically analyze microsystems technology for technical feasibility as well as practicality
- Understand the concept of time response and frequency response of the system.
- Analyze feedback characteristics of linear control systems to reduced the disturbance
- Perform frequency domain analysis of linear control system using nyquist stability criterion

UNIT I - Overview and Working Principles of MEMS

MEMS and Microsystems – Typical MEMS and Microsystems Products – Microsystems and Microelectronics – Miniaturization – Applications of Microsystems – Micro Sensors, Micro Actuation, Micro Grippers, Micro Motors, Micro Accelerometer.

UNIT II - Fabrication and Microsystems Design

Ions and Ionization – Doping – Diffusion Process – Scaling Laws For Electrical Design – Substrate and Wafers – Silicon as a Substrate – Silicon Compounds – Piezo Resistors – Piezo Crystals - Photolithography – Ion Implantation – Diffusion – Oxidation – PVD – Etching – Surface Micro Matching – LIGA Process – Micro System Design Considerations

UNIT III - Concepts of Control System

Introduction – Open and Closed Loop Systems – Examples – Elements of Closed Loop Systems – Linear and Nonlinear System - Effect of Feedback on Overall Gain, Stability, Sensitivity and Noise – Transfer Function of Closed Loop System – Block Diagram Algebra and Reduction – Mason's Gain Formula.

UNIT IV -Time Response Analysis and Stability in Time and Frequency Domain

First Order System: Impulse and Step Input Analysis – Second Order System Analysis – Steady State Error – Stability Analysis: Routh Hurwitz Criterion – Root Locus Method – Construction and Application - Nyquist Stability Criterion – Bode Diagrams – Polar Plot.

UNIT V - Design of Digital Control System

Z Plane Specifications of Control System Design – Digital Compensator Design – Frequency Response Method - State Feedback – Pole Placement Design – State Observers – Digital Filter Properties – Frequency Response – Kalman's Filter.

TEXT BOOKS

1. MEMS & Microsystems Design & Manufacture and Nano Scale Engineering, Tai-Ran Hsu, Wiley Publications, Second Edition, 2011.
2. Control Systems Engineering, R. Ananada Natrajan, P. Ramesh Babu, SCITECH Publications, Fifth Edition, 2012

REFERENCES

1. Digital Control Engineering, M. Gopal, New age International (p) Ltd, Fifth Edition, 2012.

15ECP204B	LOW POWER VLSI DESIGN	Semester-III			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To learn the fabrication techniques of Integrated Circuits.
- To know the fundamental rules of layout design.
- To design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout
- Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication
- Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters
- The issues associated with Mixed Signal VLSI Circuits.

COURSE OUTCOMES

- Realize logic circuits with different design styles.
- Understand working principle of operation of different types of memories.
- Familiarize with the fabrication techniques of Integrated Circuits.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Express the layout of simple MOS Circuit using Lambda based design rules.
- Design an application using Verilog HDL

UNIT I - Power Dissipation in CMOS

Hierarchy of Limits of Power – Sources of Power Consumption – Physics of Power Dissipation in CMOS FET Devices - Basic Principle of Low Power Design.

UNIT II - Power Optimization

Logical Level Power Optimization – Circuit Level Low Power Design – Circuit Techniques for Reducing Power Consumption in Adders and Multipliers.

UNIT III - Design of Low Power CMOS Circuits

Computer Arithmetic Techniques for Low Power Systems – Reducing Power Consumption in Memories – Low Power Clock, Interconnect and Layout Design – Advanced Techniques – Special Techniques

UNIT IV - Power Estimation

Power Estimation Techniques – Logic Level Power Estimation – Simulation Power Analysis – Probabilistic Power Analysis.

UNIT V - Synthesis and Software Design for Low Power

TEXT BOOKS

1. Low Power CMOS VLSI Circuit Design, K.Roy and S.C. Prasad, Wiley Publications, 2011,
2. Low Voltage CMOS VLSI Circuits, Kuo J.B. and Lou J.H, Wiley Publications, 2008.

REFERENCES

1. Low Power Digital CMOS Design, Chandrakasan A.P. and Broadersen R.W. Wiley Publications, 2008.

15ECP204C	REAL TIME OPERATING SYSTEMS	Semester-V			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To know the Fundamental elements of real-time multitasking embedded application software design and development. Processor and operating system concepts
- To provides a broad introduction to real time systems and their programming.
- To make the students to understand the fundamental problems, concepts, and approaches in the design and analysis of real-time systems
- To provides a broad introduction to real time systems and their programming.
- To make the students to understand the fundamental problems, concepts, and approaches in the design and analysis of real-time systems.
- To study issues related to the design and analysis of systems with real-time constraints.

COURSE OUTCOMES

- Program the Arduino microcontroller to make the circuits work
- Compare different scheduling algorithms and the schedulability criteria.
- Determine schedulability of a set of periodic tasks given a scheduling algorithm.
- Develop algorithms to decide the admission criterion of sporadic jobs
- To know the schedule of aperiodic jobs.
- Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulability criteria.
- Enumerate the need and the challenges in the design of hard and soft real time systems.

UNIT I - Introduction

Real-Time Computation – Structure of A Real-Time System – Task Classes – Performance Measures For Real-Time Systems – Estimating Program Run Times – Task Assignment and Scheduling – Classical UniProcessor Scheduling Algorithms – Uniprocessor Scheduling of IRIS Tasks – Task Assignment – Mode Changes – Fault Tolerant Scheduling

UNIT II - Real-Time Models

Event-Based, Process-Based and Graph-Based Models – Pertinent Models –Real-Time Languages – System Performance Analysis – Optimization of Time Loading and Memory Loading Models of Multiprocessor Systems and Distributed Systems – Task Assignment – End to End Tasks in Heterogeneous Systems – Temporal Distance Constraints – Resource Contention – Resource Access Control – Priority Ceiling – Multiple Unit Resource Access.

UNIT III - RTOS Concepts

Foreground and Background Process – Resources – Tasks–Multitasking – Priorities – Schedulers – Kernel – Exclusion – Inter-Task Communication – Interrupts – Clock Tick – Micro C/OS II Kernel Structure – Micro C/OS II Initialization – Starting Micro C/OS II

UNIT IV - RTOS Functions

Task Management – Time Management – Semaphore Management – Mutual Exclusion - Semaphore – Event Management – Message Management – Memory Management – Porting Micro C/OS II

UNIT V - Real-Time Kernel and RTOS Applications

Principles – Design Issues – Polled Loop Systems – RTOS Porting to a Target – Comparison and Study of QNX, Vx works and PSOS – RTOS for Image Processing – Embedded RTOS for VOIP – RTOS for Fault - Tolerant Applications .

TEXT BOOKS

1. Real-Time Systems, Krishna, and Kang Shin, McGraw Hill, First Edition, 2009.
2. Real-Time Systems: Theory and Practice, Rajib Mall, Pearson Education, First Edition, 2009.

REFERENCES

1. Real-Time Design and Analysis – An Engineer's Handbook, Philip Laplante, John Wiley Publications, 2003
2. Micro C/OS II - The Real-Time Kernel, Jean Labrosse, CMP Books, Second Edition, 2002.

15ECP204D	AUTOMOTIVE ELECTRONICS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- To understand the concept of automotive systems, vehicles dynamics, electrical and electronic systems used in automobiles
- To know the concepts and develop basic skills necessary to diagnose in an automatic electronic systems
- To analyze and design the electronic systems for controlling mechanical systems in automobiles
- To test and validate automotive electronic systems
- To apply state-of-art software and hardware tools and techniques for development of automotive electronic systems
- To design modern embedded software and electronic hardware based products for automotive applications.

COURSE OUTCOMES

- Enumerate the construction, characteristics and maintenance of different accessories in a typical automobile system
- Explain the construction characteristics and maintenance of ignition system and diagnose the ignition system fault of any vehicle
- List out the principles and characteristics of charging system components and demonstrate their working with suitable tools
- Describe the principle and architecture of electronic systems and its components present in an automobile related to instrumentation, control and security systems
- Knowledge about handling of industrial automated control systems and working of automotive communication systems.
- Enumerate the principles, application construction and specification of different sensors and actuators

UNIT I - Power Train Engineering and fundamentals of Automotive

Fundamentals of Petrol, Diesel and Gas Engines - Electric Motors and Control Systems - Basic Automotive System - System Components - Evolution of Electronics in Automotive - Alternators and Charging - Battery Technology - Ignition Systems.

UNIT II - Sensor technologies in Automotive

In-Vehicle Sensors: Working Principles – Characteristics – Limitations - Distance Sensing- Velocity Sensing - Vibration Sensing – Airbags - Flow Sensing and Measurement.

UNIT III - Automotive Control Systems

Control System Approach in Automotive: Analog and Digital Control Methods - Stability Augmentation - Control Augmentation - Transmission Control - Motion Equations - Modeling of Linear and Non-Linear Systems - Spark Ignition and Compression Ignition Engines.

UNIT IV - Electronic Control Unit Design

Architecture of 8 /16 Bit Microcontrollers – Ports - Timer/Counters – Interrupts - Watch-Dog Timers - PWM, - High-Level Language Programming: Operators - Control Constructs.

UNIT V - Automotive Communication Systems

Communication Interface with ECU's: Interfacing Techniques -Wireless LAN's Standards- CAN - LIN - Application of Telemetries in Automotive: Global Positioning Systems (GPS) - General Packet Radio Service (GPRS).

TEXT BOOKS

1. Understanding Automotive Electronics, Ribbens William and B Ribbens, Elsevier Science, Seventh Edition, 2012.
2. Mechatronics: Integrated Mechanical and Electronic System, K.P.Ramchandran, G.K.Vijayraghavan, M.S. Balsundaram, Wiley India Publications, Eighth Edition, 2010.

REFERENCES

1. Fundamentals of Automotive Electronics, V.A.W.Hiller, Trans Atlantic Publications, Fifth Edition, 2010

15ECP204E	ANDROID AND ITS APPLICATIONS	Semester-II			
		L	T	P	C
		5	-	-	5

COURSE OBJECTIVES

- Ability to design an Embedded System, component or process to meet desired needs within realistic constraints.
- To develop the next generation technologies, methods and tools for modeling, design, implementation and operation of hardware/software systems embedded in intelligent devices.
- To provide a broad overview of both theoretical and practical aspects of a design flow for embedded systems.
- To learn the basics of electronics, including reading schematics (electronics diagrams)
- To learn how to prototype circuits with a breadboard
- To learn the Arduino programming language and IDE

COURSE OUTCOMES

- Program the Arduino microcontroller to make the circuits work
- Understand the value and importance of learning a coding language
- Transform a physical input into a digital input and analyze it
- Connect the Arduino microcontroller to a serial terminal
- To understand communication and stand-alone use Program basic Arduino examples
- Explore the provided example code and online resources for extending knowledge about the capabilities of the Arduino microcontroller

UNIT I - Introduction

About Android - Smart Phones Future - Android Architecture - Android Stack - Android Application Structure - Smart Phone's Future.

UNIT II - Java Concept

Oops Concepts - Inheritance in Detail - Exception Handling - Packages & Interfaces - JVM & .Jar File Extension - Multi Threading (Thread Class & Runnable Interface).

UNIT III - Basic UI design

Introduction to UI Design - Form Widgets: Text Fields – Layouts – [DIP, DP, SIP, SP] Versus PX – Examples. Time and Date - Images and Media – Composite – Alert Dialogs & Toast – Popup – Examples.

UNIT IV – Menu and Intents

Menu : Option Menu - Context Menu - Sub Menu - Menu From Xml - Menu Via Code – Examples. Intents : Explicit Intents - Implicit Intents – Examples.

UNIT V - Animation and Network Communication

Introduction to Animation and Network Communication - View Animation - Drawable Animation

TEXT BOOK

1. Android Apps for Absolute Beginners, Wallace Jackson, Wiley India Pvt. Ltd, Second Edition, 2013.

REFERENCES

1. Android Programming: Pushing the Limits, Erik Hellman, Wiley India Pvt Ltd, First Edition, 2014.

15ECP211	PRACTICAL – III VLSI LAB	Semester-II			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- Introduced digital integrated circuits
- Introduce CMOS devices and manufacturing technology.
- Introduce CMOS logic gates and their layout.
- Ability to find Propagation delay, noise margins, and power dissipation in the digital VLSI circuits.
- Ability to design Combinational (e.g., arithmetic) and sequential circuit.
- Ability to design Memory in VLSI circuits.

COURSE OUTCOMES

- Analyze the CMOS layout levels, how the design layers are used in the process sequence, and resulting device structures (i.e. cross-sectional views).
- Design and implementation of logic gates
- Implement digital logic designs of various types (i.e. combinational logic, multiplexers).
- Analyze performance issues and the inherent trade-offs involved in system design (i.e. power vs. speed).
- Complete a moderately complex design project involved with data path operators, data registers, serial/parallel conversion, clocking/timing details and feedback.
- Identify the interactions between process parameters, device structures, circuit performance, and system design.

(Any 10 Experiments)

1. Design and implementation of logic gates
2. Design and implementation of half adder & full adder
3. Design and implementation of half Subtractor & full Subtractor
4. Design and implementation of Encoder & decoder
5. Design and implementation of 4 bit & 8 bit multiplexer
6. Design and implementation of flip flops
7. Design and implementation of up/down counters
8. Design and implementation of shift register
9. Design and implementation of ALU
10. Design and simulation of Programmable Logic Array
11. Design and simulation of Traffic light Controller
12. Design and simulation of Real time clock

15ECP212	PRACTICAL – IV ARM MICROCONTROLLER LAB	Semester-II			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- Demonstrate the sensing of different physical parameters
- Explain the calibration of parameters measured and displayed
- Evaluate the data transfer
- To understand the need and applications of Microcontrollers and ARM Processors in embedded system.
- To understand architecture and features of typical Microcontroller
- To learn interfacing of real world input and output devices

COURSE OUTCOMES

- Define the arithmetical and logical assembly language for microcontroller
- Know the downloading procedure on hardware into flash ROM and show the testing data on defined port wish board
- Able to describe the microcontroller and ARM Processor Architecture and its Features
- Learn importance of microcontroller and ARM Processor in designing embedded applications
- Learn use of hardware and software tools.
- Develop interfacing to real world devices.

(Any 10 Experiments)

1. Arranging the numbers in ascending and descending order in an array using a simulator.
2. LED Interfacing
3. LCD Interfacing.
4. Stepper Motor Interfacing.
5. PWM generation.
6. ADC interface.
7. DAC interface
8. Digital Clock
9. LCD Interfacing
10. A/D converter interface
11. Interfacing PWM
12. Interfacing serial port

15OEP201	DATA COMMUNICATION NETWORKS	Semester-III			
		L	T	P	C
		-	-	-	3

COURSE OBJECTIVES

- To understand the communication protocols and layered network architectures.
- To explain conventional computer system interfacing standards and peer to peer data link communication protocols.
- To know the designing concepts of basic network systems and various components in a data communication system.
- To represent a digital signal using several modulation methods
- Draw signal space diagrams compute spectra of modulated signals and apply redundancy for reliable communication.
- To make students familiar with fundamentals of mobile communication systems

COURSE OUTCOMES

- Understand the basics of information theory, source coding techniques and calculate Entropy of source
- To know the various types of noises in communication systems and reduction techniques
- Describe and determine the performance of line codes and methods to mitigate inter symbol interference
- Learn the generation and detection of base band system
- Understand the generation, detection signal space diagram, spectrum, bandwidth efficiency, and probability of error analysis of different band pass modulation techniques
- Describe and determine the performance of different error control coding schemes for the reliable transmission of digital representation of signals and information over the channel.

UNIT 1 - Introduction

Definition of Networks – Classification of Networks – LAN, MAN, WAN, Internet – Network Topology – Protocols and Standards – Network Models – OSI, TCP/IP Models of Networking – Internet

UNIT II - Physical Layer and the Media

Review of Signals – Data Rate Limits – Performance Issues – Bandwidth, Throughput, Latency, Bandwidth - Delay Product- Jitter-Digital Transmission - Analog Transmission: Line Coding Techniques- PCM - Delta Modulation Techniques – ASK, FSK, PSK, and QAM Techniques – Bandwidth Utilization: Multiplexing and Spreading - Data Transmission using Telephone Networks – Dial-Up MODEMS.

UNIT III - Data Link Layer

Error Detection and Correction Techniques – Data Link Control: Framing, Flow and Error Control – HDLC and PPP Protocols. Multiple Access Techniques – CSMA, CSMA/CD, CSMA/CA – Channelization – TDMA-FDMA- CDMA

UNIT IV – LAN’S

Wired LAN’s– IEEE 802 Standards - Ethernet – IEEE 802.3 MAC Frame – Token Ring LAN - IEEE 802.5 MAC Frame – Wireless LAN’s – IEEE 802.11 Standard – Bluetooth Technology – Interconnection of LAN’s.

UNIT V - Internetworking

Internetworking – Tunneling – IP Addressing Scheme – Structure of IP Datagram – IP Routing – TCP as Transport Layer Protocol – Structure of TCP Segment – TCP Connection: Establishment and Closing – SMTP Protocol for E-Mail Application.

TEXT BOOKS

1. Data Communications and Networking, Behrouz A. Forouzan , Tata McGraw-Hill, Fourth Edition, 2009
2. Computer Networks: A Systems Approach, Larry L. Peterson and Bruce S. Davie, Elsevier Publications, Fourth Edition, 2007.

REFERENCES

1. Computer Networking, Stanford H. Rowe and Marsha L. Schuh, Pearson Education, First Edition, 2007.
2. Computer Networking: Top Down Approach featuring the Internet, James Kurose and Keith Ross, Pearson Education, Fifth Edition, 2012.

15ECP301	DIGITAL SIGNAL PROCESSING	Semester-III			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To apply design technique for FIR type digital filters
- Understand fundamentals of Digital Signal Processing
- Analyze & compare different signal processing strategies.
- Become aware of some applications of DSP.

COURSE OUTCOMES

- Understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform
- Ability to compute various transform analysis of Linear Time Invariant Systems.
- Implement problem solving strategies to DSP Problems.
- Able to test signal processing algorithms for various applications
- Ability to understand Various applications of DSP such as signal processing and telecommunication.
- Apply design techniques for FIR type digital filters

UNIT I - Structures For Discrete Time Systems

Introduction – Block Diagram and Signal Flow Graph Representation of Linear Co-Efficient Difference Equation – Basic Structures for IIR Systems – Basic Network Structures for FIR Systems – Lattice Structures – Zero Input Cycles in Fixed Point Realization of IIR Digital Filters.

UNIT II - Filter Design Techniques

Introduction – Design of Discrete Time IIR Filters from Continuous Time Filters – Frequency Transformation of Low Pass IIR Filters – Design of FIR Filters by Windowing - Comments on IIR and FIR Digital Filters.

UNIT III - Computation of Discrete Fourier Transform

Introduction – Efficient Computation of DFT – Decimation in Time FFT Algorithms – Decimation in Frequency Algorithms – Implementations of FFT Algorithms – FFT Algorithms for Composite N.

UNIT IV - TMS 320 C 6713 Overview

Introduction – TMS320C6713 Overview – Key Features – Architectural Overview – Functional Block Diagram - Internal Memory Organization – CALU – System Control – PLU – Interrupts – Addressing Modes – Instruction Set.

UNIT V - Introduction to MATLAB

Introduction To M-Files – Inline Functions – Control Flow – Relations & Logical Operators – Strings – Cell Arrays – Functions – MATLAB Graphics: - 2d Graphics – 3d Graphics – Animations.

TEXT BOOKS

1. Discrete Time Signal Processing, Oppenheim A.V and Schaffer RW, Buck .C, Prentice Hall India, Second Edition, 2013.
2. Digital Signal Processing – A computer Based Approach, Sanjith K.Mitra, McGraw Hill, Fourth Edition, 2013.
3. TMS 320 C 671x users guide, Texas instruments, 1993.

REFERENCES

1. Digital Signal Processing, Nagoor Kani.A, Tata McGraw Hill Pvt Ltd, Second Edition, 2012.

15ECP302	DIGITAL IMAGE PROCESSING	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To acquire the fundamental concepts of a digital image processing system
- To identify and exploit analogies between the mathematical tools.
- To design and implement with MATLAB algorithms for digital image process.
- Discuss techniques specific to 2D system

COURSE OUTCOMES

- Understand the need for image transforms different types of image transforms and their properties.
- Develop any image processing application.
- Learn different techniques employed for the enhancement of images.
- Learn different causes for image degradation and overview of image restoration techniques.
- Understand the need for image compression and to learn the spatial and frequency
- Apply design techniques for FIR type digital filters

UNIT I - Digital Image Fundamentals

Introduction to Elements of A Digital Image Processing System – Structure of the Human Eye – Image Formation and Contrast Sensitivity – Sampling and Quantization – Neighbors of Pixel – Distance Measure – Photographic Film Structure and Exposure – Film Characteristics – Image Processing Applications.

UNIT II - Image Transforms

Introduction to Fourier Transform – DFT – Properties of Two-Dimensional FT – Separability, Translation, Periodicity, Rotation, Average Value – FFT Algorithm – Walsh Transform – Hadamard Transform – Discrete Cosine Transform.

UNIT III - Image Enhancement

Definition – Spatial Domain Methods – Frequency Domain Methods – Histogram – Modification Techniques – Neighborhood Averaging – Median Filtering – Low Pass Filtering – Averaging of Multiple Images – Image Sharpening by Differentiation and High Pass Filtering.

UNIT IV - Image Encoding

Introduction to Image Encoding - Objective and Subjective Fidelity Criteria – Basic Encoding Process – Mapping – Quantizer – Coder – Encoding – Contour Encoding – Run Length Encoding - Image Encoding – Relative to Fidelity Criterion – Differential Pulse Code Modulation.

UNIT V - Application of Image Processing

Introduction to Image Classification – Image Recognition – Image Understanding – Image Fusion – Image Compression - Colour Image Processing.

TEXT BOOKS

1. Digital Image Processing, Rafael C. Gonzalez, Richard E Woods, Pearson Education, Third Edition, 2014.
2. Fundamentals of Digital Image Processing, Anil K.Jain, Pearson Education, Second Edition, 2010.

REFERENCES

1. Digital Image Processing, S. Sridhar, Oxford University Press, First Edition, 2011

15ECP303	PROGRAMMABLE LOGIC CONTROLLER	Semester-III			
		L	T	P	C
		3	1	-	4

COURSE OBJECTIVES

- To identify logical process control in automation
- To connect PLC peripherals with PLC for logical functioning.
- To get strong knowledge in the developing of basic PLC programs
- To understand the components of a PLC system To understand how PLCs are used
- To understand the H&S requirements of a PLC- controlled system
- To understand different methods of interfacing with a PLC

COURSE OUTCOMES

- Identify the main parts of programmable logic controller
- Develop logic gate circuits for Boolean expressions
- Able to state basic PLC Terminology
- Identify logical process control, in automation.
- Describe how a programmable logic controller is programmed.
- Describe switching elements on input/output modules

UNIT I - Introduction to Programmable Logic Controller

PLC Evolution – Hardwire Control System Compared with PLC System - Advantages of PLC's – Criteria for Selection of Suitable PLC - Block Diagram of PLC – Principle of Operation – CPU – Memory Organization – I/O Modules – Input Types – Logic, Analog – Pulse Train – Expansion Modules – Power Supplies to PLC – Modular PLC's .

UNIT II - Input Modules

Discrete Input Module – AC Input Module – DC Input Module – Sinking and Sourcing – Sensor Input – Special Input Modules – Sensors – Limit Switch, Reed Switch, Photo Electric Sensor, and Inductive Proximity Sensor – Input Addressing Scheme in Important Commercial PLC's.

Output Modules Discrete Output Module – TTL Output Module – Relay Output – Isolated Output Module – Surge Suppression in Output – Analog Outputs – Open Collector Output.

UNIT III - PLC Programming

Symbols Used – Relays and Logic Functions – OR, AND, Comparator - Programming Devices – Programming Methods – STL and CSF, FBD and Ladder Methods – Simple Instructions – Programming NC and NO Contacts - EXAMINE ON and EXAMINE OFF Instructions - Online, Offline Methods – Latch and Unlatch Outputs – Pulse Edge Evaluation – Timer Instructions – ON Delay and OFF-Delay Timer-Counter Instructions – UP / DOWN Counters – Timer and Counter Applications- Program Control Instructions – Data Manipulating Instructions – Math Instructions - Converting Simple Relay Ladder Diagram into PLC Relay Ladder Diagram – PID and PWM Functions.

UNIT IV - Networking

Levels of Industrial Control – Types of Networking – Network Communications – Principles – Transmission Media – Field Bus – Introduction, Concepts, International Field Bus Standards – Networking with TCP / IP Protocol – Network Architecture – Physical Addressing – LAN Technologies – Ethernet – Token Ring – Sub-Netting – Subnet Mask – Transport Layer – Ports – Sockets Network Services – File Transfer Protocol.

UNIT V - Data Acquisition Systems

Computers in Process Control – Data Loggers – Data Acquisition Systems (DAS) – Alarms – Direct Digital Control (DDC) - Characteristics of Digital Data – Controller Software – Computer Process Interface for Data Acquisition and Control –Supervisory Digital Control (SCADA) - Introduction and Brief History of SCADA – SCADA Hardware and Software.

TEXT BOOK

1. Introduction to Programmable Logic Controllers, Gary Dunning, Thomson Delmar Learning, Third Edition, 2007.

REFERENCES

1. Programmable Logic Controllers: Principles and Applications, Webb John W , A, Prentice Hall of India, Fifth Edition, 2009

15ECP304	MOBILE COMPUTING	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To build knowledge on various Mobile Computing algorithms.
- To provide application skills in working with Wireless Application Protocols to develop mobile content applications.
- To explore the characteristics of different types of mobile networks on the performance of a pervasive computing system
- To develop applications that are mobile-device specific and demonstrate current practice in mobile computing
- To have knowledge in the comprehension and appreciation of the design and development of context-aware solutions for mobile devices.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.

COURSE OUTCOMES

- Understand fundamentals of wireless communications.
- Know the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks.
- Demonstrate basic skills for cellular networks design.
- Apply knowledge of TCP/IP extensions for mobile and wireless networking.
- Analyze different parameters of wireless communication techniques

UNIT I -Wireless Communication

Introduction – Wireless transmission – Frequencies for radio transmission – Signals – Antennas – Signal Propagation – Multiplexing – Modulations – Cellular Wireless Networks.

UNIT II - Satellite Systems and Broadcast Systems

Introduction – Applications – Basics –Routing –Localization – Handover – Examples – Cyclic repetition of data - Digital audio broadcasting - Digital video broadcasting - Convergence of Broadcasting and mobile

UNIT III - Wireless LAN

Infrared vs. Radio Transmission - Infrastructure and Adhoc Network – IEEE 802.11 – HYPERLAN – Bluetooth.

UNIT IV - Mobile Network Layer

Mobile Network layer - Mobile IP – Dynamic Host Configuration Protocol – Mobile Adhoc Networks.

UNIT V - Mobile Transport Layer

Traditional TCP - Classical TCP Improvements – TCP over 2.5/3G Wireless Networks -3G NETWORKS: Introduction-Principles of WCDMA - UMTS Network Architecture and Protocols.

TEXT BOOK

1. Mobile Computing, Hasan Ahmed , Roopa Yavagal , Asoke K, McGraw Hill Education (India) Private Limited, 2nd Edition, 2011

REFERENCES

1. Mobile communications, Jochen Schiller, Pearson Education, New Delhi, Second Edition, 2008.
2. 3G Networks, Architecture, Protocols and Procedures, SumitKasera and NishitNarang, Tata McGraw Hill Professional networks Series, New Delhi, 2008.

15ECP305A	ANALOG VLSI DESIGN	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To learn the fabrication techniques of Integrated Circuits.
- To know the fundamental rules of layout design.
- To design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout
- Importance of CMOS and Mixed Signal VLSI design in the field of Electronics and Telecommunication
- Underlying methodologies for analysis and design of fundamental CMOS Analog and Mixed signal Circuits like Current and Voltage references, Single stage Amplifiers, Operational Amplifiers, Data Converters
- The issues associated with Mixed Signal VLSI Circuits.

COURSE OUTCOMES

- Realize logic circuits with different design styles.
- Understand working principle of operation of different types of memories.
- Familiarize with the fabrication techniques of Integrated Circuits.
- Design the fundamental blocks of a VLSI circuits, both by circuit schematic and physical layout.
- Express the layout of simple MOS Circuit using Lambda based design rules.
- Design an application using Verilog HDL

UNIT 1 - Device Modeling

Introduction to Analog Design - MOS Device Model- DC, Small Signal and High Frequency Model- Diode Model: DC, Small Signal and High Frequency Model- BJT: DC, Small Signal and High Frequency Model - Measurement of Model Parameters.

UNIT II - Analog Circuit Building Blocks

Switches- Active Resistors- Current Sources and Sinks- Current Mirrors – Simple, Wilson, Cascode- Folded – Cascode - Voltage and Current. References – Band gap Voltage references, Comparators-Multipliers.

UNIT III - Single Stage Amplifiers

MOS and BJT inverting amplifier- Improving the performance of Inverting amplifier - Single stage BJT and MOS amplifiers.

UNIT IV - Multistage Amplifiers

CMOS and BJT differential amplifiers - Darlington Amplifiers - Cascode Amplifiers- Characteristics of Operational amplifiers – Types -Two stage BJT and CMOS - Cascode - Folded Cascode - Transconductance.

UNIT V - Data Converters

Data Converter fundamentals- DAC Architectures- Current Switched-Resistive-Charge redistribution- Hybrid -Segmented D/A Converters - ADC architectures: Flash, Pipeline, Integrating, Successive Approximation and folding A/D Converters - Over sampling Converters

TEXT BOOKS

1. Analog Integrated Circuit Design, David A. Johns, Ken Martin, John Wiley & Sons, Second Edition, 2013.
2. CMOS Circuit Design, Layout and Simulation, Jacob Baker, Harry W.Li and David E Boyce, John Wiley & Sons, Second Edition, 2009.

REFERENCES

1. CMOS Analog Circuit Design, Phillip E. Allen and Douglas R. Holdberg, Oxford University Press, Third Edition, 2013.
2. Design of CMOS Integrated Circuits, Behzad Razavi, Tata McGraw Hill, First Edition, 2008.

15ECP305B	CRYPTOGRAPHY AND NETWORK SECURITY	Semester-III			
		L	T	P	C
		4		-	4

COURSE OBJECTIVES

- To describe and analyze existing authentication protocols.
- To analyze key agreement algorithms to identify their weakness
- To develop knowledge on system level security and misuse of computer security
- Acquire background on well known network security protocols
- Learn fundamentals of cryptography and its application to network security
- Acquire background on hash functions; authentication; firewalls; intrusion• detection techniques

COURSE OUTCOMES

- Understand various Cryptographic Techniques
- Apply various public key cryptography techniques
- Implement Hashing and Digital Signature techniques
- Understand the various Security Applications
- Implement system level security applications
- Understand network security threats, security services, and countermeasures

UNIT I - Introduction

OSI Security Architecture - Classical Encryption Techniques – Cipher Principles – Data Encryption Standard – Block Cipher Design Principles and Modes of Operation -Evaluation Criteria for AES – AES Cipher – Triple DES – Placement of Encryption Function – Traffic Confidentiality

UNIT II - Public Key Cryptography

Key Management – Diffie-Hellman Key Exchange – Elliptic Curve Architecture and Cryptography - Introduction To Number Theory – Confidentiality Using Symmetric Encryption – Public Key Cryptography and RSA.

UNIT III - Authentication and Hash Function

Authentication Requirements – Authentication Functions – Message Authentication Code - Hash Functions – Security of Hash Functions and MAC's – MD5 Message Digest Algorithm - Secure Hash Algorithm – RIPEMD – HMAC Digital Signatures – Authentication Protocols.

UNIT IV - Network Security

Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IP Security – Web Security.

UNIT V - System Level Security

Intrusion Detection – Password Management – Viruses and Related Threats – Virus Counter

TEXT BOOKS

1. Cryptography and Network Security – Principles and Practices, William Stallings, Pearson Education, Sixth Edition, 2013.
2. Cryptography and Network Security, Behrouz A. Foruzan, Tata McGraw-Hill Publications, Second Edition, 2011.

REFERENCES

1. Applied Cryptography, Bruce Schneier, John Wiley & Sons Inc, Second Edition, 2010.
2. Security in Computing, Charles B. P fleeger, Shari Lawrence P fleeger, Pearson Education, Fourth Edition, 2006.

15ECP305C	PRINCIPLES OF ROBOTICS	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To learn the basic configuration of Robotics
- To understand the various types of Robots.
- To get an exposure in Robot control systems
- To acquire the knowledge on advanced algebraic tools for the description of motion
- To develop the ability to analyze and design the motion for articulated systems.
- To develop an ability to use software tools for analysis and design of robotic systems

COURSE OUTCOMES

- Understand the relationship between mechanical structures of industrial robots and their operational workspace characteristics.
- Illustrate the kinematics and dynamics of robotics.
- Implementation of related instrumentation and control in robotics
- Ability to solve inverse kinematics of simple robot manipulators
- Able to do the path planning for a robotic system
- Identify a Robot for a specific application

UNIT I - Introduction and Terminologies

Definition-Classification- History - Robots Components - Degrees of Freedom-Robot Joints- Coordinates- Reference Frames-Workspace-Robot Languages-Actuators-Sensors- Position, Velocity and Acceleration Sensors-Torque Sensors-Tactile and Touch Sensors-Proximity and Range Sensors-Social Issues

UNIT II - Kinematics

Mechanism - Matrix Representation - Homogenous Transformation - Inverse Kinematics-Solution and Programming - Degeneracy and Dexterity

UNIT III - Differential Motion & Velocities

Jacobian - Differential Motion of Frames - Interpretation - Calculation of Jacobian - Inverse Jacobian – Design - Lagrangian Mechanics - Dynamic Equations - Static Force Analysis

UNIT IV - Robot Control System

Sensor Characteristics- Hydraulic, Pneumatic and Electric Actuators - Trajectory Planning-Decentralized PID Control - Non-Linear Decoupling Control

UNIT V - Image Processing & Vision Systems

Two and Three Dimensional Images - Spatial and Frequency Domain Representation - Noise and Edges - Convolution Masks - Processing Techniques – Thersholding - Noise Reduction - Edge Detection-Segmentation - Image Analysis and Object Recognition

TEXT BOOKS

1. Introduction to Robotics: Analysis, Control, Applications, Saeed B. Niku, Wiley India Pvt Ltd, Second Edition, 2012.
2. Introduction to Robotics Mechanics and Control, John J. Craig, Tata McGraw Hill Publishing Company Limited. Third Edition, 2008.

REFERENCES

1. Industrial Robotics: Technology, Programming, and Applications, Mikell P Groover, Tata McGraw Hill Publishing Company Limited, Second Edition, 2012.

15ECP305D	MATLAB AND SIMULINK PROGRAMMING	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To introduce the MATLAB for numerical computations to know the basic concepts.
- To familiarize basic commands through the Command window and output through the Graph window
- Introduce the MATLAB software environment
- Apply a variety of common numeric techniques to solve and visualize engineering-related computational problems
- To program scripts and functions using the Matlab development environment.
- To use basic flow controls (if-else, for, while).

COURSE OUTCOMES

- Understand the concept of time response and frequency response of the system
- Use MATLAB effectively to analyze and visualize data
- Apply numeric techniques and computer simulations to solve engineering-related problems
- Apply a top-down, modular, and systematic approach to design, write, test, and debug sequential MATLAB programs to achieve computational objectives
- Design and document computer programs and analyses in a careful and complete manner so as to effectively communicate results,
- Demonstrate understanding and use of fundamental data structures (classes).

UNIT I

MATLAB Basics – Variables - Arrays - Multidimensional Sub Arrays - Special Values - Displaying Output Data-Data Files- Scalar and Array Operations - Hierarchy of Operations -Built-In MATLAB Functions- Introduction to Plotting- Debugging MATLAB Programs.

UNIT II

Branching Statements - Logical Data type - Vectorization.

UNIT III

User-Defined & I/O Functions-Introduction to MATLAB Functions- Variable Passing in MATLAB-Three Optional Arguments- Sharing Data Using Global Memory- Preserving Data Between Calls to a Function- Sub Functions-Private Functions-Nested Functions- Complex Data- String Functions-Text Read Function-Load And Save Commands- MATLAB File Processing-File Opening and Closing- Binary I/O Functions-Formatted I/O Functions- Comparing Formatted and Binary I/O Function- File Positioning and Status Functions.

UNIT IV

Handle Graphics & GUI - Graphics System-Object Handles-Examining and Changing Object Properties- User-Defined Data- Finding Objects- Selecting Objects -Object Properties-Graphical User Interface Components-Dialog Boxes- Menus.

UNIT V

Simulink Basics: Introduction-Simulink Modeling-Solvers- Simulating Model Using Variables from MATLAB-Data Import/Export - State – Space Modeling & Simulation- Creation of Subsystems-Mass Subsystem.

TEXT BOOKS

1. MATLAB programming for Engineers, Stephen J. Chapman, Cengage Learning Fourth Edition, 2014.
2. MATLAB & its Application in Engineering, Rajkumar Bansal, Ashokkumar Good, Manoj kumar Sharma, Person Education. First Edition, 2010.

REFERENCES

1. MATLAB and Simulink – Introduction to Applications, Partha S.Mallick, Scitech Publications, Fourth Edition, 2011.

15ECP305E	NANO ELECTRONICS	Semester-III			
		L	T	P	C
		4	-	-	4

COURSE OBJECTIVES

- To discuss about the latest technology on nano systems based Nanoelectronics.
- To know the various methods to fabricate and measure Nanoscale features.
- To identify the critical parameters that one must evaluate when considering any new Nanoelectronics device.
- Know the types of nanotechnology, atomic structure, molecular technology and preparation of nano materials
- Understand the fundamentals of nano electronics and its properties.
- Know the Silicon MOSFET's, QTD and carbon nano tubes

COURSE OUTCOMES

- Understand the fundamentals of Nano Electronics and its properties.
- Gain the concepts of quantum theory.
- Understand the latest technology on nano systems based Nano electronics
- Identify the various methods to fabricate and measure Nanoscale features.
- Evaluate the critical parameters when considering any new Nano electronics device.
- Understand the applications of Nano Electronics

UNIT I - Introduction

The Development of Microelectronics – The Region of Nanoelectronics - The Complexity Problem – The Challenge Initiated by Nanoelectronics. Basics of Nanoelectronics: Electromagnetic Fields and Photons – Quantization of Action, Charge, and Flux – Electrons Behaving as Waves – Electrons in Potential Wells – Diffusion Process.

UNIT II - Biochemical and Quantum-Mechanical Computers

DNA Computer – Information Processing with Chemical Reactions – Nanomachines – Parallel Processing - Quantum Computers – Bit and Q bit – Coherence and Entanglement – Quantum Parallelism.

UNIT III - Parallel Architectures for Nanosystems

Mono and Multiprocessor Systems – Some Considerations to Parallel Processing – Influence of Delay Time – Power Dissipation - Architecture for Processing in Nanosystems: Classic Systolic Arrays – Processor with Large Memory – Processor Array with SIMD and PIP Architectures.

UNIT IV - Soft Computing and Nanoelectronics

Methods of Soft Computing – Fuzzy Systems – Evolutionary Algorithms – Connectionist Systems – Computationally Intelligent Systems – Characteristics of Neural Networks in Nanoelectronics - Local Processing – Distributed and Fault-Tolerant Storage – Self-Organization.

UNIT V - Nanosystems as Information Processing Machines

Nanosystems as Functional Machines – Information Processing as Information Modification – System Design and its Interfaces – Requirements of Nanosystems - Uncertainties: Removal of Uncertainties by Nanomachines – Uncertainties in Nanosystems – Uncertainties in the development of Nanoelectronics.

TEXT BOOK

1. Basics of Nano Electronics, G. P. Singh, Animol Publications Pvt. Ltd., First Edition, 2011

REFERENCES

1. Nanoelectronics and Nanosystems: From Transistors to Molecular and Quantum devices, Karl Goser Springer, New Delhi, First Edition, 2005.

15ECP311	PRACTICAL – V DIGITAL SIGNAL PROCESSING LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To implement Linear and Circular Convolution
- To implement FIR and IIR filters
- Familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.
- Aware about implications of the properties of systems and signals
- To design FIR filters and IIR Filters
- Analyze discrete-time filter banks and multi-rate signal processing system

COURSE OUTCOMES

- Analyze the CMOS layout levels, how the design layers are used in the process sequence, and
- Understand the handling of discrete/digital signals using MATLAB
- Understand the basic operations of Signal processing
- Analyze the spectral parameter of window functions
- Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters
- Design the signal processing algorithm using MATLAB

(Any 10 Experiments)

USING TMS320C5X/TMS320C54XX/TMS320C67XX/MATLAB

1. Study of addressing Modes of DSP using simple examples
2. Arithmetic operations
3. DFT computations
4. FFT Computations
5. Convolution of two discrete signals
6. Correlation of two discrete signals
7. Quantization noise
8. Waveform generation
9. FIR Filter design
10. IIR filter design
11. Discrete Cosine Transform
12. Kalman filter

15ECP312	PRACTICAL – VI DIGITAL IMAGE PROCESSING LAB	Semester-III			
		L	T	P	C
		-	-	4	2

COURSE OBJECTIVES

- To get an exposure on Discrete Fourier Transforms (DFT), its applications and implementation by FFT techniques.
- To understand the fundamental concepts and theory of Discrete Fourier Series and Discrete Fourier Transform.
- To acquire the fundamental concepts of a digital image processing system
- To identify and exploit analogies between the mathematical tools.
- To design and implement with MATLAB algorithms for digital image process.
- To treat the 2D systems as an extension of 1D system design
- Discuss techniques specific to 2D system

COURSE OUTCOMES

- Understand the need for image transforms different types of image transforms and their properties.
- Develop any image processing application.
- Learn different techniques employed for the enhancement of images.
- Learn different causes for image degradation and overview of image restoration techniques.
- Understand the need for image compression and to learn the spatial and frequency
- Apply design techniques for FIR type digital filters

(Any 10 Experiments)

1. Generation of Signals
2. Amplitude Modulation & FFT response
3. Impulse, Step, Exponential & Ramp functions
4. Frequency sampling method
5. Image Sampling – Zooming & Shrinking Operations
6. Basic Gray Level Transformations: Image Negative, Power law and log transforms
7. 2-D Discrete Fourier Transform
8. Walsh Transform
9. Image Contrast Enhancement by Histogram Equalization Technique
10. Spatial Image Filtering: Low pass and high pass filtering
11. 2-D Wavelet Transform
12. Image Compression.

15ECP306	ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS	Semester-III			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To develop an in-depth knowledge on IC fabrication technology
- To understand the basic concepts of operational amplifier and its various applications
- To understand the basics of PLL and its practical applications
- To know about analog multipliers
- To know about various analog switches and different A/D and D/A convertors
- To understand the concepts of switched capacitor filters, Voltage regulator and various amplifiers

COURSE OUTCOMES

- Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve engineering problems
- Develop skills to design simple circuits using OP-AMP
- Gain knowledge about various multiplier circuits, modulators and demodulators
- Gain knowledge about PL
- Learn about various techniques to develop A/D and D/A convertors
- Develop skills to develop simple filter circuits and various amplifiers and can solve problems related to it.

UNIT I - Single Stage Amplifiers

Common Source Stage-Source Follower-Common Gate Stage-Cascade Stage-Single Ended and Differential Operation-Basic Differential Pair-Differential Pair with MOS Loads.

UNIT II - Frequency Response and Noise Analysis

Miller Effect - Association of Poles With Nodes - Frequency Response of Common Source Stage - Source Followers - Common Gate Stage - Cascode Stage - Differential Pair - Statistical Characteristics of Noise - Noise in Single Stage Amplifiers - Noise in Differential Amplifiers.

UNIT III - Operational Amplifiers

Concept of Negative Feedback- Effect of Loading in Feedback Networks-Operational Amplifier Performance Parameters- One-Stage Op Amps- Two-Stage Op Amps- Input Range Limitations-Gain Boosting- Slew Rate- Power Supply Rejection- Noise in Op Amp's.

UNIT IV - Stability and Frequency Compensation

General Considerations- Multipole Systems - Phase Margin - Frequency Compensation - Compensation of Two Stage Op-Amps - Slewing In Two Stage Op- Amps - Other Compensation Techniques.

UNIT V - Biasing Circuits

Basic Current Mirrors- Cascode Current Mirrors- Active Current Mirrors- Voltage References- Supply Independent Biasing- Temperature Independent References- PTAT Current Generation- Constant-Gm Biasing.

TEXT BOOK

1. Analysis and Design of Analog Integrated Circuits, Paul R. Gray, Paul J. Hurst, Stephen H. Lewis, Robert G. Meyer, Wiley India Pvt Ltd, Fifth Edition, 2010.

REFERENCES

1. Analog Integrated Circuit Design, David A. Johns, Ken Martin, John Wiley & Sons, Second Edition, 2013.
2. CMOS Circuit Design, Layout and Simulation, Jacob Baker, Harry W.Li and David E Boyce, John Wiley & Sons, Second Edition, 2009.

15ECP401	HIGH PERFORMANCE COMMUNICATION NETWORKS	Semester-III			
		L	T	P	C
		-	-	-	4

COURSE OBJECTIVES

- To develop a comprehensive understanding of multimedia networking.
- To know the various types of Networks.
- To provide strong knowledge in ultra wideband networks and other types of UWB.
- To have knowledge on broadband networks, ATM networks and high performance networks.
- Understand the overview of Communication Networks, Network Services and layered Architecture.
- Understand the ATM and Wireless Networks.

COURSE OUTCOMES

- Know the communication networks principles and future networks.
- Know the network services and layered architectures.
- Explain the wireless networks, Internet and different protocols.
- Understand the circuit switched networks and ATM.
- Apply the concepts of Random Process to the design of Communication systems
- Gain knowledge in sampling and quantization

UNIT I - Introduction

Networking Principles - Digitalization Service and Layered Architecture - Traffic Characterization and QOS - Network Services - Network Elements - Network Monitoring - Network Control-Network Mechanisms - Network Element Management

UNIT II - Broadband Networks

Introduction – Multi-hop Wireless Broadband Networks-Mesh Networks - Importance of Routing Protocols - Routing Metrics - Packet Scheduling-Admission Control - Classification of Routing - Protocols - MANET Routing Protocols .

UNIT III - IP Networks

Technology Trends in IP Networks- Internet Protocol- IP Packet Communications in Mobile Communication Networks -TCP and VDP- Performance of TCP/IP Networks- Circuits Switched Networks- SONET-DWDM-DSL-Intelligent Network (IN) Scheme-Comparison with Conventional Systems -Merits of the IN Scheme -CATV.

UNIT IV - ATM Networks

Introduction to ATM- Reference Model - ATM Layer- ATM Adaptation Layer (AAL) - AAL1 - AAL2 - AAL3/4 - AAL5 -Traffic Classes - Traffic Management and Quality of Service - Traffic Descriptor - Traffic Shaping-ABR and Traffic Congestion -Network Management - Layer Management- ATM Signaling-ATM Addressing Format-Connection Establishment - IP/ATM

Internetworking - IP Multicast over ATM

UNIT V - High Performance Networking With WIMAX and Ultra Wideband (WPAN)

Introduction - WIMAX Overview - Competing Technologies - Overview of The Physical Layer - PMP Mode - Mesh Mode -Multihop Relay Mode- Introduction- Time-Hopping Ultra wideband - Direct Sequence Ultra wideband – Multiband- Other Types Of UWB.

TEXT BOOK

1. High Performance Communication Networks, Jean warland and Pravin Varaiya, , Morgan Kanffman Publishers, London, 2nd Edition ,2010.

REFERENCES

1. ATM Networks, Sumit Kasera and Pankaj Sethi, Tata McGraw Hill Publications, Second Edition, 2005.

பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
(முதல்பருவம்)
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes)

15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

- Learn to reflect on the literary works and communicate flexibly.
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Text Book

Rao, G. Chandralekha and et al. 2013, *Spring*, Emerald Publishers: Chennai.

Reference

Syamala, V, 2006, English for Communication., Emerald Publishers: Chennai

Course Objectives (CO)

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming logic.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To understand memory allocation concepts through pointers
- To teach the issues in file organization and the usage of file systems

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Gain experience about structured programming
2. Develop efficient algorithms for solving a problem.
3. Use the various constructs of a programming language viz. conditional, iteration and recursion.
4. Implement the algorithms in C” language.
5. Use simple data structures like arrays, stacks and linked list in solving problems.
6. Handle file in C.

UNIT-I

Computer Concepts and Problem Solving: Computer Fundamentals: Definition, Block diagram along with computer components, Characteristics & classification of computers, Hardware & software, Types of software, Firmware.

Introduction to Computer based Problem Solving- Problem definition – Problem Solving- goals and objectives – problem identification and definitions. Algorithms for Problem definition – Program design and Implementation issues. Programming Environment – Computer Programming Languages – Types of Programming Languages – Compilers – interpreters.

UNIT-II

Introduction to C: Introduction - An Overview of C – Keywords and Identifier – Variables - Declarations of Variables - User Defined Type Declarations - Typedef – Enum - Constants – Data Types – Operators – Expressions - C Formatted I/O Operations. Decision Making and Branching Statements – Decision Making and Looping Statements - Arrays-Strings - String Handling Functions.

UNIT-III

Functions, Structures and Union: Functions - Introduction - Definition of Functions - Function Declaration - Category of Functions - Nesting of Functions – Recursion - Passing Arrays to Function. Storage Classes – Auto-extern-static-register. Structures and Unions – Introduction - Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Arrays of Structure – Unions.

UNIT-IV

Pointers: Pointers – Introduction – Declaring Pointer Variables - Pointer and Arrays - Pointers and Strings – Array of Pointers - Functions and Pointers - Function Returning Pointers -Pointers to functions - Pointers and Structures

UNIT-V

File Management : File Management in C – Introduction - Opening a File - Closing a file – Input/output operations on files - Error handling during I/O Operations - Random Access to Files - Command Line Arguments - Dynamic Memory Allocation

Text Books

Ashok N. Kamthane, 2013, ITL Education Solutions Limited, C Programming, 1st Edition, Pearson education, New Delhi. [Page Nos.: 1-18, 29-37,259-261,269-282,291-310,317-334,341-365,373-404,415-452,467-473,481-500,519-540,551-559,581-597, 617-631,673-719]

Balagurusamy .E, 2007, Programming in ANSI C, 4th Edition, Tata McGraw Hill Publishers, New Delhi.[Unit – I (23-81), Unit – II (114-259), Unit – III (262-348), Unit – IV (351-388), Unit – V (389-442)]

Balagurusamy .E, 2012, Programming in ANSI C, 6th Edition, Tata McGraw Hill Publishers, New Delhi.

References

Vikas Gupta, 2009, Computer Concepts and C Programming, Dream tech Press, Wiley India.

Ashok N. Kamthane, 2004, Programming with ANSI and Turbo, 1st Edition, Pearson education, New Delhi.[Unit – I (7-60), Unit – II (63-277), Unit – III (318-446), Unit – IV (281-315), Unit – V (451-525)]

Yeswanth Kanetkar, 2007, Let Us C, 8th Edition, BPB Publications, New Delhi. [Unit – I (1-39,489-513), Unit – II (49-312,335-362), Unit – III (155-392), Unit – IV (155-198), Unit – V (423-462)]

Web Sites

<http://www.cs.cf.ac.uk/Dave/C/CE.html>

<http://www2.its.strath.ac.uk/courses/c/>

<http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Course Objectives (CO)

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming logic
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To understand memory allocation concepts through pointers
- To teach the issues in file organization and the usage of file systems

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Gain experience about structured programming
 2. Develop efficient algorithms for solving a problem.
 3. Use the various constructs of a programming language viz. conditional, iteration and recursion.
 4. Implement the algorithms in C language.
 5. Use simple data structures like arrays, stacks and linked list in solving problems.
 6. Handle file in C.
-
1. Write a C program to find the area of a circle using the formula.
Area = $PI * r^2$
 2. Write a C program to convert decimal to binary.
 3. Write a program to print Multiplication table using for and Do While Loops
 4. Write a program to find the roots of quadratic equation
 5. Write a program to find Maximum number without using arrays
 6. Write a C program to arrange the accepted numbers in ascending order and descending order.
 7. Write a program to calculate SIN(x) without using library function
 8. Write a program
 - (i) to find the length of a string
 - (ii) concatenation of two strings
 9. Write a program to reverse the given string
 10. Write a program to check the given string is palindrome or not
 11. Write a program to perform matrix multiplication
 12. Using any one sorting method to sort given 'n' numbers using pointers.

13. Write a program to prepare an employee pay slip using structures
14. Write a program for Electricity Bill Preparation using files
15. Write a program for the Odd and even numbers are stored in separate files the original files.

Course Objectives (CO)

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D & D/A Converters and its Applications.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. learn about Cache memory and its importance
6. Solve the binary arithmetic problems and conversion among the number systems

UNIT I – Number System and Codes

Introduction to Digital concepts – Number Systems: Decimal, Binary, Octal and Hexadecimal Numbers – Conversion – 1's and 2's Complements of Binary Numbers – Binary Arithmetic with Signed and Unsigned Numbers – Codes: Binary Coded Decimal (BCD) — Excess-3 – Gray Code — ASCII Codes — Error Detection and Correction Codes.

UNIT II – Logic Gates and Boolean Algebra

Introduction to Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates. Boolean Logic and Expression, Laws and Rules of Boolean Algebra, DeMorgan's Theorem – Simplification using Boolean Algebra – Karnaugh Map.

UNIT III – Combinational Logic Circuits

Basic overview of Logic functions – Basic Adders & Subtractor – Parallel Binary Adder – 4-bit Binary Adder/Subtractor – Comparators – Encoders and Decoders – Code Converters – Multiplexers and Demultiplexers — Parity Generators/Checkers.

UNIT IV – Sequential Logic Circuits

Flip-flops: RS – Clocked RS – Edge-triggered RS, D, and JK – JK Master-Slave flip flops – Registers and its Types – SISO, SIPO, PISO, PIPO – Shift Registers and its Types – Ring Counters – Asynchronous and Synchronous Counter – UP/DOWN Counter- Ring Counter.

UNIT V – D/A, A/D Converters

Digital to Analog converters: Resistor Networks – Binary Ladder – Analog to Digital converters: Counter type – Ramp type – Successive Approximation Type.

Text Books

Salilvahanan, 2014, Digital Electronics and its Principles, Seventh Edition, Tata McGraw Hill.

Albert Paul Malvino, Donald P. Leach and Goutam Saha, 2010, Digital Principles and Application, Seventh Edition, Tata McGraw Hill.

Morris Mano, 2013, Digital Design: With an Introduction to Verilog HDL, Fifth Edition, Pearson Education.

References

Jain R.P, 2012, Modern Digital Electronics, Fourth Edition, Tata McGraw Hill Company.

Botkar K.R, 2008, Integrated Circuits, Fourth Edition, Khanna Publications.

(Any 8 Experiments)**Course Objectives (CO)**

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D & D/A Converters and its Applications.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. learn about Cache memory and its importance
6. Solve the binary arithmetic problems and conversion among the number systems

1. Verification of basic gates
2. Realization of Logic Gates Using Universal Gates
3. Adder using Gates
4. Subtractor using Gates.
5. Multiplexer
6. Demultiplexer
7. Encoder
8. Decoder
9. Study of Flip-flops
10. Binary to Gray and Gray to Binary Converter

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives (CO)

- To teach and inculcate the importance of value based living and sustainable lifestyle.
- To give students a deeper understanding about the purpose of life.
- To teach and inculcate the essential qualities to become a good leader.
- To be responsible citizens with clear conviction to practice values and ethics in life.
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Students will understand the importance of value-based living.
2. Students will gain deeper understanding about the purpose of their life.
3. Students will understand and start applying the essential steps to become good leaders.
4. Students will emerge as responsible citizens with clear conviction to practice values and ethics in life.
5. Students will become value-based professionals
6. Students will contribute in building a healthy nation

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

15SSD101	Soft Skill Development - I	Semester-I
		L T P C
		2 0 0 0

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

□ □ □ □ □ □ □ □ □ □ □ □ □ □

(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

(For I-UG Science Degree Classes)

15LSU201

பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஐந்தாம் வகுப்பு மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

- [illegible]

பகுதி - I, தமிழ்

15LAU201 :

தமிழ் இரண்டாம் தாள்

பருவம் II

5-H,5-C

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

- நற்றிணை. 1. இலை இல பிடவம், திணை - முல்லை,
ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.
2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

- குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.
2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

- ஐங்குறுநூறு : 1. நுண்ணேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.
2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21, India

Course Objectives (CO)

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcome (COs)

After the completion of this course, a successful student will be able to:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Text Book

Board of Directors, 2014, Wings of Communication, Emerald Publishers: Chennai

Reference

Syamala, V, 2006, English for Communication, Emerald Publishers: Chennai.

15CTU201	Object Oriented Programming with C++	Semester – II			
		L	T	P	C
		5	0	0	5

Course Objectives (CO)

- To understand how C models ++ improves C with object-oriented feature.
- To learn how transpose the physical problem domain into a hierarchy of objects.
- To learn the syntax and semantics of classes in C++ programming language.
- Objects, their behaviors, and their relationships, will be modeled and these will be programmed into a functional application that the student will compile, modify, enhance and run.
- The student will program in a structured style whereby reinforcing the concepts of software quality, reliability and maintainability.
- To learn file handling in C++.

Course Outcomes (COs)

After completion of this course the students will be able to :

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Understand how to manage console I/O operations.
6. Use the concepts of preprocessor directives and macros.

UNIT – I

Introduction: Principles of object oriented programming: Basic concepts of object oriented programming – Benefits of OOP – Applications of OOPs – Structure of C++ Program C++ Tokens – Control Statement – Decision Making Statements- Loop Statements - Inline Functions – Function Overloading.

UNIT – II

Control Structure, Functions and Constructors: Classes and Objects: Specifying a class – Creating Objects – Accessing Class Members – Defining Member Functions – Static Data Members – Static Member Functions - Array of Objects – Friend Functions. Constructors and Destructors:- Constructors – Parameterized Constructors - Multiple Constructors in a Class – Constructors with Default Arguments - Copy Constructor - Dynamic Constructor – Destructors.

UNIT – III

Operator Overloading and Inheritance: Operator overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. Inheritance :- Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

UNIT – IV

Pointers and I/O Operations: Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual functions- Pure Virtual Functions. Managing console I/O operations :- C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

UNIT – V

File Management: Files: Classes for file stream operations – Opening and Closing a file – sequential input and output operations – updating a file random access – Command Line Arguments. Templates and Exceptions:- Templates – class templates – function templates – member function templates – exception handling.

Text Books

K.R.Venugopal and Rajkumar Buyya, 2013, Mastering C++, 2nd Edition, Tata Mc Graw Hill Education, New Delhi.

Balagurusamy. E, 2007, Object Oriented Programming with C++, 3rd Edition, Tata McGraw Hill publishing company Ltd, New Delhi. [Unit-I(7-14, 26 – 27, 32-52, 59- 82), Unit-II(88-147), Unit-III(151-207), Unit-IV(222-270),Unit V(277-340)].

Balagurusamy. E, 2013, Object Oriented Programming with C++, 6th Edition, Tata McGraw Hill publishing company Ltd, New Delhi.

References

Yashavant Kanetkar, 2000, Let Us C++, 2nd Edition, BPB Publications. [Unit-I(2-13, 19-80), Unit-II(87-96,177-182), Unit-III(187-197,261-304), Unit-IV(321-360),Unit V(385-463,540-566,571-586)].

Nabajyothi Barkakoti, 2001, OOPS in C++, 2nd Edition, Tata McGraw Hill Publishers. [Unit-I(3-39), Unit-II(161-179,189-206), Unit-III(209-223,231-254), Unit-IV(277-289),Unit V(295-325)].

Pearl software, 2002, OOP in C++, First Edition, Khanna Book Publishing co(p) Ltd. Delhi. [Unit-I(1-67,83-92), Unit-II(185-220,223-237), Unit-III(241-247,251-265,293-307), Unit-IV(269-289),Unit V(309-319,321-333,337-345,347-369)].

Web Sites

www.daniweb.com
www.eships.com
www.allexperts.com

Course Objectives (CO)

- To understand how C models ++ improves C with object-oriented feature.
- To learn how transpose the physical problem domain into a hierarchy of objects.
- To learn the syntax and semantics of classes in C++ programming language.
- Objects, their behaviors, and their relationships, will be modeled and these will be programmed into a functional application that the student will compile, modify, enhance and run.
- The student will program in a structured style whereby reinforcing the concepts of software quality, reliability and maintainability.
- To learn file handling in C++.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Understand how to manage console I/O operations.
6. Use the concepts of preprocessor directives and macros.

Write a C++ Program for the Following Concepts

Object and classes:

1. Create a class to implement the data structure STACK . Write a constructor to initialize the top of the stack to zero .Write a member function PUSH() to insert an element and a member function POP() to delete an element.
2. Create a class ARITH which consists of a FLOAT and an INTEGER variable. Write member functions ADD(),SUB(),MUL(),DIV(),MOD() to perform addition, subtraction, multiplication, division and modulus respectively. Write member functions to get and display MAT() object values.

Operator overloading:

3. Create a class MAT as a 2D matrix and R, C represents rows and columns of the matrix. Overload the operators +,-,* to add, subtract, multiply two matrices. Write member functions to get and display MAT() object values.
4. Create a class STRING. Write member functions to initialize to get and display strings. Overload the operator + to concatenate two strings, == to compare two strings and a member function to find the length of the strings.

Inheritance:

5. Create a class which consist of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and Write member functions to calculate da , hra, pf depending on the grade and display the pay slip in a neat format using console I/O.

6. Create a class SHAPE which consist of two virtual functions cal_Area() and cal_Peri() to calculate area & perimeter of various figures. Derive three classes SQUARE, RECTANGLE and TRIANGLE from the class SHAPE and calculate area and perimeter of each class separately and display the result.
7. Create two classes which consist of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a FRIEND function common to both classes which takes the object of the above two classes as arguments and the integer and float values of both the objects separately and display the result.

Console I/O:

8. Write a user-defined function USERFUN() which has the formatting commands like setw(), showpos(), precision(). Write a program which prints a multiplication table and uses userfun() for formatting.

Files:

9. Write a program to perform insertion, deletion and updation of records using files.
10. Write a program which takes a file as argument and copies into another file with line numbers using command line arguments.

Templates:

11. Write a Program to swap the numbers using the concept of function template.

Course Objectives (CO)

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Ability to write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

UNIT I – 8051 Microcontroller

Introduction to Microcontroller and Embedded Processors – Microcontroller for Embedded Systems – Overview of 8051 Family – 8051 Architecture – 8051 flag bits and PSW Register - Register Bank and Stack.

UNIT II –8051 Programming

8051 Assembly and C Programming – Instruction Set –Address Modes - Loop and Jump Instructions - Arithmetic Instruction - Logic Instructions - Single Bit Instructions. Data Types and Directives - I/O Port Programming.

UNIT III – Internal Peripherals of 8051

Basic Registers of Timer - Programming 8051 Timer-Counter Programming – Basics of Serial Communication – 8051 Connection to RS232 - 8051 Serial Communication Programming – 8051 Interrupts - Programming External Hardware Interrupts.

UNIT IV – Applications

Interfacing LCD to the 8051 – Interfacing ADC – Sensors to 8051- Interfacing Stepper Motor - 8051 Interfacing to the Keyboard - Interfacing DAC to the 8051.

UNIT V – Real-Time Operating System

Survey of Software Architecture: Round Robin-Round Robin with Interrupts-Function – Queue Scheduling Architecture - Introduction of RTOS - RTOS Architecture -Task and Task

States - Task and Data - Semaphores and Shared Data - Message Queues, Mailboxes and Pipes - Timer Function – Events - Memory Management.

Text Books

Mohammed Ali Mazidi and Janice Gillispie Mazidi , 2008, The 8051 Microcontroller and Embedded Systems, 3rd edition, Pearson Education, Singapore.

Ayala. 2010. The 8051 Architecture and its Applications, Sixth Edition, Prentice Hall of India, New Delhi.

References

Embedded Microcontroller, 2008, Intel Manual – Volume I and II.

Dr. Rajiv Kapadia, 2004, The 8051 Microcontroller and Embedded Systems, First Edition, Jaico, Publishing House, Mumbai.

15CTU202B	Allied Elective I - PC hardware and Trouble shooting	Semester II			
		L	T	P	C
		4	0	0	4

Course Objectives (CO)

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Learn the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

UNIT I – Micro Computer System

Introduction to Micro Computer System – Computer Organization – Number Systems and Codes Memory – Arithmetic and Logic Unit – Control Unit.

UNIT II – Peripheral Devices

Introduction to Peripheral Devices – Keyboard – CRT Display monitor – Printer – Magnetic Storage Devices – Floppy Disk Drive – Hard Disk Drive – Peripherals Interfaces and Controller – Keyboard Interface

UNIT III – Display Adapter

CRT Display — CRT Controller –Auxiliary Subsystems – Data Communication fundamentals – Serial Port in PC – Real time clock (RTC) – Magnetic Tape Subsystems – LAN – Memory Expansion Options

UNIT IV – Installation and Preventive Maintenance

Pre Installation Planning – Installation Practice – Routine Checks – Special Configurations – Memory Up Gradation

UNIT V – Trouble shooting

Troubleshooting – Computer faults – Nature of faults – Types of Faults Diagnostic Programs and Tools — Faults in Elimination Process – Systematic Troubleshooting – POST (Power on Self Test)

Text Books

B. Govindarajalu, 2011, IBM PC and Clones, Second Edition, Tata McGraw Hill Publishing Company.

Michael Meyers, 2003, Introduction to PC Hardware and Troubleshooting, First Edition , The Mike Meyers' Computer Skills, McGraw Hill.

Reference

Sanjay K. Bose , 1999, Hardware and Software of Personal Computers, New Age International Publishers.

				Semester II
				L T P C
15CTU202C	Allied Elective I – Microprocessor and its Application			4 0 0 4

Course Objectives (CO)

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

UNIT I – Introduction to 8-bit Microprocessor

Introduction to 8085 – Pin Diagram –Architecture – Demultiplexing the Bus –Generation of Control Signals – Fetching, Decoding and Execution of Instruction – Instruction Timing and Status Flag.

UNIT II – Addressing Modes

Instruction Set – Addressing Modes – Instruction Format – Simple Program – Memory Read Machine Cycle – Memory Unit s Machine Cycle.

UNIT III- Interfacing Concepts

Peripheral I/O Instructions – Device Selection And Data transfer – Types of Data Transfer - Input Interfacing – Input Interfacing Using Decoders – Output Interfacing: LED and 7 Segment Display – Interfacing Memory.

UNIT IV Peripheral Devices

Introduction to Programmable Peripheral Interface 8255 – Pin Diagram –Architecture – Modes of Operation: I/O and BSR – Architecture and Operation of 8251(USART). Architecture and Operation of Programmable Interrupt Controller (8259) – Architecture of 8254(8253) Programmable Interval Timer/Counter –DMA Controller(8279).

UNIT V- Applications

Time Delay Program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC –Interfacing ADC – Temperature Measurement.

Text Books

Ramesh S Gaonkar, 2000, Microprocessor Architecture, Programming and Application with 8085, Fourth Edition , Penram International Publishing, New Delhi.

M.K.Gupta, 2006, Microprocessor, Microcomputer, Microcontroller and Interfacing, First Edition, Paragon International Publisher, New Delhi.

References

Adithya P.Mathur, 2004, Introduction to Microprocessors, Second Edition, Tata Mc Graw Hill Publishers, New Delhi.

Ram.B, 2000, Fundamentals of Microprocessor and Microcontroller, Second Edition, Dhanpat Rai Publication, Mumbai.

		Semester II
		L T P C
15CTU212A	Allied Elective Practical I Embedded Systems Lab	0 0 3 2

Course Objectives (CO)

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

(Any 8 Experiments)

1. Addition of 8/16 Bit Array of Data
2. Subtract of 8/16 Bit Array of Data
3. Multiplication & Division
4. Ones and Two's Compliment
5. Data Transfer using Parallel Port
6. Sorting of Numbers
7. Stepper Motor Interface
8. Wave Form Generation
9. Biggest and Smallest Number in an Array
10. D/A Converter

15CTU212B	Allied Elective Practical I PC Hardware Trouble Shooting Lab	Semester II L T P C 0 0 3 2
------------------	---	--

Course Objectives (CO)

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Learn the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

(Any 8 Experiments)

1. Identifying External Ports and Interfacing
2. Identifying PC cards and Interfacing.
3. Assembling of PC
4. Preventive Maintenance of a PC
5. Trouble Shooting of SMPS
6. Keyboard Servicing
7. Study of CRT
8. Communication and Bus Interfacing
9. Partitioning and Formatting Hard disks.
10. Installing System And Application Software

Course Objectives (CO)

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

(Any 8 Experiments)

MICROPROCESSOR LAB

1. Addition of 8/16-bit and Array of Data
2. Subtraction of 8/16-Bit Number
3. Multiplication of 8-Bit Number
4. Division of 8-bit Number
5. Fill and Transfer an Array of Data.
6. Ascending and Descending of an Array.
7. Data Transfer using Parallel Ports.
8. Stepper Motor Interface
9. Traffic Light Controller
10. A/D Convertor and D/A Convertor

15FCB201

**FOUNDATION COURSE - B
ENVIRONMENTAL STUDIES**

2H - 1C

Total hours/week: L:2 T:0 P:0**Marks: Internal: 100 External: -****Total:100****Course Objectives (CO)**

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabililisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
 2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
 3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
 4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
 5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.
-

Semester – II

15SSD101	Soft Skill Development – I	L T P C
		2 0 0 1
Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100		

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Course Objectives (CO)

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcome (COs)

After the completion of this course, a successful student will be able to:

- Learn the basics and purposes of listening skill.
- Understand importance of speaking.
- Develop the speaking skills on telephone, business and also in travel
- Learnt some effective vocabulary learning strategies.
- Communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

References

Kenneth Anderson , Language in Use, Cambridge University Press.

Kenneth Anderson, Joan MacLean and Tony Lynch, 2008, Study Speaking: A course in Spoken English for Academic Purpose, Cambridge University Press.

Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.

Dr. J. John Love Joy, Dr.Francis M.Peter S.J., 2007, Lets Communicate – Basic English for Everyone, 1st edition, Vaigarai Publications, Dindugul.

15CTU301	Algorithm Analysis and Data Structures	Semester – III L T P C 5 0 0 5			
----------	--	--------------------------------------	--	--	--

Course Objectives (CO)

- To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- To choose the appropriate data structure and algorithm design method for a specified application.
- To study the systematic way of solving problems, various methods of organizing large amounts of data.
- To employ the different data structures to find the solutions for specific problems.
- To solve problems using data structures such as linear lists, stacks, queues.
- To understand the usage of Tree and Binary tree and search operations.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. To design and apply appropriate data structures for solving computing problems
4. To analyze algorithms and to determine algorithm correctness and time efficiency class.
5. Use linear and non-linear data structures like stacks, queues, linked list etc.
6. Illustrate various technique to for searching and Sorting

UNIT-I

Analysis of Algorithms : Introduction to Data Structures: Introduction to the Theory of Data Structures Data Representation-Abstract Data Types-Data Types-Primitive Data Types-Difference between Abstract Data Types, Data Types, Data Structures.

Analysis of Algorithms: Introduction – Best, Worst and Average Cases - Asymptotic analysis – Upper bounds – Lower bounds - Notations , Simplified rules –Classifying functions – Calculating running time of a program – Analyzing problems..

UNIT-II

Arrays and Linked Lists: Arrays: Introduction to Linear and Non-linear Data Structures-Arrays in C- One Dimensional Arrays-Array Operations-Two Dimensional Arrays-Multi Dimensional Arrays-Pointers and Arrays. Linked List: Introduction to Lists and Linked Lists-Dynamic Memory Allocation-Basic Operations-Double Linked Lists-Circular Linked Lists-Linked List in arrays-Linked Lists versus Arrays.

Polynomials and Sparse Matrix: Introduction-Representation of Polynomials.

UNIT- III

Stack and Queues: Stack: Introduction- Representation of Stack using Arrays and Linked List-Applications of Stack-Stack and Recursion.

Queues: Introduction- Representation of Queue-Circular Queue-Double Ended Queue-Priority Queue-Application of Queue.

UNIT-IV

Searching and Trees: Searching: Introduction-Sequential Search-Binary Search -Indexed Sequential Search. Trees: Introduction-Types-Basic Definition-Properties-Representation-Operation on Binary Tree – Application of Binary Trees – Recursive Traversal of Binary Tree.

UNIT-V

Graphs and Sorting: Graphs: Introduction-Sequential Representation-Linked Representation-Traversal of Graphs-Spanning Trees-Shortest Path. Sorting: Introduction – Selection Sort – Insertion sort – Bubble- Quick- Merge- Radix-Shell- Heap-Comparison of Time Complexity

Text Books

ISRD GROUP, 2013, Data Structures Using C, 2nd Edition, [Unit-I(1-26), Unit-II(27-99), Unit III(129-206), Unit IV(210-248, 255-284, 340-344), Unit V(348-370, 308-339)].

Clifford A. Shaffer, 2012, Data Structures and Algorithm Analysis, 3rd Edition, Dover Publications.

References

Krishnamoorthy, 2008, Data Structures Using C, Tata McGraw Hill Publishing Company Limited, New Delhi.

Kruse R, 2007, Data Structures & Program Design In C, 2nd Edition, Prentice-Hall of India, New Delhi.

Muniswamy, 2007, C & Data Structures, I.K. International Publishing House.

Seymour Lipschutz and G.A.Vijayalakshmi Pai, 2007, Data Structures, Schaum's Outlines, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Tanenbaum A M, 2007, Data Structures Using C, Prentice-Hall of India Pvt Ltd, New Delhi.

Web Sites

www.gatesit.org/gitdownloads/C&DS.pdf

		Semester – III
		L T P C
15CTU302	Relational Database Management System	5 0 0 5

Course Outcomes (COs)

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- Ability to use PL/SQL
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
- To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
3. Create and populate a RDBMS for a real-life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6. Build indexing mechanisms for efficient retrieval of information from a database

UNIT - I

Understanding Database Fundamentals: Origin of Database – Database elements – Design concepts – components of DBMS – Advantages and Disadvantages of DBMS. Database Models: Flat-file-hierarchical model – network model – relational model – object oriented model – Features of Object oriented Database Management system – Features of distributed DBMS – Comparison of DBMS & DDBMS - Object relational model. ER-model: entities – relationships – ERD symbols – cardinalities – sample ERD.

UNIT – II

Entities and Entity Relationships: Relational Model: Introduction – Relational database: attributes and domains – Tuples – Relation and their schemes – Relation representation – keys – relationships – relational operations – Integrity rules. Relational Algebra: Basic operations – Additional relational algebraic operations – some Relational algebra queries. Functional dependency: Reasoning about FD's – closure of set of FD's – Attribute closure.

UNIT – III

Objects: Relational database manipulation: Introduction – SQL: Data definition – Data manipulation: Basic data retrieval – condition specification – Arithmetic and aggregate

operations. SQL joins – Set manipulation – categorization – updates – views – index. Data Control language: grant – revoke – simple privileges. Simple flashback queries.

UNIT – IV

Overview of PL/SQL: Declaration section – executable command section: conditional logic, loops, CASE statements – exception handling section: predefined and user defined exceptions. Triggers: definition – types: row level, statement level, before and after, instead of – syntax – enabling and disabling triggers - replacing and dropping triggers. Cursors – definition – open – fetch – close – cursor attributes- select for update – types : implicit, explicit. Procedures, Functions: Local and global – procedures vs. functions – stored procedures, functions – create procedure syntax - create function syntax – calling procedures, functions. Replacing and dropping procedures, functions.

UNIT - V

Packages: Package header – package body – calling package members - Replacing and dropping package. Overview of Normalization: advantages - disadvantages. Normal forms: first normal form – second normal form – third normal form – denormalization. Parallel Databases: Introduction – Design of Parallel Databases – Advantages and Disadvantages of Parallel Database.

Text Books

Bipin C. Desai, 2013, An Introduction to Database Systems, Galgotia Publications, New Delhi [Unit-I (20-30, 45-72, 660-663, 821-826), Unit – II (145-184, 293-306), Unit- III (208-242)]

Rajiv chopra, 2013, Database Management Systems, 3rd revised edition, S.Chand publication [Unit I (404 – 432), Unit V (460-463)]

Kevin Loney and George Koch, 2002, Oracle 9i The Complete Reference, 1st Edition, Tata Mcgraw-Hill, New Delhi [Unit-IV(489-508), Unit – V (509-550)]

Alexis Leon, Mathews Leon, 2007, SQL Complete Reference[Unit-III (83-98, 103-118,132-139,153-165), Unit-IV (287-289,218-227,312-330), Unit – V (47-57)]

References

Shio Kumar Singh, 2011, Database Systems Concepts Design and Application, 2nd Edition, Pearson Education, New Delhi.

Ragu Ramakrishnan and Gehrke, 2003, Database Management Systems, Third Edition, McGraw-Hill, New Delhi, [Unit-I(26-47, 611-642), Unit-III(57-126, 130-173)].

Gerald V. Post, 2005, Database Management Systems Designing and Building Business Applications, 2nd Edition, Tata McGraw-Hill, New Delhi [Unit-I(30-76), Unit-II(77-140), Unit-III(159-181, 182-220)]

Case study

Project: University System

Project: Course Registration System

Project: Airline Reservation System

Web Sites

www.databasedir.com

www.rdbms.org

Course Outcomes (COs)

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- Ability to use PL/SQL
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
- To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6. Build indexing mechanisms for efficient retrieval of information from a database

List of Programs

1. Create a table with following fields:

Employee table:

Field name	Constraint	Type	Size
Employee_no	Primary key	Character	6
Employee_name		Character	30
Address		Character	25
Designation		Character	15
Dob		Date	
Gender	Check	Character	1
Doj		Date	
Salary		Number	10,2

Queries:

- a) Display name of the employees whose salary is greater than “10,000”.
- b) Display the details of employees in ascending order according to Employee Code
- c) Display the details of the employee earning the highest salary.
- d) Display the names of the employees who earn more than “Ravi”

2. Create a table named **Student** with the following fields and insert the values:

Field name	field type	field size
Student Name	character	15
Gender	character	6
Roll No.	character	10
Department Name	character	15
Address	character	25
Percentage of Marks	number	4 , 2

Queries:

- Calculate the average mark percentage of the students.
- Display the names of the students whose percentage marks are greater than 80%
- Display the details of the student who got the highest percentage of marks.
- Display the details of the students whose mark percentage is between 50 and 70.
- Display the details of the students whose mark percentage is greater than the mark percentage of Roll No = 12CA01

3. Create a table with following fields:

Staff table:

Field name	Constraint	Type	Size
Staff_no	Primary key	Character	6
Staff_name		Character	30
Dob		Date	
Dept_code	Foreign key	Character	4
Designation		Character	15
Basic Salary		Number	7,2

Department table:

Field name	constraint	Type	Size
Dept_code	Primary key	Character	4
Dept_name		Character	30

Execute the following queries:

- To list the staff who joined 2 years back.
- To list the staff in computer science dept.
- To list the staff_name and the dept_name in which he/she works.
- To list the maximum and minimum salary in each dept.
- To list the dept along with the total amount spent on salary
- To list the name of the employees who draw the salary more than the average salary.

4. Create a table with the following fields:

Book table:

Field name	Constraint	Type	Size
Access_no	Primary key	Character	6
Title		Character	30
Author		Character	30
Publisher		Character	30
Subject		Character	10
Price		Number	6,2

Execute the following queries:

- The title of C and C++ books.
- The books written by a particular author.

3. The books which cost between Rs.300/- and Rs.500/-
4. The number of books available in each subject.
5. The books in the decreasing order of the cost.

5. Create a table with the following fields:

Account table:

Field name	Constraint	Type	Size
Acc_no	Primary key	Number	4
Cust_name		Varchar2	30
Branch_name		Varchar2	30
Cust_city		Varchar2	30

Borrower table:

Field name	Constraint	Type	Size
Acc_no	Foreign key	Number	30
Branch_name		Varchar2	30
Amount		Number	8,2

Write a Query to perform different types of Join.

6. Create two tables course & batch with following fields:

COURSE: coursecodeno number(5),course name varchar(20), syllabus varchar(20)

BATCH: bcode number(5), coursecode number(5),starting_date date, duration number(3),coursefee number(10,2)

Perform the following queries:

- ☐ ☐ Insert the details for course and batch tables with 10 records
- ☐ ☐ Show the description of the two tables
- ☐ ☐ Select all the fields from course & batch tables
- ☐ ☐ Select all the fields from course & batch tables where coursecode=10
- ☐ ☐ Select all the fields from batch table where starting date=march 10th
- ☐ ☐ Select batch code from batch table where net income>50000
- ☐ ☐ Select course name, batch code & starting date from batch & course tables where course code in batch table and course code in course table are equal
- ☐ ☐ Select a syllabus from course where coursecode=5

7. Create table with following fields:

Product table:

Field name	Constraint	Type	Size
Product_code	Primary key	Varchar2	7
Product_name		Varchar2	30
Price		Number	6,2
Quantity		Number	4

Vendor table:

Field name	Constraint	Type	Size
Vendor_name		Varchar2	30
Vendor address		Varchar2	30
Product_code	Foreign Key	Varchar2	7

Create a trigger to fire when the Record is deleted and inserted.

8. Write a PL/SQL trigger to update the records while deleting the one record in another table.

voters_master:

Field name	Constraint	Type	Size
voterid	Primary key	Number	5
name		Varchar2	30
Ward_no	Primary key	Number	4
dob		Date	
address		Varchar2	150

new_list

Field name	Constraint	Type	Size
voterid		Number	5
ward_no		Number	4
name		Varchar2	30
Description		Character	50

9. Create a table to store the salary details of the employees in a company. Declare the cursor id to contain empno, employee name and net salary. Use cursor to update the employee details.

Salary:

Field name	Constraint	Type	Size
emp_no	Primary key	Number	4
emp_name		Varchar2	30
designation		Varchar2	25
dept		Varchar2	30
basic		Number	5

10. Write the PL/SQL program to find the factorial and Fibonacci series of given number.

Implement the Following programs using C

11. To perform the operations of Linked List.
12. To perform Stack operations using arrays
13. To perform Infix-postfix operations
14. To search an element in an array using Linear Search
15. To Sort an array using Bubble Sort.

Course Objectives (CO)

- To understand the basic concepts of numerical methods
- To develop the mathematical skills in the areas of numerical methods.
- To understand numerical techniques as powerful tool in scientific computing.
- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.

Course Outcomes (COs)

On completion of the course students will be able to

1. Apply Numerical analysis which has enormous application in the field of Science
2. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
3. Familiar with calculation and interpretation of errors in numerical method.
4. Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.
5. Understand the basics of Numerical Differentiation & Integration and numerical solutions of ordinary differential equations.
6. Understand the concepts of difference operators and the use of Interpolation.

UNIT I

Relations: Properties of Binary relations – Equivalence relations - composition of relations, Closure of relations – Order relations – Partial order relations.

Functions: one-to-one, onto, one-to-one-onto functions – composition of functions, Inverse functions.

UNIT II

Mathematical Logic: Connectives, well-formed formulae, tautology, equivalence of formulas, tautological implications, duality law, normal forms, predicates, variables, quantifiers, Free and bound variables. Theory of inference for statement calculus and predicate calculus.

UNIT III.

Transcendental and polynomial equation – Bisection method, Regula Falsi method, Newton – Raphson method. Polynomial equation – Graffe's root squaring method.

UNIT -IV

System of linear algebraic equations – Gauss Elimination, Gauss Jordan and Gauss Seidel methods.

Interpolation – Newton's Forward and Backward formula – Lagrange's interpolation formula.

UNIT- V

Numerical Differentiation : Newton's Forward Difference and Backward Difference.
Numerical Integration: Trapezoidal rule and Simpson's rule.

Text Books

Venkataraman M.K., 2001, Numerical methods in science & Engineering, National Publication Co. Chennai.

Tremblay.J.A and R. Manohar., 2000, Discrete Mathematical structures with applications to Computer Science, Tata Mcgraw Hill Book Company, New Delhi.

References

Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2002. Discrete Mathematics, A.R. Publications, Nagapatinam.

Kandasamy P., Thilagavathy K., and Gunavathy K., 2003, Numerical methods, S.Chand & Company Ltd, New Delhi.

Veerarajan T., 2007, Discrete mathematics with graph theory and combinatorics, Tata Mcgraw hill companies, New Delhi.

Course Objectives (CO)

- To learn how to use Cloud Services.
- To implement Virtualization
- To implement Task Scheduling algorithms.
- To apply Map-Reduce concept to applications.
- To build Private Cloud.
- To know the impact of engineering on legal and societal issues involved

Course Outcomes (COs)

Upon completion of this course, the students will be able to

1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
2. Design different workflows according to requirements and apply map reduce programming model.
3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
6. Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

UNIT I

Introduction to Cloud Computing -Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards- Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

UNIT II

Virtualization Technologies -Load Balancing and Virtualization -Advanced load balancing - The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

UNIT III

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

UNIT IV

Cloud Information Security Objectives -Confidentiality, Integrity, and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider

Risks Architectural Considerations General Issues- Trusted Cloud Computing -Identity Management and Access Control

UNIT V

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2- Google Web services.

Text Books

Barrie Sosinsky, 2010, Cloud Computing Bible, Wiley- India.

Ronald L. Krutz, Russell Dean Vines, 2010, Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley –India.

References

Aravind Doss, Rajeev Nanda, 2013, Cloud computing – A Practitioner’s Guide, Tata Mc Graw Hill Publication, New Delhi

Dr Kumar Saurabh, 2012, Cloud Computing, 2nd Edition, Wiley India.

Course Objectives (CO)

- To know the basic concepts involved in mobile development environment
- To describe the limitations and challenges of working in a mobile and wireless environment
- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development.
- To inculcate working knowledge of Android Studio development tool
- To integrate multimedia, camera and Location based services in Android Application.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Identify various concepts of mobile programming that make it unique from programming for other platforms,
2. Critique mobile applications on their design pros and cons
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
4. Describe and work within the capabilities and limitations of a range of mobile computing devices.
5. Program mobile applications for the Android operating system that use basic and advanced phone features
6. Understand various Mobile security issues.

UNIT I

Introduction to Mobile Development: What is mobile computing? History of mobile environments – early mobile phones to smartphones and tablets, Development for mobile environments, Differences from traditional application development, Trends in mobile development.

UNIT II

Mobile Development : Introduction, Advantages, Limitations, Features useful for mobiles – Geolocation, offline web applications, offline web storage, animations, 2D/3D graphics, Audio/Video etc. , Frameworks -- HTML5 , Phone Gap (Apache Cordova) framework and jQuery Mobile framework.

UNIT III

Introduction to Android : Android Overview -- Features, Architecture, Applications, Application frameworks, Libraries, Runtime, Kernel, Android Ecosystem – Application stores, publishing, Android Development Tools – Android SDK, Android emulator, Development on hardware devices

UNIT IV

Basic Android Development: Writing Android Applications, Activity Lifecycle, Multi device support, Fragments, Data storage, Intents, Data sharing, Audio playback, Photo capture

UNIT V

Advanced Android Development : Animations. OpenGL ES, Wireless connections, Data syncing, Location aware applications, Best practices for development, Security, Distribution and Monetizing

Lab: Exercises using PhoneGap and the Android SDK using various features of Android.

Text Book

Ed Burnette, 2010, Hello Android: Introducing Google's Mobile Development Platform, 3rd Edition, The Pragmatic Programmers.

References

Wallace Jackson, 2012, Android Apps for Absolute Beginners, 2nd Edition, Apress,

Jeff Mc Wherter, Scott Gowell, 2012, Professional Mobile Application Development, 1st Edition.

Course Objectives (CO)

- To know the need, advantages and disadvantages of Open Source software.
- To know the basic concepts of Open Source Database
- To understand how server-side programming works on the web.
- To receive and process form submission data by creating session
- To learn Open Source Server Applications and Open Source Desktop Applications
- To introduce the concepts of basic SQL as a universal Database language

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. To understand the history and characteristics of open source software.
2. To understand the architecture and life cycle of OSS
3. To know the applications of Open source software.
4. To understand the basic concepts of PHP and MySQL programming.
5. Analyze and solve SQL database tasks using the PHP language.
6. Analyze and solve common Web application tasks by writing PHP programs

UNIT I

Overview of Free Open Source Software: The Open Source Definition - Examples of OSD Compliant Licenses - Examples of Open Source Software Product – The Open Source Software Development Process – A History of Open Source software: The Berkeley Software Distribution – The Free Software Foundation – Linux – Apache – Mozilla – Open Source Software.

UNIT II

Qualification: Defining Open Source Software – Categorizing Defining Open Source Software – Specific Characteristics of Open Source Software Transformation: The OSS Development Process – Taboos and Norms in OSS Development – The OSS development Life Cycle – Deriving a Framework for Analyzing OSS – Zachmans Framework for IS Architecture – CATWOE and Soft System Method – Deriving the Analytical Framework for OSS.

UNIT III

Environment: The “where” of OSS – the “when” of OSS – World View: A Framework for classifying OSS Motivations – Technological Micro-level (individual) motivation – Economic Micro-level and Macro-level (individual) Motivation – Socio-political Micro-level and Macro-level (individual) Motivation. Open Source Server Applications: Infrastructure Services – Web Services – Database Servers – Mail Servers – Systems Management – Open Source Desktop Applications: Introduction – Graphical Desktops – Web Browsers – The Office Suite – Mail and Calendar Clients – Personal Software – Cost of OSS: Total Cost of Ownership – Types of Costs Licensing: Types of Licenses – Licenses in Use – Mixing Open and Close Code – Dual Licensing.

UNIT IV

PHP Programming Basics - PHP - Introduction, PHP Basics: - Syntax- Variables- Controls and functions - Strings. Arrays: - Using Arrays, Manipulating Arrays, Associative Arrays. OOP with PHP –Advanced Array functions-Sessions-cookies and HTTP.

UNIT V

MySQL: Introduction-Connecting to and Disconnecting from the Server-Entering Queries. Creating and Using a Database-Creating and Selecting a Database-Creating a Table- Loading Data into a Table-Retrieving Information from a Table-Selecting All Data-Selecting Particular Rows-Selecting Particular Columns-Sorting Rows-Date Calculation-Working with NULL Values-Pattern Matching-Counting Rows-Using More Than one Table.

Text Books

Joseph Feller, Brain Fitzgerald, Eric S. Raymond, 2001, Understanding Open Source Software Development, 1st Edition , Addison-Wesley Professional.

Philipp K. Janert, 2011, Data Analysis with Open Source Tools, O'Reilly.

Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, 2013, Programming PHP, O'Reilly.

Gayanath Jayarathne, 2013, Mysql Basics with PHP,. Lean Publishing

Reference

Tim Converse and Joyce Park with Clark Morgan, 2006, PHP 5 and MySQL Bible, Wiley Dreamtech India Pvt. Ltd .

.

15SSD301	Soft Skill Development – II	Semester – III			
		L	T	P	C
		2	0	0	0

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impact knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Objectives

- To train the students in understanding the concepts of communication.
- To train the students in developing their written communication and
- presentation skills.

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precise Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Text Book

Juneja. P. Om and Aarati Mujumdar, 2010, Business Communication -Techniques and Methods, Orient Blackswan Pvt. Ltd., Hyderabad.

References

Badi, R.V and K. Aruna, 2008, Business Communication, Vrinda Publications: New Delhi.

Balasubramanian M and G Anbalagan, 2007, Performance in English, Anuradha Publications: Kumbakonam

Mohan, Krishna and Meenakshi Raman, 2008, Effective English Communication, Tata McGraw Hill: New Delhi.

Selley, John, 2005, Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Course Objectives (CO)

- To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC. To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
- To understand the structure and organization of the file system
- To learn case studies based on different operating system.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Describe the important computer system resources and the
2. Perform the role of operating system in their management policies and algorithms.
3. Understand the process management policies and scheduling of processes by CPU
4. Evaluate the requirement for process synchronization and coordination handled by operating system
5. Describe and analyze the memory management and its allocation policies.
6. Identify use and evaluate the storage management policies with respect to different storage management technologies, identify the need to create the special purpose operating system.

UNIT – I

Introduction: What is an OS? – Mainframe systems Desktop Systems – Multiprocessor systems – distributed systems – real time systems. Process: - Process concepts – Operation on process – cooperation process - Inter process Communication - - Mutual Exclusion - Critical sections- primitives – Semaphores – Deadlock: Deadlock prevention, avoidance, detection, recovery from deadlock.

UNIT – II

Storage management: Memory Management - swapping- Contiguous memory allocation – paging, segmentation – segmentation with paging – Virtual memory :Virtual storage organization – Demand Paging, Process Creation – Page replacement – Thrashing.

UNIT – III

Processor Scheduling: preemptive scheduling : - Scheduling Criteria – Scheduling Algorithms – FCFS- SJF- Priority – RoundRobin –Multilevel Queue – Multilevel Feedback Queue .

UNIT – IV

File systems: Introduction – File System Concepts – Access Methods – Directory structure – File Sharing – Allocation Methods – Free space management –Efficiency and performance –

Recovery Disk Performance Optimization: Introduction – Disk structure – Disk scheduling – Disk management.

UNIT – V *Case studies*

LINUX, Windows 2000, Windows XP : History- Design principles- File systems- Memory.

Text Book

Silberschatz Galvin Gagne, 2012, Operating system concepts, 9th Edition, Wiley India (pvt), Ltd, New Delhi. [(Unit 1: 3-14,17,95,103,1-7,109,191,201,145-164), (Unit 2: 280-309,320-330,348), (Unit 3: 155, 157-168), (Unit 4: 371-383,395,421-437,491-498), (Unit 5: 695-700, 716-724, 743,744,766,789,791,823)]

References

Deitel H.M, 2005, Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.[(Unit-1:-3, 49, 54, 75, 76, 77, 89, 160, 164, 168, 170),(Unit-2:- 187, 201, 190, 221, 230, 237, 264, 253), (Unit-3:- 290, 289, 292, 295, 291, 293, 296), (Unit-4:- 389, 394)]

Pramod Chandra P. Bhatt, 2007, An Introduction to Operating Systems, 2nd Edition, Prentice Hall India, New Delhi.[(Unit-1:-101, 104, 105, 108, 109), (Unit-2:-56, 67, 74, 69, 71)]

Tanenbaum Woodhull, 2005, Operating Systems, 2nd Edition, Pearson Education (LPE) , New Delhi. [(Unit-1:- 3,59,58,66,166,173,175,172), Unit-2:- 310, 313, 319, 348, 352, 319),(Unit-3:- 85,84,87)]

William Stallings, 2009, Operating Systems internals and Design Principles, 6th Edition, Prentice Hall India, New Delhi.

Web Sites

www.webopedia.com
searchwindowsserver.tech.target.com
www.glu.org
www.computerhope.com
www.answers.com
www.osdata.com

Course Objectives (CO)

- To design, formulate, and construct applications with VB.NET
- To integrate variables and constants into calculations applying VB.NET
- To determine logical alternatives with VB.NET decision structures
- To implement lists and loops with VB.NET controls and iteration
- To separate operations into appropriate VB.NET procedures and functions
- To assemble multiple forms, modules, and menus into working VB.NET solutions

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Grasp the fundamentals of a programming language and know the basic differences between programming languages
2. Choose the architecture based on the problem to be solved.
3. Differentiate between the types of applications supported by .Net
4. Build, compile and execute a VB .Net program
5. Apply techniques to develop error-free software
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts

UNIT - I

Introduction to .NET: .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development & event driven Programming -Methods and events.

UNIT - II

The VB.NET Language: The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Structure Programming – Modularity – Information Hiding – Abstraction – Events – subroutines and functions– Message box – Input box. Control flow statements: conditional statement, loop statement.

UNIT - III

Working with WPF: Introduction : Understanding Windows Graphics - WPF: A Higher-Level API - The Architecture of WPF. – ,XAML: Basics, Properties and Events in XAML – Loading and compiling -Layout-.Classic Controls: The Control Class - Content Controls - Text Controls - List Controls - Range-Based Controls.

UNIT – IV

Objects and collections: Understanding objects, Properties, Methods. Understanding collections. Files : Introduction – Classification of files – Processing files – handling files and folder using class – Directory class – file class.

UNIT - V

Database programming with ADO.NET: Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using CrystalReportViewer.

Text Books

Shirish Chavan, 2007, Visual Basic .Net, 1st Edition, Pearson Education, New Delhi.

Bryan Newsome, 2012, Beginning Visual Basic 2012, John Wiley & Sons, Inc.

Matthew MacDonald, 2008, Windows Presentation Foundation with .NET 3.5, Apress.(Chapters 1,2,4 and 7 only).

Duncan Mackenzie and Kent Sharkey, 2006, Sams Teach Yourself Visual Basic.Net, 1st Edition, Techmedia, New Delhi.

References

Ian Griffiths, Chris Shells, 2005, Programming Windows Presentation Foundation. 1st Edition, O'Reilly Publishers.

Jeffrey R. Shapiro, 2002, The Complete Reference Visual Basic.Net, Tata -McGraw-Hill Edition, New Delhi.

Web Sites

www.startvbdotnet.com

www.functionx.com

www.devarticles.com

www.dotnetspider.com

www.developerfusion.com

<http://www.wpftutorial.net/hellowpf.html>

Course Objectives (CO)

- To design, formulate, and construct applications with VB.NET
- To integrate variables and constants into calculations applying VB.NET
- To determine logical alternatives with VB.NET decision structures
- To implement lists and loops with VB.NET controls and iteration
- To separate operations into appropriate VB.NET procedures and functions
- To assemble multiple forms, modules, and menus into working VB.NET solutions

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Grasp the fundamentals of a programming language and know the basic differences between programming languages
 2. Choose the architecture based on the problem to be solved.
 3. Differentiate between the types of applications supported by .Net
 4. Build, compile and execute a VB .Net program
 5. Apply techniques to develop error-free software
 6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts
-
1. Write a VB.NET program to calculate Simple interest and compound Interest
 2. Write a VB.NET program to implement Calculator.
 3. Write a VB.NET program to implement Notepad
 4. Write a VB.NET program to draw several shapes and fill with color.
 5. Write a VB.NET program to perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
 6. Write a program to calculate the total marks of the student and print the grades
 7. Write a VB.NET Program to implement Employee Payroll System.
 8. Write a VB.NET program to create and manipulate a File.
 9. Write a Program to implement a Web Browser
 10. Write a program to maintain the details of doctors in a hospital with their specialization.
 11. Write a program to animate the picture using Timer Control.
 12. Write a program to move the object from one location to another. Change the color and size of object at different time interval.

13. Write a program to place ten pictures in the list box. Using timer control take the picture from List box and change the form background after specific time interval.
14. Write a program to implement speaking program. Get the text input from the user and convert into voice.
15. Write a program to implement chatting.

Course Objectives (CO)

This course enables the students to

- To learn the basic concepts and applications of linear programming.
- To impart knowledge in concepts and tools of Operations Research.
- To know the constructive techniques to make effective business decisions
- Define and formulate linear programming problems and appreciate their limitations
- To Identify and develop operational research models from the verbal description of the real system
- To Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. Understand the basic concepts and application of operation research in various fields.
2. Understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively
3. Define and formulate linear programming problems and appreciate their limitations
4. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry
5. Identify and develop operational research models from the verbal description of the real system
6. Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

UNIT I

Linear Programming: Formulation of LPP – Graphical solution to LPP –Simplex method – Big M method and Duality in LPP.

UNIT II

Transportation model: Introduction – Mathematical Formulation –Finding initial Basic Feasible solutions – Optimum solution for non degeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem

UNIT III

The Assignment problem - Mathematical formulation of the problem – Hungarian method – Unbalanced Assignment problem- Maximization case in Assignment problem.

Queuing theory : Introduction – Characteristics of queuing system. Problems in (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) models .

UNIT IV

Inventory Control: Introduction – Costs involved in inventory – Deterministic EOQ models – Purchasing Model without and with shortage, Manufacturing Model without and with shortage -Price break.

UNIT V

PERT and CPM: Network representation – Calculation of Earliest expected time, latest allowable occurrence time. CPM - various floats for activities – critical path.

PERT –Time estimates in PERT- Probability of meeting scheduled date of completion of projects .

Text Book

Kanthi Swarup, Gupta P.K., Man Mohan., 2006, Operations Research, Sultan Chand & Sons, New Delhi. (For Unit I – V)

References

Sharma J.K., 2009, Operations Research: Theory and Applications, Macmillan publishers India Ltd, New Delhi.

Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2005, Resource Management Techniques, 3rd edition A. R. Publications, Nagapatinam.

Shanthi Sophia Bharathi D.,1999, Operations Research/Resource management techniques, 2nd edition, Charulatha Publications.

		Semester – IV			
		L	T	P	C
15CTU403 B	Allied Elective II – Statistical Methods	4	2	0	4

Course Objectives (CO)

- To recognize the error in the number generated by the solution.
- To compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
- To apply method of interpolation and extrapolation for prediction.
- To recognize elements and variable in statistics and summarize qualitative and quantitative data.
- To calculate mean, median and mode for individual series.
- To outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

Course Outcomes (COs)

Upon completion of the course students shall be able to:

1. Recognize the error in the number generated by the solution.
2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
3. Apply method of interpolation and extrapolation for prediction.
4. Recognize elements and variable in statistics and summarize qualitative and quantitative data.
5. Calculate mean, median and mode for individual series.
6. Outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

UNIT-I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

UNIT – II

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion- Range, standard deviation, Coefficient of variation.

UNIT – III

Correlation – Meaning and definition - Scatter diagram –Karl pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – IV

Probability theory : Axioms of Probability–Addition theorem – Multiplication theorem– conditional Probability.

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

UNIT – V

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit.

Text book

R.S.N.Pillai , Bagavathy, 2002, Statistics, S. Chand & Company Ltd. New Delhi.

References

Jerrold H.Zar, 2003, Bio-Statistical Analysis, Fourth Edition, Pearson Education, (Pvt) .Ltd, New Delhi.

PA.Navnitham, 2006, Business Mathematics and Statistics, Jai Publishers, Trichy - 21,

S.P. Gupta, 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

		Semester – IV			
		L	T	P	C
15CTU403 C	Allied Elective II – Discrete Mathematics	4	2	0	4

Course Objectives (CO)

- To learn the basic concepts of sets, types of sets, functions and relations
- To understand about Pigeonhole principle, Permutation and Combination, Mathematical Induction
- To solve the problems using Recurrence relations and generating functions.
- To know the basic concepts of Logical Connectives, Graphs and Trees.
- To express ideas using mathematical notation
- To solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course, students will be able to

1. Familiar with elementary algebraic set theory.
2. Acquire a fundamental understanding of the core concepts in growth of functions.
3. Describe the method of recurrence relations.
4. Get wide knowledge about graphs and trees
5. Initiate to knowledge from inference theory
6. Solve problems with the help of tools of mathematical analysis.

UNIT-I

Mathematical logic: Connections well formed formulas, Tautology, Equivalence of formulas, Tautological implications, Duality law, Normal forms, Predicates, Variables, Quantifiers, Free and bound Variables.

UNIT-II

Relations: Properties of Binary relations – Equivalence relations - composition of relations, Closure of relations – Order relations – Partial order relations.

Functions: one-to-one, onto, one-to-one-onto functions – composition of functions, Inverse functions.

UNIT-III

Formal languages and Automata: Grammars: Phrase–structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata- Deterministic finite automata and Non deterministic finite automata-conversion of non deterministic finite automata to deterministic finite automata.

UNIT-IV

Lattices and Boolean algebra: Partial ordering, Poset, Lattices, Boolean algebra, Boolean functions, Theorems, Minimization of Boolean functions.

UNIT-V

Graph Theory: Directed and undirected graphs, Paths, Reachability, Connectedness, Matrix representation, Euler paths, Hamiltonian paths, Trees, Binary trees simple theorems, and applications.

Text Books

Tremblay J.P., and R.P Manohar., 1975, Discrete Mathematical Structures with applications to computer science, Tata Mc.Graw Hill, New Delhi. (For Unit I – V)

Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2002, Discrete Mathematics, A.R. Publications, Nagapatinam.

Veerarajan T.,2007, Discrete mathematics with graph theory and combinatorics, Tata McGraw hill companies, New Delhi.

Sharma.J.K, 2005 , Discrete Mathematics, Second Edition , Macmillan India Ltd.

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

15CTU501	Advanced JAVA Programming	Semester V			
		L	T	P	C
		5	0	0	5

Course Objectives (CO)

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and SWING component and classes.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language
2. Understand the benefits of Multithreading and Portability
3. Develop robust, object oriented, dynamic and scalable java applications.
4. Develop GUI based applications that responds to user events. Using Java
5. Employ a hierarchy of Java classes to provide a solution to a given set of requirements
6. Understand various Java Utilities Package and JDBC connectivity

UNIT - I

Introduction to Java Applications and Applets: Printing a line of text – Displaying text in a Dialog Box – Adding integers – Arithmetic – Decision Making – Drawing a String – Adding Floating Point Numbers. Control Statements: Pseudocode – Control Structures - if, if/else, while – Formulating Algorithms: Case studies: 1, 2 & 3 – Compound Assignment – Increment and Decrement Operators – Primitive types – for, do/while – switch –break and continue statements (simple & labeled) – Logical Operators - selection statements. Methods: Program Modules in Java – Method Declarations – Argument Promotion - Java API Packages – Scope of Declarations – Method Overloading – Recursion. Arrays: Declaring and Creating Arrays – Reference Parameters – Passing Arrays to Methods – Multidimensional Arrays.

UNIT - II

Object-Based Programming: Implementing a Time Abstract Data Type with a Class – Class Scope – Controlling Access to members – ‘this’- Constructors – Overloaded Constructors – set and get methods – Composition – Static Class Members – Creating Packages – Package Access. Object-Oriented Programming: Superclasses and Subclasses – protected Members – Constructors and Finalizers in Subclasses – Invoking Superclass Method from Subclass Objects - Using Superclass with Subclass-Type Variables – Subclass Method Calls via Superclass-Type Variables – Inheriting Interface and Implementation – final Methods and classes Nested Classes – Type-Wrapper Classes for Primitive Types. String and Characters: Fundamentals – Class String – Class StringBuffer – class Character – class StringTokenizer – Regular Expressions, Class Pattern and Class Matcher.

UNIT - III

Graphics and Java2D: Graphics Contexts and graphics Objects – Color Control – Font Control – Drawing Lines, Rectangles, Ovals, Arcs, Polygons and Polylines – Java2D API. Graphical User Interface Components: Overview of Swing Components- JLabel – EventHandling – Textfields – How event handling works – JButton – JCheckBox and JRadioButton – JComboBox – JList – Multiple-Selection Lists – Mouse Event Handling – Adapter classes – Key Event Handling – Layout Managers – Panels – JTextArea – JPanel – JSlider – Using Menus with Frames – JPopupMenu – Pluggable Look-and-Feel. Exception Handling: Java Exception Hierarchy – Rethrowing and Exception – finally Clause – printStackTrace, getStackTrace and getMessage – Chained Exceptions.

UNIT - IV

Multithreading: Life Cycle of a Thread – Thread Priorities and Thread Scheduling – Creating and Executing Thread – Thread Synchronization – Daemon Threads – Runnable Interface. Files and Streams: Data Hierarchy – Files and Streams – Class File – Creating a Sequential-Access File – Reading Data from a Sequential-Access File – Random-Access Files – Creating/Writing/Reading Random-Access Files – New I/O APIs for the Java Platform. Networking: Manipulating URLs – Reading a File on a Web Server –Client/Server Interaction with Stream Socket Connections. Multimedia: Loading, Displaying and Scaling Images – Animating a series of Images – Image Maps – Loading and Playing Audio Clips.

UNIT - V

Java Utilities Package and Bit Manipulation: Vector Class and Enumeration Interface – Stack Class of Package java.util – Hashtable Class – Properties Class – Bit Manipulation and the Bitwise Operators – BitSet Class. Collections: Collections Overview – Class Arrays – Interface Collection and Class Collections – Lists – Sets – Maps. Java Database Connectivity with JDBC: Relational Database Overview – SQL – Manipulating Databases with JDBC – Stored Procedures. Servlets: Servlet Overview and Architecture – Handling HTTP get /post Requests - Redirecting Requests to other Resources – Multi-Tier Applications. JavaServer Pages: JavaServer Pages Overview – Implicit Objects – Scripting – Standard Actions – Directives.

Text Books

Deitel & Deitel, 2007, Java How to Program, 6th Edition, Pearson Education Asia, New Delhi.

Poornachandra Sarang, 2012, Java Programming, McGraw Hill Professional.

References

Herbert Schildt, 2014, Java Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.

Aaron walsh, Justin couch & Daniel H.Steinberg, 2000, Java 2 Programming, IDG Books India (P) Ltd., New Delhi.

Balagurusamy.E,. 2000, Programming with Java, Tata Mc-Graw Hill, New Delhi.

ISRD Group, 2007, Introduction to Object Oriented Programming through Java, 1st Edition, Tata Mc- Graw Hill, New Delhi.

Web sites

java.sun.com/docs/books/tutorial/
www.en.wikipedia.org/wiki/Java
www.java.net/

15CTU502	Internetworking with TCP/IP	Semester V			
		L	T	P	C
		5	0	0	5

Course Objectives (CO)

- To understand fundamental concepts of computer networking.
- To familiarize with the basic taxonomy and terminology of the computer networking area.
- To understand the function of each layer of the TCP/IP protocol suite
- To understand why a protocol is essential for communication between computers
- To familiarize the functions of IP protocol
- To learn the requirements of IP routing and choose appropriate routing methods

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Identify the different types of network devices and their functions within a network.
5. Understand and building the skills of subnetting and routing mechanisms.
6. Able to analyze IP addressing requirements and design an addressing scheme

UNIT - I

Introduction: History of internet – Interconnecting devices - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT - II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum .

UNIT - III

Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT - IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.

UNIT - V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets-VPN.

Text Book

Behrouz A. Forouzan, 2010, TCP/IP Protocol Suite, 4th Edition, Tata McGraw Hill Publication, New Delhi.

References

Andrews S Tanenbaum, 2003, Computer Networks. 4th Edition, Prentice Hall of India Private Ltd, New Delhi.

Buck Graham, 2007, TCP/IP Addressing, 2nd Edition, Harcourt India Private Limited, New Delhi.

Douglas E Comer, 2000, Computer Networks and Internets, 4th Edition, Pearson Education Asia, New Delhi .

William Stallings, 2007, Data and Computer Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

Web Sites

en.wikipedia.org/wiki/Internet_protocol_suite

www.yale.edu/pclt/COMM/TCPIP.HTM

www.w3schools.com/tcpip/default.asp

Course Objectives (CO)

- To learn the behavior and flow of the software
- To learn the essential and fundamental aspects of object-oriented concepts along with their applications
- To analyze, design and implement object oriented software systems
- To learn various modelling techniques to model different perspectives of object-oriented software design (UML)
- Understand the fundamental Software engineering Concepts like Analyzing, coding, and Testing.
- To learn applications of software architectures in various setting including the application of design patterns, frameworks and toolkits

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Identify and select suitable process model for the application
2. Understand software development life cycle development activities
3. Understand various aspects involved in analyzing and design software development process
4. Work effectively as leader/member of a development team to deliver quality software artifacts.
5. Analyze, specify and document software requirements for a software system.
6. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its objectives and risks, and estimate its cost and time.

UNIT I

Introduction: System Concepts – Software Engineering Concepts - Software Life Cycle– Development Activities – Managing Software Development – Unified Modeling Language – Project Organization – Communication.

UNIT II

Analysis: Requirements Elicitation – Use Cases – Unified Modelling Language, Tools – Analysis Object Model (Domain Model) – Analysis Dynamic Models – Non-functional requirements – Analysis Patterns.

UNIT III

System Design: Overview of System Design – Decomposing the system -System Design Concepts – System Design Activities – Addressing Design Goals – Managing System Design.

UNIT IV

Implementation and Managing Change : Programming languages and coding- Human computer interaction-Reusing Pattern Solutions – Specifying Interfaces – Mapping Models to Code – Testing Rationale Management – Configuration Management – Project Management -real time interface design(eg: mobile design)

UNIT V

Aspect Oriented Software Development : Design Principles -Separations of Concerns, Subject Oriented Decomposition, Traits, Aspect Oriented Decomposition, Theme Approach, Designing Base and Crosscutting Themes, Aspect-Oriented Programming using Aspect-J.

Text Books

Bernd Bruegge, Alan H Dutoit, 2004, Object-Oriented Software Engineering, 2nd Edition Pearson Education.

David Kung, 2013, Object-Oriented Software Engineering: An Agile Unified Methodology, 1st Edition, McGraw-Hill Higher Education

Reference

Yogesh Singh, Ruchika Malhotra, 2012, Object-Oriented Software Engineering, 1st Edition, PHI Learning Private Limited Haryana, India..

Course Objectives(CO)

- To understand the basic animation principles,
- To analyze of the multimedia streaming,
- To perform and establish multimedia communication terminals,
- To present multimedia communications
- To Explore adobe and flash software in creating 3D animation and content creation,
- To Analyze instructional and informational media (print materials, audio/visual materials and/or web-based materials, games/simulations, etc.)

Course Outcomes (COs)

After completion of this course, the students will be able to:

- Understand basic Animation concepts.
- Acquire basic knowledge on Multimedia devices.
- Understand current trends in multimedia by experiencing a variety of applications and development packages.
- Be able to design different application in multimedia and use different tools like adobe Photoshop and macromedia flash.
- understand and explore drawing and basic animation within the Flash interface

Objectives

The main objective of this course is to have students develop an understanding of fundamental techniques used for computer animation. At the end of this course, students will be able to identify the advantages and disadvantages of using simulation, procedural animation, motion capture, and hand designed animations, with respect to both online and offline applications. The student also will be able to implement animation techniques, using common software languages and tools. Finally, in addition to an understanding of current practices in computer animation, a general objective is for students to better recognize current important challenges in computer animation.

UNIT-I

Introduction to Animation – History of Animation – Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects - Creating Animation.

UNIT-II

Creating Animation in Flash: Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT-III

3D Animation & its Concepts – Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT-IV

Motion Caption – Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT-V

Concept Development –Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets - 3D Animated Movies.

Text Books

Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata Mc Graw Hill publishers, New Delhi.

William Heldman, 2013, Adobe Flash Professional CS6 Essentials, 1st Edition, Wiley Publishers.

Reference

Ashok Banerji, Ananda Mohan Ghosh, 2010, Multimedia Technologies, 1st Edition McGraw Hill Publication.

Course Objectives (CO)

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and SWING component and classes.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language
2. Understand the benefits of Multithreading and Portability
3. Develop robust, object oriented, dynamic and scalable java applications.
4. Develop GUI based applications that responds to user events. Using Java
5. Employ a hierarchy of Java classes to provide a solution to a given set of requirements
6. Understand various Java Utilities Package and JDBC connectivity

List of Programs

1. Write a program to find the sum of series $1+x+x^2+x^3+\dots$
2. Define a class for Employee with name and date of appointment. Create employee objects and sort them as per their date of appointment.
3. Write a program to find factorial of number using recursion.
4. Write a program to find maximum and sum of an array.
5. Write a program to perform string operations.
6. Write a program to accept more strings and arrange them in alphabetical order.
7. Write a program to create a window and draw cross lines.
8. Write a program to create an applet and draw the shapes.
9. Write a program to create a window with a background color and display a message.
10. Write a program for multiplication tables by multithreading.
11. Write a program to create an exception for marks out of bounds. If mark is greater than 100 throw an exception.
12. Write an applet program to create menus.
13. Write an applet program to perform operations in list box

15CTU505 A	Core Elective II - Spatial Databases	Semester V L T P C 5 0 0 5
-------------------	---	---

Course Objectives (CO)

- To distinguish between various spatial distance metrics.
- To use SQL operations to query databases
- To learn Query language for graphs
- To inculcate knowledge on data mining query languages.
- To know in detail about data mining algorithms
- To learn the special nature of spatial data and how they are different from non-spatial data

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Develop a sound understanding of the principles and techniques of database design and development as they apply to geospatial data
2. Understand the strengths and limitations of various database and non-database structures for spatial data
3. Use SQL fragments and/or statements as appropriate, to interrogate (geo)databases
4. Collect and manage spatial data in both file formats and databases
5. Identify appropriate data mining algorithms to solve real world problems
6. use geospatial databases to perform common types of queries and geospatial analyses; and publish spatial data to the internet

UNIT I

Introduction to Spatial Databases: Overview – GIS and SDBMS – Query Language – Query Processing – File Organization – Data Mining – Spatial Concepts and Data Models – Models of Spatial Information – Fixed based models – Object based models – Spatial data Types – Operations in Spatial objects – Dynamic spatial Operations Mapping spatial objects into java.

UNIT II

Spatial Query Languages: Standard Database Query Languages – World Database – The Select and project operations – Basic SQL Primer – DDL – DML – Extending SQL for Spatial Data – Object Relational SQL – Spatial Storage and Indexing – Storage disk and files – Buffer Manager – Clustering.

UNIT III

Query Processing: Query Processing and Optimization – Evaluation of Spatial Operation – Spatial operations – Techniques for spatial selection – General spatial selection – Query Optimization – Analysis of Spatial Index Structure – Distributed DBMS architecture – Parallel spatial database systems.

UNIT IV

Spatial Networks: Spatial Networks – Query language for graphs – graph algorithms – access methods – Graph algorithms

UNIT V

Introduction to Spatial Data Mining: Pattern discovery – the data mining concepts – Statistics and Data Mining – Data Mining as a search problems – features – classification techniques- Association rule discovery Techniques – Clustering – Trends in Spatial databases

Text Book

Shashi Shekhar Sanjay Chawla, 2009, Spatial Databases – A Tour Prentice Hall publication.

Reference

Albert K.W Yeung G. Brent Hall, 2007, Spatial Database Systems Design Implementation and Project Management, Springer.

15CTU505 B	Core Elective II - Ethical Hacking	Semester V			
		L T P C			
		5 0 0 5			

Course Objectives (CO)

- To learn terminologies, types and phases involved in ethical Hacking.
- Learn about basic system defense infrastructure
- Learn about the hacker mindset and the history of hackers
- To learn web application vulnerabilities involved in web server hacking
- To learn computer network threat and vulnerability and overview of digital crime.
- To learn the interrelationships among elements that comprise a modern security system, including hardware, software, policies, and people

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the core foundations of ethics in regards to computer security
2. Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
3. Understand basic networking and security technologies
4. Gain a basic understanding of security policy
5. Understand how intruders escalate privileges.
6. Understand the cryptography and its application and some of the important terms used in information security

UNIT I

Introduction To Ethical Hacking : Introduction-Ethical hacking Terminology-types of hacking technologies-phases of ethical hacking-Foot printing-Social Engineering-Scanning and enumeration.

UNIT II

System Hacking : Understanding the password hacking techniques-Rootkits-Trojans-Backdoors-Viruses and worms-sniffers-denial of service-Session hijacking.

UNIT III

Web Server Hacking : Hacking web servers-web application vulnerabilities –Buffer overflow-Wireless hacking Physical Security.

UNIT IV

Wireless Hacking Wep: WPA Authentication mechanism-wireless sniffers-Physical Security-factors affecting physical security-honeypots-Firewall types.

UNIT V

Penetration Testing Cryptography-overview of MD5, SHA, RC4-penetration testing methodologies- steps-pen test legal framework-penetration testing tools.

Text Book

Michael T. Simpson, 2013, Hands-On Ethical Hacking and Network Defense, Course Technology PTR.

References

Steven DeFino, Barry Kaufman, Nick Valenteen, Official Certified Ethical Hacker Review Guide

The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy (Syngress Basics Series)

Hands on Ethical Hacking and Network Defense , Kindle Edition.

15CTU505C	Core Elective II-Virtual Reality and Virtual Environment	Semester V L T P C 5 0 0 5
-----------	---	----------------------------------

Course Objectives (CO)

- To learn the basic categories of virtual reality technology.
- To learn about different theoretical foundations of virtual reality.
- To learn about existing and potential virtual reality applications in education and training.
- To learn about basic components of virtual environment
- To learn emerging possibilities of environmentally sensed information.
- To learn basic system concept and definitions of system simulation and modeling

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the basic concepts of computer graphics and virtual reality environment
2. Understand and apply the concepts of 3D modeling and VR
3. Understand the principles within computer modelling and simulation
4. Analyze key performance factors in virtualized systems.
5. Compare and contrast traditional e-learning environments with virtual environments
6. Understand the process of creating virtual environments, by developing a complete VR application

UNIT I

Introduction – Computer graphics – Real time computer graphics – Flight Simulation – Virtual environments –requirement – benefits of virtual reality- **3D Computer Graphics** : Introduction – The Virtual world space – positioning the virtual observer – the perspective projection – human vision – stereo perspective projection – 3D clipping – Colour theory – Simple 3D modeling – Illumination models – Reflection models – Shading algorithms.

UNIT II

Geometric Modeling : Introduction – From 2D to 3D – 3D space curves – 3D boundary representation - **Geometrical transformations**: Introduction – Frames of reference – Modeling transformations – Instances – Picking – Flying – Scaling the VE – Collision detection - **A Generic VR system**: Introduction – The virtual environment – the Computer environment – VR Technology – Model of interaction – VR System.

UNIT III

Virtual Environment: Animating the Virtual Environment: Introduction – The dynamics of numbers – Linear and Non-linear interpolation - The animation of objects – linear and non-linear translation - shape & object in-betweening – freeform deformation – particle system- **Physical Simulation** : Introduction – Objects falling in a graphical field –Rotating wheels – Elastic collisions – projectiles – simple pendulum – springs – Flight dynamics of an aircraft.

UNIT IV

VR Hardware & Softwares : Human factors : Introduction – the age- the ear- the somatic senses - **VR Hardware** : Introduction – sensor hardware – Head-coupled displays –Aquatic hardware – Integrated VR systems-**VR Software**: introduction – Modeling virtual world – Physical simulation- VR toolkits – Introduction to VRML.

UNIT V

VR Application : Introduction – Engineering – Entertainment – Science – Training – **The Future:** Introduction – Virtual environments – modes of interaction.

Text Books

John Vince, 2007. Virtual Reality Systems , 1st Edition, Dorling Kindersley publishers, India.

Matjaz Mihelj, Domen Novak, Samo Begus, 2013, Virtual Reality Technology and Applications, 1st Edition, Springer Publication.

Reference

William R. Sherman, Alan B. Craig, 2002, Understanding Virtual Reality: Interface, Application, and Design, 1st edition, Morgan Kaufmann publication.

		Semester – V
		L T P C
150EU501	Open Elective – Intranet Technology	0 0 0 3

Course Objectives (CO)

- Able to share and view information within the organization
- To have access to the intranet all the time.
- Promote fundamental concepts within the company over intranet
- Cost effective, saves money - this is one of the greatest benefits of the intranet.
- Messages, event and information can be placed on the intranet as they are quick. This saves time.
- To learn to maintain database and its applications

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Understand the advantage of intranet over groupware technologies
2. Understand the concept of sharing of files over Intranet
3. Work on Intranet chat tools and Intranet phones
4. Gain knowledge over the Intranet usage of Group scheduling, Message boards, News Feeds and other applications
5. Understand how to integrate intranet with existing applications
6. Understand impact to f security issues and its mechanisms

UNIT – I

Introducing Intranets: Internet Definition – The Internet in Action – Intranets Versus traditional Groupware – Client server basics and Theory. Building Intranet – Server Software – Starting with the Server – Connectivity – wide area networks – Selecting an Intranet Service Provider – Client Issues – Security..

UNIT – II

Applications: Business applications – Viewing corporate Information with HTML – Authoring Tool – Creating a Dynamic & Functional site – Presentations: PDF – SGML-Audio – Video.

UNIT – III

Intranet: Intranet Corporate data – Sharing files – using databases – Direct access. Communication – E-Mail – Intranet chat tools – Intranet phones.

UNIT – IV

Intranet applications : Developing Intranet applications – Intranet tools – Creating real word applications – Group scheduling – Message boards – Contact Databases – Alert messaging and real time chat – News Feeds – Group Document creation and Editing – Private Messaging areas – Document submission – Search functions – Help Desk – Reference Desk.

UNIT – V

Administering Intranet: Integrating existing applications – Maintaining a user Databases – Designing a successful file structure – Maintaining Security – Hardware and software upgrades – the Future of Intranets.

Text Book

David Garrett, 1998, Intranet Unleashed. 2nd Edition, New Delhi: Techmedia publication.[Unit-I(3-220), Unit-II(299-390), Unit-III(393-499), Unit-IV(513-698), Unit-V(701-802)]

References

Dasgupta, Subhasish. 2001. Managing Internet and Intranet Technologies in Organizations: Challenges and opportunities, 1st Edition, Idea Group Publishing.

Rolf Oppliger, 2002, Internet and Intranet Security, 2nd edition, Artech House Inc.

Course Objectives (CO)

- To learn client and server-side scripting languages
- Understand the technologies used in Web designing.
- Know the importance of object-oriented aspects of Scripting.
- To understand and practice embedded dynamic scripting on client-side Internet Programming
- To master the theory behind scripting and its relationship to classic programming
- To gain some fluency programming in HTML, ASP, JavaScript and related languages, to design and implement one's own scripting language.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Choose, understand, and analyze any suitable real time web application
2. Design simple web pages using markup languages like HTML and XHTML
3. Create dynamic web pages using ASP and java script that is easy to navigate and use.
4. Program server-side web pages that have to process request from client-side web pages.
5. Develop web pages using ASP, JSP and VBScript.
6. Develop embedded dynamic scripting on client-side Internet Programming

UNIT – I

Introduction to HTML: Introduction-HTML Browsers-History of HTML and SGML-HTML Command Tags-Quotation Marks-Spacing-Special Symbols-Tags with Automatic Line Breaks-URLs-Understanding Domain Names-Links-Defining Web Page-Main Body of Text- Headers-Adding Paragraph-Formatting Text-Font Type, Size, Predefined Fonts, Bold, Italic-Setting Colors-Text Color, Superscripts and Subscripts-Underlining Text-Preformatted Text-Blinking Text-Block Quotes-Margins-Line Breaks-Ordered and Unordered List-Links-Scaling an Image-Images Alignment

More on HTML: Creating Table-Dividing Table into Columns-Dividing Table into Rows-Creating Headers- Adding Border –Putting a Background Image- Heading across two or More Columns-Changing Color of a Cell-Aligning the Contents of a Cell-Display of Tables.

UNIT – II

HTML, Forms, Frames and Style Sheets: HTML : Working with Forms-Creating Forms-Working with Menus-Working with Radio Buttons-Check Boxes-Text Boxes- Text Areas-Password Boxes-Submit Button-Resetting the Form-Working with Frames-Creating Frameset-Creating Columns-Creating Rows and Columns-Combining Framesets-Giving Colors to the Borders-Space between Frames-Nesting Framesets-Showing or Hiding Scrollbars-Alternatives to Frames

Cascading Style Sheets: Introduction to CSS-Creating Style Sheets-Common Tasks with CSS-Colors-The Font Family-Assigning Classes-The Layer Tag-CSS Tags

UNIT – III

eXtensive Markup Language: Introduction-Features of XML-XML Support and Usage-Compatibility of XML with Others-Structure of XML Document-Common Errors-Structures in XML-Creating Document Type Declarations-Flow Objects-Length-Colour and Background Properties

UNIT – IV

ASP: How Active Server Pages Really Work?-Variables-Procedures-ASP Forms-Date Types-Operators. More on ASP: Introduction to Object Hierarchies-Getting Information from the Visitor-Sending Information to Visitors-ASP Applications-Getting in at the Top (Server Object)-Response Object Methods.

UNIT – V

Java Script and VB Script : Java Script: Introduction-Operators-Assignments-Comparisons-Reserved Words-Browsers to Use-Software Requirement-Starting with Java Script-Using Quotes, Alert-Functions-Eval Function-Using Statements in Java Script-Working with Objects-Properties-Browser objects-Date object-Math Object-String Object-Defining Objects-Handling Events in Java Script-Event Handling Attributes-Window Events-Working with Forms-Form Elements-User Actions-windows and Frames-Window Object-Frame Object-Document Object-Navigator Object-Screen Object-Using Images and Math-Images and Animation-Area Object-Math Object-Java Script Objects.

VB Script: Introduction-Adding VB Script code to HTML- Adding VB Script code to Documents-Data Types-Getting the Message Across.

Text Books

Thomas A.Powell, 2010, The Complete Reference HTML and CSS, 5th Edition, Tata MC-Graw Hill Publications, New Delhi.

Ramesh Bangia, 2010, Web Technology, 1st Edition, Firewall Media Publications, New Delhi.

David Flanagan, 2011, Javascript: The Definitive Guide, 6th Edition, O'Reilly Media.

References

Abbey Deitel, Harvey Deitel, Paul Deitel, 2012, Internet and World Wide Web: How to Program, 5th Edition, Prentice Hall.

Rohit Khurana, 2002, JavaScript, 1st Edition, A.P.H Publishing, New Delhi.

Xavier C, 2008, World Wide Web With HTML, 1st Edition, Tata MC-Graw Hill Publications, New Delhi.

Danny Goodman, 2003, Javascript Bible, 3rd Edition, IDG Books India(p) Ltd. New Delhi.

Achyut S. Godbole, 2003, Web Technologies , 2nd Edition, Tata Mc Graw Hill.

Chris Bates, 2007, Web programming Building Internet Applications, 3rd edition, Wiley.

Xavier C., 2003, Web Technology & Design, 1st edition, New Age Publication.

Web Sites

www.w3schools.com/
www.htmlcodetutorial.com/
alexle.net/archives/category/web-technolgy
jmarshall.com/easy/

Course Objectives (CO)

- To learn the concepts of classical encryption techniques and concepts of finite fields and number theory.
- To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
- To explore the design issues and working principles of various authentication protocols, PKI standards.
- To explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email.
- To learn the ability to use existing cryptographic utilities to build programs for secure communication.
- To know the concepts of cryptographic utilities and authentication mechanisms to design secure applications

Course Outcomes (COs)

After successful completion the student will be able to:

1. Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.
2. Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
3. Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes
4. Apply different digital signature algorithms to achieve authentication and create secure applications
5. Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols.
6. Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

UNIT I

Introduction to Cryptography – Security Attacks – Security Services – Security Algorithm – Stream cipher and Block cipher – Symmetric and Asymmetric – Key Cryptosystem; Symmetric Key Algorithms: Introduction – DES – Triple DES – AES – IDEA – Blowfish – RC5.

UNIT II

Public Key Cryptosystem: Introduction to Number Theory – RSA Algorithm – Key Management – Diffie-Hell man key exchange – Introduction to Elliptic Curve Cryptography; Message Authentication and Hash functions – Hash and Mac Algorithm – Digital Signatures and Authentication Protocol.

UNIT III

Network Security Practice: Authentication Applications – Kerberos – X.509 Authentication Services and Encryption Techniques;; E-mail security – PGP – s/MIME – IP Security.

UNIT IV

Web Security – Secure Socket Layer – Secure Electronic Transaction; System Security – Intruders and Viruses – Firewalls – Password Security.

UNIT V

Case Study: Implementation of Cryptographic Algorithms – RSA – DSA – ECC (C / JAVA Programming). Network Forensic – Security Audit; Other Security Mechanism: Introduction to Stenography – Quantum Cryptography – Water Marking – DNA Cryptography

Text Book

William Stallings, 2011, Cryptography and Network Security, 5th Edition. Pearson Education, New Delhi.

References

Bruce Schneir, 2002, Applied Cryptography, 1st Edition. CRC Press, New Delhi.

A.Menezes, P.Van Oorschot and S.Vanstone, 1997, Hand Book of Applied Cryptography, 1st Edition. CRC Press, New Delhi.

Ankit Fadia, 2003, Network Security, 1st Edition. McMillan India Ltd, New Delhi.

Web Sites

williamstallings.com/Crypto3e.html
u.cs.biu.ac.il/~herzbea/book.html

Course Objectives (CO)

- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To acquire knowledge of Application layer and Presentation layer paradigms and protocols.
- To study Session layer design issues, Transport layer services, and protocols.
- To gain core knowledge of Network layer routing protocols and IP addressing.
- To study data link layer concepts, design issues, and protocols.
- To read the fundamentals and basics of Physical layer, and will apply them in real time applications.

Course Outcomes (COs)

After successful completion the student will be able to:

1. Describe the functions of each layer in OSI and TCP/IP model.
2. Explain the functions of Application layer and Presentation layer paradigms and Protocols.
3. Describe the Session layer design issues and Transport layer services.
4. Classify the routing protocols and analyze how to assign the IP addresses for the given network.
5. Describe the functions of data link layer and explain the protocols.
6. Explain the types of transmission media with real time applications

Implement the following Program

1. To print the IP Address of the Machine
2. Implementation Of TCP/IP Echo
3. To convert Binary notation to Hexa Decimal
4. To simulate Sliding Window Protocol
5. To perform PC to PC communication using RS232 port.
6. To capture the Packets in the Network
7. Concurrent TCP/IP Day-Time Server
8. To implement Chatting using TCP Protocol
9. Design TCP Client and Server application to transfer file.
10. Design UDP Client Server to transfer a file.
11. Program to set and get socket options
12. To simulate ICMP Protocol

15CTU603 A	Core Elective III Satellite Communications	Semester VI			
		L T P C			
		5 0 0 5			

Course Objectives (CO)

- To provide an in-depth treatment of satellite communication systems operation and planning.
- To provide in-depth understanding of modern satellite multiple access, modulation and coding schemes.
- To learn the basics of satellite Networks
- To Review the state of the art in new research areas such as speech and video coding, satellite networking and satellite personal communications.
- To Understand the Digital carrier modulation and Quantization
- To Enhance the knowledge in communication with satellite and network systems

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Understand the background components required for efficient satellite communications
2. Analyze the satellite orbits
3. Understand Wave Propagation and Polarization
4. Analyze the earth segment and space segment
5. Analyze the satellite Link design
6. Understand the applications of satellites

UNIT I

Introduction: General background, frequency allocations for satellite services, basic satellite system, system design considerations, applications.

UNIT II

Satellite Orbits: Introduction, laws governing satellite motion, orbital parameters, orbital perturbations, Doppler effects, geostationary orbit, antenna look angles, antenna mount, limits of visibility, Earth eclipse of satellite, sun transit outage, inclined orbits, sun-synchronous orbit, launching of geostationary satellites.

UNIT III

Wave Propagation and Polarization: Introduction, atmospheric losses, ionospheric effects, rain attenuation, other impairments, antenna polarization, polarization of satellite signals, cross polarization discrimination, ionospheric depolarization, rain depolarization, ice depolarization.

UNIT IV

Satellite Antenna: Antenna basics, aperture antennas, parabolic reflectors, offset feed, double reflector antennas, shaped reflector systems.

UNIT V

Link Design: Introduction, transmission losses, link power budget equation, system noise, carrier to noise ratio for uplink and downlink, combined uplink and downlink carrier to noise ratio, inter modulation noise

Text Books

Dennis Roddy, 2002, Satellite Communications, 3rd edition, Mc-Graw Hill publication.

Michael Olorunfunmi Kolawole, 2014, Satellite Communication Engineering, Second Edition, CRC Press.

Reference

Gerard Maral, Michel Bousquet, 2009, Satellite Communications Systems: Systems, Techniques and Technology, 5th Edition, Wiley Publishers.

				Semester VI
				L T P C
15CTU603 B	Core Elective III	Geographical Information System	5	0 0 5

Course Objectives (CO)

- To learn about the key components of a GIS, including users, databases, software, and networks
- To learn basic to advanced spatial analytical methods, including interpolation and clustering
- To provide details of spatial data structures and input, management and output processes.
- To learn the need of data quality and standards to be followed in GIS
- To learn Vector Based GIS Data Processing method
- To learn the basic concepts of Principles of Electro Magnetic Remote Sensing

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Understand the basic concepts and components of GIS
2. Analyze various techniques used for storage of spatial data and data compression
3. Understand how to provide for input, manage and get output of spatial data
4. Concepts of spatial data quality and data standards
5. Understand integration of remote sensing and GIS model
6. Understand Digital Terrain Modeling

UNIT I

Definition of GIS And Related Terminology – The Evolution of GIS – Components of GIS – Approaches To The Study Of GIS. Maps and GIS: Map Scale – Classes of Map – The Mapping Process – Plane Coordinate Systems And Transformations – Geographic coordinate System of Earth – Map Projection - Establishing For A Spatial Frame Work For Mapping Locations on Earth : Geo referencing – Attribute Data For Thematic Mapping Digital Representation of Geographic Data Technical Issues Pertaining to Digital Representation of Geographic Data – Database And Database Management .

UNIT II

Data Quality And Data Standards: Introduction – Concepts and Definitions of Data Quality - Components of Geographic Quality – Assessment Of Data quality – Managing Spatial Errors – Geographic Data Standards – Geographic Data Standards And GIS Developments
Raster Based GIS Data Processing: Introduction – Acquiring And Handling Raster Geographic Data – Raster Based GIS Based Analysis – Output Functions Of Raster Data Processing – Cartographic Modeling

UNIT III

Vector Based GIS Data Processing: Introduction – Characteristics Of Vector Based GIS Data Processing – Vector Data Input Functions – Non topological GIS Analysis Function – Feature Based Topological Functions – Layer Based Topological Functions – Vector Based Output Functions – Application Programming

UNIT IV

Remote Sensing And GIS Integration : Introduction – Principles Of Electro Magnetic Remote Sensing –Remote Sensing System Classifications – Imaging Characteristics Of Remote Sensing Systems – Extraction Of Metric Information From Remotely Sensed Images –

Extraction Of Thematic (Descriptive Attribute) Information From Remotely Sensed Images – Integration Of Remote Sensing And GIS

UNIT V

Digital Terrain Modeling : Introduction – Definitions And Terminology – Approaches To Digital Terrain Data Sampling – Acquisition Of Digital Terrain Data – Applications Of Digital Terrain Models Spatial Analysis And Modeling : Introduction – Descriptive Statistics – Spatial Autocorrelation – Quadrant Counts And Nearest Neighbor Analysis – Trend Surface Analysis – Gravity Models – Network Analysis – GIS Modeling

Text Books

C.P.Lo.Albert K.W.Yeung, 2002, Concepts and Techniques of Geographic Information Systems, 1st Edition , Prentice Hall of India , New Delhi.

Paul A. Longley, Mike Goodchild, David J. Maguire, David W. Rhind, 2011, Geographic Information Systems and Science, Third edition, John Wiley & Sons.

References

Lan Heywood, Sarah Cornelius, Steve Carver, Srinivasa Raju, 2006, An Introduction to Geographical Information Systems, 2nd Edition, Pearson Education, New Delhi.

Kang-Tsung Chang, 2006, An Introduction to Geographical Information System, 3rd Edition, Tata Mcgraw Hill Edition , New Delhi.

15CTU603 C Core Elective III Real Time System Design	Semester VI			
	L	T	P	C
	5	0	0	5

Course Objectives (CO)

- To develop an understanding of various Real Time systems Application
- To obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
- To get in-depth hands-on experience in designing and developing a real operational system.
- To acquire knowledge about concepts related to OS such as Scheduling techniques, threads, memory management.
- To learn design techniques and perform Intertask communication.
- To learn role on real time database in various applications

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Understand concepts of Real-Time systems and modeling
2. Recognize the characteristics of a real-time system
3. Understand and develop document on an architectural design of a real-time system
4. Develop and document task scheduling, resource management, real-time operating systems and fault tolerant applications of Real-Time Systems.
5. Understand how synchronization can be done in real-time based system
6. Analyze evaluation techniques applied over Realtime system to measure its performance

UNIT I

Real Time Specification And Design Techniques: Introduction– Structure of a Real Time System –Task classes – Performance Measures for Real Time Systems – Estimating Program Run Times – Issues in Real Time Computing – Task Assignment and Scheduling – Classical uniprocessor scheduling algorithms –Fault Tolerant Scheduling.

UNIT II

Real Time Specification And Design Techniques: Natural languages – mathematical specification – flow charts – structured charts – pseudocode and programming design languages – finite state automata – data flow diagrams – petri nets – Warnier Orr notation – state charts – polled loop systems – phase / state driven code – coroutines – interrupt – driven systems – foreground/background system – full featured real time operating systems.

UNIT III

Intertask Communication And Synchronization: Buffering data – mailboxes – critical regions – semaphores – deadlock – process stack management – dynamic allocation – static schemes – response time calculation – interrupt latency – time loading and its measurement – scheduling is NP complete – reducing response times and time loading – analysis of memory requirements – reducing memory loading – I/O performance.

UNIT IV

Real Time Databases: Real time Databases – Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency control issues, Disk Scheduling Algorithms, Two – phase Approach to improve

Predictability – Maintaining Serialization Consistency – Databases for Hard Real Time Systems.

UNIT V

Evaluation Techniques: Reliability Evaluation Techniques – Obtaining parameter values, Reliability models for Hardware Redundancy – Software error models. Clock Synchronization – Clock, A Nonfault – Tolerant Synchronization Algorithm – Impact of faults – Fault Tolerant Synchronization in Hardware – Fault Tolerant Synchronization in software.

Text Books

Rajib Mall, 2007, Real-time systems: theory and practice, Pearson Education.

Hermann Kopetz, 2011, Real-Time Systems: Design Principles for Distributed Embedded Applications, Springer.

References

Philip.A.Laplante, 2004, Real Time System Design and Analysis, 3rd Edition, Prentice Hall of India.

Allen Burns, Andy Wellings, 2003, Real Time Systems and Programming Languages, Pearson Education.

Course Objectives(CO)

- To develop an understanding of the modern network technologies in common use today
- To identify potential and actual limitations with existing networks and identify advances in technology that may solve them
- To appreciate how computer networks can format and transfer data at high speed and over both the local and wide area
- To know the design principles of internetworking protocols
- To know the implementation details of IPv4, IPv6, and TCP
- To adapt the IP for Mobile applications

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Familiarize with the basic taxonomy and terminology of the computer networking area.
2. Understand various transmission media, their comparative study, fiber optics and wireless media
3. Understanding the concepts of IPv6, and how is it better than IP v4
4. Describe the devices and services used to support communications in data networks and the Internet
5. Understand the importance of security over internet and how IPv6 provide security mechanism to handle various vulnerabilities
6. Understand the role of Ipv6 over mobile computing technology.

UNIT I

The History of IPv6 - What's New in IPv6? - Why Do We Need IPv6? - Common Misconceptions - IPv6 Status and Vendor Support IPv6 Addressing - The IPv6 Address Space - Address Types - Unicast, Multicast and Anycast Addresses - Some General Rules - Address Notation - Prefix Notation - Global Routing Prefixes- Global Unicast Address - International Registry Services and Current Address Allocations - The Interface ID - Address Privacy - Special Addresses - IPv6 Addresses with Embedded IPv4 Addresses - 6to4 Addresses

UNIT II

The Structure of the IPv6 Protocol : General Header Structure - The Fields in the IPv6 Header - Extension Headers - Hop-by-Hop Options Header - Routing Header - Fragment Header - Destination Options Header - New Extension Header Format - Processing of Extension Headers and Header Chain Length ICMPv6 - General Message Format - ICMP Error Messages - Destination Unreachable - Packet Too Big - Time Exceeded - Parameter Problem - ICMP Informational Messages - Echo Request Message - Echo Reply - Router Solicitation and Router Advertisement - Neighbor Solicitation and Neighbor Advertisement - The ICMP Redirect Message - Inverse Neighbor Discovery - Neighbor Discovery Options - Secure Neighbor Discovery

UNIT III

Security with IPv6: General Security Concepts - General Security Practices - IPsec Basics - Security Associations - Key Management - IPv6 Security Elements - Authentication Header -

Encapsulating Security Payload Header - Combination of AH and ESP - Interaction of IPsec with IPv6 Elements - IPv6 Security “Gotchas” - Native IPv6 - Transition and Tunneling Mechanisms - Enterprise Security Models for IPv6 - The New Model - Using Directory Services for Controlling Access - IPv6 Firewall Filter Rules

UNIT IV

Transition Technologies - Dual-Stack - Tunneling Techniques - How Tunneling Works - Automatic Tunneling Configured Tunneling - Encapsulation in IPv6 - Tunneling Mechanisms - Network Address and Protocol Translation - Stateless IP/ICMP Translation - NAT to Extend IPv4 Address Space - NAT as an IPv6 Translation Mechanism - NPTv6 and NAT66 - Other Translation Techniques - Load Balancing - Comparison - Dual-Stack - Tunneling - Translation

UNIT V

Mobile IPv6: Overview – Mobile Ipv6 Terms – How Mobile Ipv6 Works – The Mobile Ipv6 Protocol – Mobility Header and Mobility Messages – The Binding Update Message – The Binding Acknowledgment – The Binding Revocation – Mobility Options – Routing Header Type 2 – ICMPv6 and Mobile Ipv6 – Home Agent Address Discovery – Mobile Prefix Solicitation – Changes in Neighbor Discovery (ND) – Mobile Ipv6 Communication – Binding Cache – Binding Update List – Return Routability Procedure – Home Agent Operation – Mobile Node Operation – Security – Extensions to Mobile Ipv6

Text Book

Silvia Hagen, 2014, IPv6 Essentials, 3rd Edition, O’Reilly Media, Inc, United States of America

References

Rick Graziani, 2013, IPv6 Fundamentals: A Straightforward Approach to Understanding IPv6, 1st Edition, Cisco Press, United States of America

Peter Loshin, 2004, IPv6: Theory, Protocol, and Practice, 2nd Edition, Elsevier Publication.

Course Objectives (CO)

- To provide students with basic concepts in information system and the benefits with these systems in modern society
- To differentiate between data, information, and knowledge
- To understand systems definition, systems requirements, and information needed for decision maker
- To understand several requirement and operations that the analyst needed to analyze, design, and implement the systems in what is called system development life cycle (SDLC)
- Appraise the interrelationships among elements that comprise a modern security system, including hardware, software, policies, and people
- Assess the role of strategy and policy in determining the success of information security

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. The students can understand the basic of computer network threat and vulnerability and overview of digital crime.
2. The students can understand the various types of cyber-attacks and criminals planning activities for cracking the system.
3. The students can understand the cryptography and its application and some of the important terms used in information security
4. Understand various Information Security Policies
5. Identify, Assess and control risk that occur while handling information transmission
6. Understand various security technologies available to handle different types of threats

UNIT I

INTRODUCTION : History, What is Information Security?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II

SECURITY INVESTIGATION : Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and obstacles to security, Ten steps to building a secure organization.

UNIT III

SECURITY ANALYSIS : Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV

LOGICAL DESIGN : Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security

Architecture, Planning for Continuity

UNIT V

PHYSICAL DESIGN : Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Text books

Michael E Whitman and Herbert J Mattord, 2003, Principles of Information Security, Vikas Publishing House, New Delhi.

John R. Vacca, 2013, Computer and Information Security Handbook, Elsevier.

References

Micki Krause, Harold F. Tipton, 2004, Handbook of Information Security management”, Vol 1-3, CRC Press LLC.

Stuart Mc Clure, Joel Scrambray, George Kurtz, 2003, Hacking Exposed, Tata McGraw-Hill.

Matt Bishop, 2002, Computer Security Art and Science, Pearson/PHI.

Course Objectives (CO)

- To know the fundamentals of Knowledge Managements and its applications.
- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To learn the Evolution of Knowledge management.
- To learn and assess various types of security threats in information security

Course Outcomes (COs)

After the completion of this course, a successful student will be able to

1. Identify and analyze the applications of knowledge management (KM)
2. Understand knowledge management models and technologies to business situations.
3. Create a KM system to capture and evaluate knowledge of Expert
4. Understand the basic concepts in information system and the benefits with these systems in modern society
5. Analyze information security needs of an organization.
6. Understand the need of security mechanism and risk management.

UNIT I

Knowledge Management Km Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT II

Knowledge Management System Life Cycle Challenges in Building KM Systems – Conventional Vs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT III

Capturing Knowledge Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding

UNITIV

Information Security History, What is Information Security ?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT V

Security Investigation Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues – Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

Text Books

Elias.M. Award & Hassan M. Ghaziri, 2008, Knowledge Management, 2nd Edition Pearson Education , India.

Michael E Whitman and Herbert J Mattord, 2011, Principles of Information Security, 2nd Edition, Vikas Publishing House, New Delhi.

References

C.W. Holsapple, 2009, Handbooks on Knowledge Management, 1st Edition, International Handbooks on Information Systems.

Guus Schreiber, 2001, Knowledge Engineering and Management, 3rd Edition University Press .

Course Objectives (CO)

- To learn basic system concept and definitions of system simulation and modeling
- To learn various methods to generate and test random variable
- Techniques to model and to simulate various systems
- The ability to analyze a system and to make use of the information to improve the performance.
- To learn Discrete, Poisson, Geometric, Gamma distribution methods to design a simulation model
- To learn simulation language and generate model

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the principles within computer modelling and simulation
2. Generate and test random number by applying various techniques
3. Understand and evaluate various distribution models
4. Create a manual simulation even scheduling
5. Design and evaluate simulation experiments
6. Implement simulation case studies and analyze the result

UNIT I

Principle of computer modeling and simulation, Monte Carlo simulation. Nature of computer modelling and simulation. Limitations of simulation, areas of application. System and environment – components of a system – Discrete and continuous systems. Models of a system – A variety of modelling approaches.

UNIT II

Random number generation, technique for generating random numbers – Midsquare method – The midproduct method – Constant multiplier technique – Additive congruential method – Linear congruencies method – Tests for random number – The Kolmogorov Smirnov test – The chi-square test. Random variable generation – Inverse transform technique – Exponential distribution – Uniform distribution – Weibull distribution, empirical continuous distribution – Generating approximate normal variates.

UNIT III

Empirical discrete distribution – Discrete uniform distribution – Poisson distribution – Geometric distribution – Acceptance – Rejection technique for Poisson distribution – Gamma distribution.

UNIT IV

Design and evaluation of simulation experiments – Input – Output analysis – Variance reduction technique – Verification and validation of simulation models. Discrete event simulation – Concepts in discrete – event simulation – Manual simulation using event scheduling, single channel queue, two server queue, simulation of inventory problems.

UNIT V

Simulation languages – GPSS – SIMSCRIPT – SIMULA – Programming for discrete

event systems in GPSS and C. Case Study : Simulation of LAN – Manufacturing system – Hospital management system.

Text Books

Jerry Banks and John S. Carson II, 1984, Discrete Event System Simulation, Prentice Hall Inc.

Narsingh Deo, 1979, System Simulation with Digital Computer, Prentice Hall of India.

Andrei Borshchev, 2013, The Big Book of Simulation Modeling: Multimethod Modeling with AnyLogic 6, AnyLogic North America.

References

Peter Fritzson, 2011, Introduction to Modeling and Simulation of Technical and Physical Systems with Modelica, Wiley-IEEE Press.

Francis Neelamkovil, 1987, Computer Simulation and Modeling, John Wiley & Sons.

Averil M. Law and W. David Kelton, 1991, Simulation Modeling and Analysis, McGraw Hill International Editions.

பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
முதல்பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes)

15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

- Learn to reflect on the literary works and communicate flexibly.
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Text Book

Rao, G. Chandralekha and et al. Spring 2013. Emerald Publishers: Chennai.

Reference

Syamala. V, 2006, English for Communication, Emerald Publishers, Chennai.

Semester – I

L T P C

15ITU101

Problem Solving Using C

5 0 0 5

Course Objectives (CO)

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming logic.
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To understand memory allocation concepts through pointers
- To teach the issues in file organization and the usage of file systems

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Gain experience about structured programming
2. Develop efficient algorithms for solving a problem.
3. Use the various constructs of a programming language viz. conditional, iteration and recursion.
4. Implement the algorithms in C” language.
5. Use simple data structures like arrays, stacks and linked list in solving problems.
6. Handle file in C.

UNIT-I

Programming and Problem Solving: Introduction to Computer based Problem Solving- Problem definition – Problem Solving- goals and objectives – problem identification and definitions. Algorithms for Problem definition – Program design and Implementation issues. Programming Environment – Computer Programming Languages – Types of Programming Languages – Compilers – interpreters. Construct algorithms for the following: Addition and Multiplication of Two numbers – Check for Odd or Even numbers – Check for Prime numbers – Summation of Set of Numbers.

UNIT-II

Introduction to C: Introduction - An Overview of C – Keywords and Identifier – Variables - Declarations of Variables - User Defined Type Declarations - Typedef – Enum - Constants – Data Types – Operators – Expressions - C Formatted I/O Operations. Decision Making and

Branching Statements – Decision Making and Looping Statements - Arrays-Strings - String Handling Functions.

UNIT-III

Functions, Structures and Union: Functions - Introduction - Definition of Functions - Function Declaration - Category of Functions - Nesting of Functions – Recursion - Passing Arrays to Function. Storage Classes – Auto-extern-static-register. Structures and Unions – Introduction - Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Arrays of Structure – Unions.

UNIT-IV

Pointers: Pointers – Introduction – Declaring Pointer Variables - Pointer and Arrays - Pointers and Strings – Array of Pointers - Functions and Pointers - Function Returning Pointers -Pointers to functions - Pointers and Structures

UNIT-V

File Management: File Management in C – Introduction - Opening a File - Closing a file – Input/output operations on files - Error handling during I/O Operations - Random Access to Files - Command Line Arguments - Dynamic Memory Allocation.

Text Books

Ashok N. Kamthane, 2013, IITL Education Solutions Limited. C Programming. 1st Edition, Pearson Education, New Delhi. (Page Nos.: 1-18, 29-37, 259-261, 269-282, 291-310, 317-334, 341-365, 373-404, 415-452, 467-473, 481-500, 519-540, 551-559, 581-597, 617-631, 673-719).

Balagurusamy .E, 2007, Programming in ANSI C, 4th Edition, Tata McGraw Hill Publishers, New Delhi. [Unit – I (23-81), Unit – II (114-259), Unit – III (262-348), Unit – IV (351-388), Unit – V (389-442)].

Balagurusamy .E, 2012, Programming in ANSI C, 6th Edition, Tata McGraw Hill Publishers, New Delhi.

References

R.G.Dromey, 2009, How to solve it by Computer, Pearson Education, New Delhi.

Ashok N. Kamthane, 2004, Programming with ANSI and Turbo, 1st Edition, Pearson Education, New Delhi. [Unit – I (7-60), Unit – II (63-277), Unit – III (318-446), Unit – IV (281-315), Unit – V (451-525)].

Yeswanth Kanetkar, 2007, Let Us C, 8th Edition, BPB Publications, New Delhi. [Unit – I (1-39,489-513), Unit – II (49-312,335-362), Unit – III (155-392), Unit – IV (155-198), Unit – V (423-462)].

Karthikeyan.E, 2008, Textbook on C: Fundamentals, Data structure & Programming, 1st Edition, PHI Publications, New Delhi. [Unit – I (3-31), Unit – II (57-141), Unit – III (147-176,233-254), Unit – IV (191-229), Unit – V (261-287)]

Web Sites

<http://www.cs.cf.ac.uk/Dave/C/CE.html>

<http://www2.its.strath.ac.uk/courses/c/>

<http://www.iu.hio.no/~mark/CTutorial/CTutorial.html>

Course Objectives (CO)

- To impart adequate knowledge on the need of programming languages and problem solving techniques.
- To develop programming logic
- To develop programming skills using the fundamentals and basics of C Language.
- To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.
- To understand memory allocation concepts through pointers
- To teach the issues in file organization and the usage of file systems

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Gain experience about structured programming
2. Develop efficient algorithms for solving a problem.
3. Use the various constructs of a programming language viz. conditional, iteration and recursion.
4. Implement the algorithms in C language.
5. Use simple data structures like arrays, stacks and linked list in solving problems.

Handle file in C.

1. Write a program to find factorial of a given number using recursive and non recursive
2. Write a program to generate Fibonacci series.
3. Write a program to print Multiplication table using for and Do While Loops
4. Write a program to find the roots of quadratic equation
5. Write a program to find Maximum number without using arrays
6. Write a program to convert a given number into words
7. Write a program to calculate SIN(x) without using library function
8. Write a program
 - (i) to find the length of a string
 - (ii) concatenation of two strings
9. Write a program to reverse the given string
10. Write a program to count the vowels in a given sentence
11. Write a program to check the given string is palindrome or not
12. Write a program to perform matrix multiplication
13. Write a program to perform Stack Operations

14. Write a program to sort and search the number using Binary search.
15. Using any one sorting method to sort given 'n' numbers using pointers.
16. Write a program to prepare an employee pay slip using structures
17. Write a program for Electricity Bill Preparation using files
18. Write a program for the Odd and even numbers are stored in separate files the original files.

Course Objectives (CO)

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D & D/A Converters and its Applications.
3. Solve the problems using Boolean algebra
4. Understand the basic computer organization and design.
5. Learn about Cache memory and its importance
6. Solve the binary arithmetic problems and conversion among the number systems

UNIT I – Number System and Codes

Introduction to Digital concepts – Number Systems: Decimal, Binary, Octal and Hexadecimal Numbers – Conversion – 1's and 2's Complements of Binary Numbers – Binary Arithmetic with Signed and Unsigned Numbers – Codes: Binary Coded Decimal (BCD) — Excess-3 – Gray Code — ASCII Codes — Error Detection and Correction Codes.

UNIT II – Logic Gates and Boolean Algebra

Introduction to Logic Gates – OR, AND, NOT, NAND, NOR, EX-OR and EX-NOR Gates. Boolean Logic and Expression, Laws and Rules of Boolean Algebra, DeMorgan's Theorem – Simplification using Boolean Algebra – Karnaugh Map.

UNIT III – Combinational Logic Circuits

Basic overview of Logic functions – Basic Adders & Subtractor – Parallel Binary Adder – 4-bit Binary Adder/Subtractor – Comparators – Encoders and Decoders – Code Converters – Multiplexers and Demultiplexers — Parity Generators/Checkers.

UNIT IV – Sequential Logic Circuits

Flip-flops: RS – Clocked RS – Edge-triggered RS, D, and JK – JK Master-Slave flip flops – Registers and its Types – SISO, SIPO, PISO, PIPO – Shift Registers and its Types – Ring Counters – Asynchronous and Synchronous Counter – UP/DOWN Counter- Ring Counter.

UNIT V – D/A, A/D Converters

Digital to Analog converters: Resistor Networks - Binary Ladder – Analog to Digital converters: Counter type – Ramp type – Successive Approximation Type.

Text Books

Salivahanan, 2014, Digital Electronics and its Principles, 7th Edition, Tata McGraw Hill.

Albert Paul Malvino, Donald P. Leach and Goutam Saha, 2010, Digital Principles and Application , 7th Edition, Tata McGraw Hill.

Morris Mano, 2013, Digital Design: With an Introduction to Verilog HDL, 5th Edition, Pearson Education..

References

Jain R.P, 2012, Modern Digital Electronics, Fourth Edition, Tata McGraw Hill Company.

Botkar K.R, 2008, Integrated Circuits, Fourth Edition, Khanna Publications.

(Any 8 Experiments)**Course Objectives (CO)**

- To enable the students to gain knowledge on the architecture of modern computer.
- To understand how computer stores positive and negative numbers and to perform arithmetic operation of positive and negative numbers.
- To learn about logic gates and solve problems using Boolean algebra.
- To understand the simplification of circuits like adders, subtractors, multiplexers, encoders.
- To understand the basic computer organization and design.
- To learn Cache memory and its importance

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. To provide a strong foundation in construction of Sequential and Combinational Circuits.
 2. To familiarize with the function of Gates, Flip Flops, Shift Registers, Counters, A/D& D/A Converters and its Applications.
 3. Solve the problems using Boolean algebra
 4. Understand the basic computer organization and design.
 5. Learn about Cache memory and its importance
 6. Solve the binary arithmetic problems and conversion among the number systems
-
1. Verification of basic gates
 2. Realization of Logic Gates Using Universal Gates
 3. Adder using Gates
 4. Subtractor using Gates.
 5. Multiplexer
 6. Demultiplexer
 7. Encoder
 8. Decoder
 9. Study of Flip-flops
 10. Binary to Gray and Gray to Binary Converter

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100**Course Objectives (CO)**

- To teach and inculcate the importance of value based living and sustainable lifestyle.
- To give students a deeper understanding about the purpose of life.
- To teach and inculcate the essential qualities to become a good leader.
- To be responsible citizens with clear conviction to practice values and ethics in life.
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Students will understand the importance of value-based living.
2. Students will gain deeper understanding about the purpose of their life.
3. Students will understand and start applying the essential steps to become good leaders.
4. Students will emerge as responsible citizens with clear conviction to practice values and ethics in life.
5. Students will become value-based professionals
6. Students will contribute in building a healthy nation

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

15SSD101	Soft Skill Development - I	Semester-I L T P C 2 0 0 0
-----------------	-----------------------------------	---

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை. 1. இலை இல பிடவம், திணை - முல்லை,

ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுண்ணோர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பணிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,

ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.

2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,

நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.

3. சமயமும் தமிழும் - பேராசிரியர் அ.ச. ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக் கட்டுரைகள்

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21, India

Course Objectives (CO)

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcome (COs)

After the completion of this course, a successful student will be able to:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Text Book

Board of Directors , 2014,. Wings of Communication, Emerald Publishers: Chennai

Reference

Syamala, V., 2006, English for Communication, Emerald Publishers: Chennai.

15ITU201	Object Oriented Programming with C++	Semester – II			
		L T P C			
		5 0 0 5			

Course Objectives (CO)

- The objective of this course is to provide the student with the fundamental knowledge and skills to become a proficient C++ programmer.
- The student will learn to transpose the physical problem domain into a hierarchy of objects.
- Industry standard software engineering techniques will be presented and used to architect the system design.
- Objects, their behaviors, and their relationships, will be modeled and these models will be programmed into a functional application that the student will compile, modify, enhance and run.
- The student will program in a structured style whereby reinforcing the concepts of software quality, reliability and maintainability.
- To learn file handling in C++.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Understand how to manage console I/O operations.
6. Use the concepts of preprocessor directives and macros.

UNIT I

Introduction: Principles of object-oriented programming: Basic concepts of object-oriented programming – Benefits of OOP – Applications of OOPs – Structure of C++ Program C++ Tokens – Control Statement – Decision Making Statements- Loop Statements - Inline Functions – Function Overloading.

UNIT II

Control Structure, Functions and Constructors: Classes and Objects: Specifying a class – Creating Objects – Accessing Class Members – Defining Member Functions – Static Data Members – Static Member Functions - Array of Objects – Friend Functions. Constructors and Destructors: - Constructors – Parameterized Constructors - Multiple Constructors in a Class – Constructors with Default Arguments - Copy Constructor - Dynamic Constructor – Destructors.

UNIT III

Operator Overloading and Inheritance: Operator overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. Inheritance: - Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

UNIT IV

Pointers and I/O Operations: Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual functions- Pure Virtual Functions. Managing console I/O operations :- C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

UNIT V

File Management: Files: Classes for file stream operations – Opening and Closing a file – sequential input and output operations – updating a file random access – Command Line Arguments. Templates and Exceptions:- Templates – class templates – function templates – member function templates – exception handling.

Text Books

K.R.Venugopal and Rajkumar Buyya, 2013, Mastering C++ 2nd Edition, Tata Mc Graw Hill Education, New Delhi.

Balagurusamy. E, 2007, Object Oriented Programming with C++, 3rd Edition, Tata McGraw Hill publishing company Ltd, New Delhi. [Unit-I (7-14, 26 – 27, 32-52, 59- 82), Unit-II (88-147), Unit-III (151-207), Unit-IV (222-270), Unit V (277-340)].

Balagurusamy. E, 2013, Object Oriented Programming with C++, 6th Edition, Tata McGraw Hill publishing company Ltd, New Delhi.

References

Ashok N. Kamthane, 2009, Object Oriented Programming with ANSI and Turbo C++, 2nd Edition, Pearson Education, New Delhi.[Page Nos.:1-14, 19-32, 96-113,115-130,144-164, 171-187, 201-240, 251-281,290-317]

Yashavant Kanetkar, 2000, Let Us C++, 2nd Edition, BPB Publications. [Unit-I,(2-13, 19-80), Unit-II(87-96,177-182), Unit-III(187-197,261-304), Unit-IV(321-360),Unit V(385-463,540-566,571-586)].

Nabajyothi Barkakoti, 2001, OOPS in C++, 2nd Edition, Tata McGraw Hill Publishers. [Unit-I(3-39), Unit-II(161-179,189-206), Unit-III(209-223,231-254), Unit-IV(277-289),Unit V(295-325)].

Pearl software, 2002, OOP in C++, First Edition, Khanna Book Publishing Co(Pvt.) Ltd. Delhi. [Unit-I(1-67,83-92), Unit-II(185-220,223-237), Unit-III(241-247,251-265,293-307), Unit-IV(269-289),Unit V(309-319,321-333,337-345,347-369)].

Web Sites

www.daniweb.com
www.eships.com
www.allexperts.com

Course Objectives

- To understand how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to write a function and constructors.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Understand how to manage console I/O operations.
6. Use the concepts of preprocessor directives and macros.

Write a C++ Program for the Following Concepts

Object and classes:

1. Create a class to implement the data structure STACK . Write a constructor to initialize the top of the stack to zero .Write a member function PUSH() to insert an element and a member function POP() to delete an element.
2. Create a class ARITH which consists of a FLOAT and an INTEGER variable. Write member functions ADD(),SUB(),MUL(),DIV(),MOD() to perform addition, subtraction, multiplication, division and modulus respectively. Write member functions to get and display MAT() object values.

Operator overloading:

3. Create a class MAT as a 2D matrix and R, C represents rows and columns of the matrix. Overload the operators +,-,* to add, subtract, multiply two matrices. Write member functions to get and display MAT() object values.
4. Create a class STRING. Write member functions to initialize to get and display strings. Overload the operator + to concatenate two strings, == to compare two strings and a member function to find the length of the strings.

Inheritance:

5. Create a class which consists of EMPLOYEE detail like eno, ename, dept, basic salary, grade. Write member functions to get and display them. Derive a class PAY from the above class and Write member functions to calculate da , hra, pf depending on the grade and display the pay slip in a neat format using console I/O.
6. Create a class SHAPE which consist of two virtual functions cal_Area() and cal_Peri() to calculate area & perimeter of various figures. Derive three classes SQUARE,RECTANGLE and TRIANGLE from the class SHAPE and calculate area and perimeter of each class separately and display the result.

7. Create two classes which consist of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a FRIEND function common to both classes which takes the object of the above two classes as arguments and the integer and float values of both the objects separately and display the result.

Console I/O:

8. Write a user-defined function USERFUN() which has the formatting commands like setw(), showpos(), precision(). Write a program which prints a multiplication table and uses userfun() for formatting.

Files:

9. Write a program to perform insertion, deletion and updation of records using files.

10. Write a program which takes a file as argument and copies into another file with line numbers using command line arguments.

Templates:

11. Write a Program to swap the numbers using the concept of function template.

Course Objectives (CO)

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Ability to write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

UNIT I – 8051 Microcontroller

Introduction to Microcontroller and Embedded Processors – Microcontroller for Embedded Systems – Overview of 8051 Family – 8051 Architecture – 8051 flag bits and PSW Register - Register Bank and Stack.

UNIT II –8051 Programming

8051 Assembly and C Programming – Instruction Set –Address Modes - Loop and Jump Instructions - Arithmetic Instruction - Logic Instructions - Single Bit Instructions. Data Types and Directives - I/O Port Programming.

UNIT III – Internal Peripherals of 8051

Basic Registers of Timer - Programming 8051 Timer-Counter Programming – Basics of Serial Communication – 8051 Connection to RS232 - 8051 Serial Communication Programming – 8051 Interrupts - Programming External Hardware Interrupts.

UNIT IV – Applications

Interfacing LCD to the 8051 – Interfacing ADC – Sensors to 8051- Interfacing Stepper Motor - 8051 Interfacing to the Keyboard - Interfacing DAC to the 8051.

UNIT V – Real-Time Operating System

Survey of Software Architecture: Round Robin-Round Robin with Interrupts-Function – Queue Scheduling Architecture - Introduction of RTOS - RTOS Architecture -Task and Task States - Task and Data - Semaphores and Shared Data - Message Queues, Mailboxes and Pipes - Timer Function – Events - Memory Management.

Text Books

Mohammed Ali Mazidi and Janice Gillispie Mazidi, 2008, The 8051 Microcontroller and Embedded Systems, Third Edition , Pearson Education, Singapore.

Ayala, 2010, The 8051 Architecture and its Applications, Sixth Edition, Prentice Hall of India, New Delhi.

References

Embedded Microcontroller, 2008, Intel Manual – Volume I and II,.

Dr. Rajiv Kapadia, Jaico, 2004, The 8051 Microcontroller and Embedded Systems, First Edition, Publishing House, Mumbai.

Course Objectives (CO)

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Learn the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

UNIT I – Micro Computer System

Introduction to Micro Computer System – Computer Organization – Number Systems and Codes Memory – Arithmetic and Logic Unit – Control Unit.

UNIT II – Peripheral Devices

Introduction to Peripheral Devices – Keyboard – CRT Display monitor – Printer – Magnetic Storage Devices – Floppy Disk Drive – Hard Disk Drive – Peripherals Interfaces and Controller – Keyboard Interface

UNIT III – Display Adapter

CRT Display — CRT Controller –Auxiliary Subsystems – Data Communication fundamentals – Serial Port in PC – Real time clock (RTC) – Magnetic Tape Subsystems – LAN – Memory Expansion Options

UNIT IV – Installation and Preventive Maintenance

Pre Installation Planning – Installation Practice – Routine Checks – Special Configurations – Memory Up Gradation

UNIT V – Trouble shooting

Troubleshooting – Computer faults – Nature of faults – Types of Faults Diagnostic Programs and Tools — Faults in Elimination Process – Systematic Troubleshooting – POST (Power on Self Test)

Text Books

B. Govindarajalu, 2011, IBM PC and Clones, Second Edition, Tata McGraw Hill Publishing Company.

Michael Meyers, 2003, Introduction to PC Hardware and Troubleshooting, First Edition, The Mike Meyers' Computer Skills, McGraw Hill.

Reference

Sanjay K. Bose, 1999, Hardware and Software of Personal Computers, New Age International Publishers.

Course Objectives (CO)

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

UNIT I – Introduction to 8-bit Microprocessor

Introduction to 8085 – Pin Diagram –Architecture – Demultiplexing the Bus –Generation of Control Signals – Fetching, Decoding and Execution of Instruction – Instruction Timing and Status Flag.

UNIT II – Addressing Modes

Instruction Set – Addressing Modes – Instruction Format – Simple Program – Memory Read Machine Cycle – Memory Unit s Machine Cycle.

UNIT III- Interfacing Concepts

Peripheral I/O Instructions – Device Selection And Data transfer – Types of Data Transfer - Input Interfacing – Input Interfacing Using Decoders – Output Interfacing: LED and 7 Segment Display – Interfacing Memory.

UNIT IV Peripheral Devices

Introduction to Programmable Peripheral Interface 8255 – Pin Diagram –Architecture – Modes of Operation: I/O and BSR – Architecture and Operation of 8251(USART). Architecture and Operation of Programmable Interrupt Controller (8259) – Architecture of 8254(8253) Programmable Interval Timer/Counter –DMA Controller(8279).

UNIT V- Applications

Time Delay Program – Traffic Light Control System – Water Level Controller – Stepper Motor Control – Interfacing DAC –Interfacing ADC – Temperature Measurement.

Text Books

Ramesh S Gaonkar, 2000, Microprocessor Architecture, Programming and Application with 8085, Fourth Edition, Penram International Publishing, New Delhi.

M.K.Gupta, 2006, Microprocessor, Microcomputer, Microcontroller and Interfacing, First Edition, Paragon International Publisher, New Delhi.

References

Adithya P.Mathur , 2004, Introduction to Microprocessors, Second Edition, Tata Mc Graw Hill Publishers, New Delhi.

Ram.B, 2000, Fundamentals of Microprocessor and Microcontroller, Second Edition, Dhanpat Rai Publication, Mumbai.

15ITU212A	Allied Elective Lab - Embedded Systems Lab	Semester II L T P C 0 0 3 2
------------------	---	--

Course Objectives (CO)

- To have knowledge about the basic working of a microcontroller system and its programming in assembly language.
- To provide experience to integrate hardware and software for microcontroller applications systems.
- To learn the various Concepts of Embedded System
- To acquire knowledge about microcontrollers embedded processors and their applications.
- To develop the Programming Skills in 8051 Microcontroller.
- To provide a strong knowledge in the field of Real Time Operating System.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the internal architecture and interfacing of different peripheral devices with Microcontrollers.
2. Write the programs for microcontroller.
3. Understand the concepts of embedded systems
4. Understand the role of embedded systems in industry.
5. Understand the design concept of embedded systems
6. Integrate hardware and software for microcontroller applications systems.

1. Addition of 8/16 Bit Array of Data
2. Subtract of 8/16 Bit Array of Data
3. Multiplication & Division
4. Ones and Two's Compliment
5. Data Transfer using Parallel Port
6. Sorting of Numbers
7. Stepper Motor Interface
8. Wave Form Generation
9. Biggest and Smallest Number in an Array
10. D/A Converter

15ITU212B Allied Elective Lab - PC hardware and Troubleshooting Lab	Semester II				
	L	T	P	C	
	0	0	3	2	

Course Objectives (CO)

- To learn the fundamentals of PC Hardware.
- To develop base knowledge in the installation of peripheral devices.
- To get a detailed knowledge of all the hardware components that make up a computer
- To understand the different interfaces required for connecting the hardware devices.
- To understand the components on the motherboard
- To provide a strong knowledge in Trouble shooting of PC

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the modern computer organization, processor and memory concept, Peripherals and recent system architecture
2. Identify the existing configuration of the computers and peripherals for upgrading the same as and when required.
3. Develop base knowledge in the installation of peripheral devices.
4. Learn the hardware components that make up a computer
5. Understand the different interfaces required for connecting the hardware devices.
6. Trouble shoots PC when required.

(Any 8 Experiments)

1. Identifying External Ports and Interfacing
2. Identifying PC cards and Interfacing.
3. Assembling of PC
4. Preventive Maintenance of a PC
5. Trouble Shooting of SMPS
6. Keyboard Servicing
7. Study of CRT
8. Communication and Bus Interfacing
9. Partitioning and Formatting Hard disks.
10. Installing System And Application Software

Allied Elective Lab - Microprocessor and Interfacing Lab

Course Objectives (CO)

- To apply the fundamentals of assembly level programming of microprocessors.
- To build a program on a microprocessor using arithmetic & logical instruction set of 8086.
- To develop the assembly level programming using 8086 loop instruction set.
- To write programs based on string and procedure for 8086 microprocessor.
- To analyze abstract problems and apply a combination of hardware and software to address the problem
- To make use of standard test and measurement equipment to evaluate digital interfaces

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Apply the fundamentals of assembly level programming of microprocessors.
2. Build a program on a microprocessor using arithmetic & logical instruction set of 8086.
3. Develop the assembly level programming using 8086 loop instruction set.
4. Write programs based on string and procedure for 8086 microprocessor.
5. Analyze abstract problems and apply a combination of hardware and software to address the problem
6. Make use of standard test and measurement equipment to evaluate digital interfaces

(Any 8 Experiments)

1. Addition of 8/16-bit and Array of Data
2. Subtraction of 8/16-Bit Number
3. Multiplication of 8-Bit Number
4. Division of 8-bit Number
5. Fill and Transfer an Array of Data.
6. Ascending and Descending of an Array.
7. Data Transfer using Parallel Ports.
8. Stepper Motor Interface
9. Traffic Light Controller
10. A/D Convertor and D/A Convertor

Course Objectives (CO)

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabiltilisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
 2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
 3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
 4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
 5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.
-

		Semester-II
		L T P C
15SSD101	Soft Skill Development - I	2 0 0 1

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Course Objectives (CO)

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcome (COs)

After the completion of this course, a successful student will be able to:

- Learn the basics and purposes of listening skill.
- Understand importance of speaking.
- Develop the speaking skills on telephone, business and also in travel
- Learnt some effective vocabulary learning strategies.
- Communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

References

Language in Use: Kenneth Anderson, Cambridge University Press.

Kenneth Anderson, Joan MacLean and Tony Lynch, 2008, Study Speaking: A course in Spoken English for Academic Purpose, Cambridge University Press.

Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.

Dr. J. John Love Joy, Dr. Francis M. Peter S.J. 2007, “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindugul..

Course Objectives (CO)

- To assess how the choice of data structures and algorithm design methods impacts the performance of programs
- To choose the appropriate data structure and algorithm design method for a specified application.
- To study the systematic way of solving problems, various methods of organizing large amounts of data.
- To employ the different data structures to find the solutions for specific problems.
- To solve problems using data structures such as linear lists, stacks, queues.
- To understand the usage of Tree and Binary tree and search operations.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Choose appropriate data structure as applied to specified problem definition.
2. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. To design and apply appropriate data structures for solving computing problems
4. To analyze algorithms and to determine algorithm correctness and time efficiency class.
5. Use linear and non-linear data structures like stacks, queues, linked list etc.
6. Illustrate various technique to for searching and Sorting

UNIT I

Overview of Data Structures: Introduction to Data Structures: Introduction to the Theory of Data Structures Data Representation-Abstract Data Types-Data Types-Primitive Data Types-Difference between Abstract Data Types, Data Types, Data Structures. Programming and Analysis of Algorithms: Program Design-Algorithms-Different Approaches to Designing an Algorithm-Complexity-Big 'O' Notation-Algorithm Analysis-Structured Approach to Programming-Recursion-Tips and Techniques for Writing Programs in C.

UNIT II

Arrays and Linked Lists: Arrays: Introduction to Linear and Non-linear Data Structures-Arrays in C- one Dimensional Arrays-Array Operations-Two Dimensional Arrays-Multi Dimensional Arrays-Pointers and Arrays. Linked List: Introduction to Lists and Linked Lists-Dynamic Memory Allocation-Basic Operations-Double Linked Lists-Circular Linked Lists-Linked List in arrays-Linked Lists versus Arrays.
Polynomials and Sparse Matrix: Introduction-Representation of Polynomials.

UNIT III

Stack and Queues: Stack: Introduction- Representation of Stack using Arrays and Linked List-Applications of Stack-Stack and Recursion. Queues: Introduction- Representation of Queue-Circular Queue-Double Ended Queue-Priority Queue-Application of Queue.

UNIT IV

Trees and Searching: Trees: Introduction-Types-Basic Definition-Properties-Representation-Operation on Binary Tree-Binary Tree Traversal-Applications of Binary Tree-Height

Balanced (AVL) Tree-Representation-Operations-Threaded Binary Tree-B Tree. Searching: Introduction-Sequential Search-Binary Search -Indexed Sequential Search

UNIT V

Graphs and Sorting: Graphs: Introduction-Sequential Representation-Linked Representation-Traversal of Graphs-Spanning Trees-Shortest Path. Sorting: Introduction – Selection Sort – Insertion sort – Bubble- Quick- Merge- Radix-Shell- Heap-Comparison of Time Complexity.

Text Book

ISRD GROUP, 2013, Data Structures Using C, 2nd Edition. [Unit-I(1-26), Unit-II(27-99), Unit III(129-206), Unit IV(210-248, 255-284, 340-344), Unit V(348-370, 308-339)].

References

Richard F.Gilberg and Behrouz A.Forouzan, 2012, Data Structures: A Pseudocode Approach with C, 2nd Edition, Cengage Learning, New Delhi.

Krishnamoorthy, 2008, Data Structures Using C, Tata McGraw Hill Publishing Company Limited, New Delhi.

Kruse R, 2007, Data Structures & Program Design In C, 2nd Edition, Prentice-Hall of India, New Delhi.

Muniswamy, 2007, C & Data Structures, I.K. International Publishing House.

Seymour Lipschutz and G.A.Vijayalakshmi Pai, 2007, Data Structures, Schaum's Outlines, Tata McGraw-Hill Publishing Company Limited, New Delhi.

Tanenbaum A M, 2007, Data Structures Using C, Prentice-Hall of India Pvt. Ltd, New Delhi.

Web Sites

www.gatesit.org/gitdownloads/C&DS.pdf

Course Outcomes (COs)

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- Ability to use PL/SQL
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
- To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6. Build indexing mechanisms for efficient retrieval of information from a database

UNIT I

Understanding Database Fundamentals: Origin of Database – Database elements – Design concepts – components of DBMS – Advantages and Disadvantages of DBMS. Database Models: Flat-file-hierarchical model – network model – relational model – object oriented model – Features of Object oriented Database Management system – Features of distributed DBMS – Comparison of DBMS & DDBMS - Object relational model. ER-model: entities – relationships – ERD symbols – cardinalities – sample ERD.

UNIT II

Entities and Entity Relationships: Relational Model: Introduction – Relational database: attributes and domains – Tuples – Relation and their schemes – Relation representation – keys – relationships – relational operations – Integrity rules. Relational Algebra: Basic operations – Additional relational algebraic operations – some Relational algebra queries. Functional dependency: Reasoning about FD's – closure of set of FD's – Attribute closure.

UNIT III

Objects: Relational database manipulation: Introduction – SQL: Data definition – Data manipulation: Basic data retrieval – condition specification – Arithmetic and aggregate operations. SQL joins – Set manipulation – categorization – updates – views – index. Data Control language: grant – revoke – simple privileges. Simple flashback queries.

UNIT IV

Overview of PL/SQL: Declaration section – executable command section: conditional logic, loops, CASE statements – exception handling section: predefined and user defined exceptions. Triggers: definition – types: row level, statement level, before and after, instead of – syntax – enabling and disabling triggers - replacing and dropping triggers. Cursors – definition – open – fetch – close – cursor attributes- select for update – types : implicit, explicit. Procedures, Functions: Local and global – procedures vs. functions – stored procedures, functions – create procedure syntax - create function syntax – calling procedures, functions. Replacing and dropping procedures, functions.

UNIT V

Packages: Package header – package body – calling package members - Replacing and dropping package. Overview of Normalization: advantages - disadvantages. Normal forms: first normal form – second normal form – third normal form – demoralization. Parallel Databases: Introduction – Design of Parallel Databases – Advantages and Disadvantages of Parallel Database.

Text Books

Bipin C. Desai, 2013, An Introduction to Database Systems, Galgotia Publications, New Delhi [Unit-I (20-30, 45-72, 660-663, 821-826), Unit – II (145-184, 293-306), Unit- III (208-242)]

Rajiv chopra, 2013, Database Management systems, 3rd revised edition, S.Chand publications. [Unit I (404 – 432), Unit V (460-463)].

Kevin Loney and George Koch. 2002. Oracle 9i The Complete Reference, 1st Edition, Tata McGraw-Hill, New Delhi [Unit-IV(489-508), Unit – V (509-550)]

Alexis Leon, Mathews Leon, 2007, SQL Complete Reference [Unit-III (83-98, 103-118,132-139,153-165), Unit-IV (287-289,218-227,312-330), Unit – V (47-57)].

References

Shio Kumar Singh, 2011, Database Management Systems – Concepts, design and Applications 2nd edition, Pearson Education, New Delhi.

Ragu Ramakrishnan and Gehrke, 2003, Database Management Systems, 3rd Edition, Tata McGraw-Hill, New Delhi, [Unit-I(26-47, 611-642), Unit-III(57-126, 130-173)].

Gerald V. Post, 2005, Database Management Systems Designing and Building Business Applications, 2nd Edition, Tata McGraw-Hill, New Delhi. [Unit-I(30-76), Unit-II(77-140), Unit-III(159-181, 182-220)].

Case Study

Project: University System

Project : Course Registration System

Project : Airline Reservation System

Web Sites

www.databasedir.com

www.rdbms.org

Course Outcomes (COs)

- To describe a sound introduction to the discipline of database management systems.
- To give a good formal foundation on the relational model of data and usage of Relational Algebra.
- To introduce the concepts of basic SQL as a universal Database language.
- Ability to use PL/SQL
- To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization.
- To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes (COs)

Upon completion of the course, students will be able to

1. Explain the features of database management systems and Relational database.
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra.
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6. Build indexing mechanisms for efficient retrieval of information from a database

List of Programs

1. Create a table with following fields:

Employee table:

Field name	Constraint	Type	Size
Employee_no	Primary key	Character	6
Employee_name		Character	30
Address		Character	25
Designation		Character	15
Dob		Date	
Gender	Check	Character	1
Doj		Date	
Salary		Number	10,2

Queries:

- a) Display name of the employees whose salary is greater than “10,000”.
- b) Display the details of employees in ascending order according to Employee Code
- c) Display the details of the employee earning the highest salary.
- d) Display the names of the employees who earn more than “Ravi”

2. Create a table named **Student** with the following fields and insert the values:

Field name	field type	field size
Student Name	character	15
Gender	character	6
Roll No.	character	10
Department Name	character	15
Address	character	25
Percentage of Marks	number	4 , 2

Queries:

- Calculate the average mark percentage of the students.
- Display the names of the students whose percentage marks are greater than 80%
- Display the details of the student who got the highest percentage of marks.
- Display the details of the students whose mark percentage is between 50 and 70.
- Display the details of the students whose mark percentage is greater than the mark percentage of Roll No = 12CA01

3. Create a table with following fields:

Staff table:

Field name	Constraint	Type	Size
Staff_no	Primary key	Character	6
Staff_name		Character	30
Dob		Date	
Dept_code	Foreign key	Character	4
Designation		Character	15
Basic Salary		Number	7,2

Department table:

Field name	constraint	Type	Size
Dept_code	Primary key	Character	4
Dept_name		Character	30

Execute the following queries:

- To list the staff who joined 2 years back.
- To list the staff in computer science dept.
- To list the staff_name and the dept_name in which he/she works.
- To list the maximum and minimum salary in each dept.
- To list the dept along with the total amount spent on salary
- To list the name of the employees who draw the salary more than the average salary.

4. Create a table with the following fields:

Book table:

Field name	Constraint	Type	Size
Access_no	Primary key	Character	6
Title		Character	30
Author		Character	30
Publisher		Character	30
Subject		Character	10
Price		Number	6,2

Execute the following queries:

- The title of C and C++ books.
- The books written by a particular author.
- The books which cost between Rs.300/- and Rs.500/-
- The number of books available in each subject.

5. The books in the decreasing order of the cost.

5. Create a table with the following fields:

Account table:

Field name	Constraint	Type	Size
Acc_no	Primary key	Number	4
Cust_name		Varchar2	30
Branch_name		Varchar2	30
Cust_city		Varchar2	30

Borrower table:

Field name	Constraint	Type	Size
Acc_no	Foreign key	Number	30
Branch_name		Varchar2	30
Amount		Number	8,2

Write a Query to perform different types of Join.

6. Create two tables course & batch with following fields:

COURSE: coursecodeno number(5),course name varchar(20), syllabus varchar(20)

BATCH: bcode number(5), coursecode number(5),starting_date date, duration number(3),coursefee number(10,2)

Perform the following queries:

- ☐ ☐ Insert the details for course and batch tables with 10 records
- ☐ ☐ Show the description of the two tables
- ☐ ☐ Select all the fields from course & batch tables
- ☐ ☐ Select all the fields from course & batch tables where coursecode=10
- ☐ ☐ Select all the fields from batch table where starting date=march 10th
- ☐ ☐ Select batch code from batch table where net income>50000
- ☐ ☐ Select course name, batch code & starting date from batch & course tables where course code in batch table and course code in course table are equal
- ☐ ☐ Select a syllabus from course where coursecode=5

7. Create table with following fields:

Product table:

Field name	Constraint	Type	Size
Product_code	Primary key	Varchar2	7
Product_name		Varchar2	30
Price		Number	6,2
Quantity		Number	4

Vendor table:

Field name	Constraint	Type	Size
Vendor_name		Varchar2	30
Vendor address		Varchar2	30
Product_code	Foreign Key	Varchar2	7

Create a trigger to fire when the Record is deleted and inserted.

8. Write a PL/SQL trigger to update the records while deleting the one record in another table.

voters_master:

Field name	Constraint	Type	Size
voterid	Primary key	Number	5
name		Varchar2	30
Ward_no	Primary key	Number	4
dob		Date	
address		Varchar2	150

new_list

Field name	Constraint	Type	Size
voterid		Number	5
ward_no		Number	4
name		Varchar2	30
Description		Character	50

9. Create a table to store the salary details of the employees in a company. Declare the cursor id to contain empno, employee name and net salary. Use cursor to update the employee details.

Salary:

Field name	Constraint	Type	Size
emp_no	Primary key	Number	4
emp_name		Varchar2	30
designation		Varchar2	25
dept		Varchar2	30
basic		Number	5

10. Write the PL/SQL program to find the factorial and Fibonacci series of given number.

11. (i) Write the PL/SQL program to check whether the string is Palindrome.
(ii) Write the PL/SQL program to reverse a number.
(iii) Write the PL/SQL program to check whether the number is Armstrong.

12. Write a PL/SQL block to create and handle user defined exception.

clientmaster

Field name	Constraint	Type	Size
client_id		Number	6
client_name		Varchar2	30
address		Varchar2	50
phone		Number	10
balance		Number	10,2

13. Create a table to store the salary details of the employees in a company. Declare the cursor_id to contain employee number, employee name, and net salary. Use cursor to update the employee details.

salary

Field name	Constraint	Type	Size
emp_no	Primary key	Number	4
emp_name		Varchar2	30
designation		Varchar2	25
dept		Varchar2	30
basic		Number	5
da_percent		Number	3
ma		Number	6,2
other_allowance		Number	6,2
deduction		Number	6,2

14. Create a table **stock** contains the itemcode varchar2(10), itemname varchar2(50), current_stock number(5), data_of_last_purchase date. Write a stored procedure to seek for an item using itemcode and delete it, if the date of last purchase is before 1 year from the current date. If not, update the current stock.

15. Create a table to contain phone_number, user_name, address. Write a function to search for address using phone_number.

Vendor table:

Field name	Constraint	Type	Size
Vendor_name		Character	30
Vendor address		Character	30
Product_code	Foreign Key	Character	7

Create a trigger to fire when the Record is deleted.

15ITU303	Numerical Methods	Semester-III				
		L	T	P	C	
		4	2	0	4	

Course Objectives (CO)

- To understand the basic concepts of numerical methods
- To develop the mathematical skills in the areas of numerical methods.
- To understand numerical techniques as powerful tool in scientific computing.
- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.

Course Outcomes (COs)

On completion of the course students will be able to

1. Apply Numerical analysis which has enormous application in the field of Science
2. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
3. Familiar with calculation and interpretation of errors in numerical method.
4. Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.
5. Understand the basics of Numerical Differentiation & Integration and numerical solutions of ordinary differential equations.
6. Understand the concepts of difference operators and the use of Interpolation.

UNIT I

Solution of algebraic and transcendental equations: Bisection method –Regula Falsi method – Newton Raphson method. Polynomial Equations – Graeffe’s root squaring method.

UNIT II

Solution of simultaneous linear algebraic equations: Gauss elimination method – Gauss Jordan method – Method of triangularization – Gauss-Jacobi method – Gauss-seidel method.

UNIT III

Interpolation: Gregory Newton Forward and Newton Backward interpolation formula – Interpolation with unequal intervals — Lagrange’s interpolation formula – Inverse interpolation formula.

UNIT IV

Numerical Differentiation and Integration: Newton’s Forward and backward differences to compute derivatives – Trapezoidal rule, Simpson’s 1/3 & 3/8 rule.

UNIT-V

Numerical methods for solving ordinary differential equations – Taylor series(I order) – Euler and Modified Euler method – Runge kutta methods (II order , III order and IV order).

Text Book

Venkataraman .M.K., 2001, Numerical Methods in Science and Engineering, Fifth Edition, National publishing Company ,Madras. (Unit I – V)

References

Kandaswamy. P., Thilagavathy K. and K.Gunavathy., 2013, Numerical Methods, S. Chand & Company Ltd., New Delhi.

Vedamurthy V.N.,N.CH.S.N.Iyenger., 1999, Numerical Methods, Vikas Publishing House Pvt Ltd, New Delhi.

		Semester III
		L T P C
15ITU304A	Core Elective - I Wireless and Mobile Computing	4 0 0 4

Course Objectives (CO)

- To know the evolution of Mobile communication and cell concept to improve capacity of the system.
- To know the types of channel coding techniques, data transmission modes and services of GSM.
- To know the types of channel coding techniques, data transmission modes and services of GPRS
- To Know about wireless application protocol in 3G spectrum technology
- To know about various security mechanism used in Mobile computing
- To learn various Security Issues in Mobile Computing

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the basic architecture of mobile computing
2. Evaluate the performance and need of wireless technology and GSM
3. Understand the basic concept of short message service and GPRS
4. Understand the architecture of wireless application protocol and 3G spectrum network
5. Understand Security Framework for Mobile Environment
6. Analyze various security mechanism and issues in security over mobile computing

UNIT I

Introduction: Introduction – Mobile Computing architecture – History – Three Tier architecture – Design consideration for Mobile Computing – Mobile Computing through Telephony – Evaluation – Multiple access procedure – Satellite Communication systems – Mobile Computing through Telephone – Developing an IVR Application – Voice XML – TAPI.

UNIT II

Emerging Technology and GSM: Introduction- Blue tooth – Radio Frequency Identification - Wireless Broad Band – Mobile IP – Internet Protocol Version 6 – Java Card – GIS- Global system for Mobile Communication – GSM architecture – GSM entities – Call routing in GSM – PLMN Interface – GSM address and Identifiers – Network aspects in GSM – Mobility Management – GSM Frequency allocation – Authentication and Security.

UNIT III

Short Message Service and GPRS: Mobile Computing over SMS – Short Message Service – Value added Service through SMS – Accessing the SMS bearer – GPRS – introduction – GPRS and Packet Data Network – GPRS Network architecture – GPRS Operations – Data Services – Applications – Limitation – EDGE.

UNIT IV

Wireless Application Protocol: Introduction – WAP – MMS – GPRS Applications – CDMA and 3G – Spread Spectrum Technology – IS-95 – CDMA Versus GSM – Wireless Data - 3G Networks – Application on 3G. – Wireless LAN – Wireless LAN Technologies – IEEE 802.11 Standards – Wireless LAN architecture – Mobility – Wireless LAN Security.

UNIT V

Mobile Computing Security: Security Issues in Mobile Computing – Introduction – Information Security – Security Techniques and algorithms – Security Protocols – Public Key Infra structure – Trust – Security – Security Models – Security Framework for Mobile Environments. Next Generation Networks .

Text Book

Asoke K. Talukder, Hasan Ahmed and Roopa R. Yavagal, 2010, Mobile Computing Technology, Application and Service Creation, 2nd Edition, Tata McGraw Hill.

References

Jochen Burkhardt Dr .Horst Henn, Klaus Rintdoff, Thomas Schack, 2009, Pervasive Computing, Pearson Education.

Fei Hu , Xiaojun Cao, 2010, Wireless Sensor Networks Principles and Practice, CRC Press.

Course Objectives (CO)

- To know the basic concepts involved in mobile development environment
- Describe the limitations and challenges of working in a mobile and wireless environment
- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development.
- To inculcate working knowledge of Android Studio development tool
- To integrate multimedia, camera and Location based services in Android Application.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Identify various concepts of mobile programming that make it unique from programming for other platforms,
2. Critique mobile applications on their design pros and cons
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces
4. Describe and work within the capabilities and limitations of a range of mobile computing devices.
5. Program mobile applications for the Android operating system that use basic and advanced phone features
6. Understand various Mobile security issues.

UNIT I

Introduction to Mobile Development : What is mobile computing?, History of mobile environments – early mobile phones to smartphones and tablets, Development for mobile environments, Differences from traditional application development, Trends in mobile development.

UNIT II

Mobile Development : Introduction, Advantages, Limitations, Features useful for mobiles – Geolocation, offline web applications, offline web storage, animations, 2D/3D graphics, Audio/Video etc. , Frameworks -- HTML5 , Phone Gap (Apache Cordova) framework and jQuery Mobile framework.

UNIT III

Introduction to Android: Android Overview -- Features, Architecture, Applications, Application frameworks, Libraries, Runtime, Kernel, Android Ecosystem – Application stores, publishing, Android Development Tools – Android SDK, Android emulator, Development on hardware devices

UNIT IV

Basic Android Development: Writing Android Applications, Activity Lifecycle, Multi device support, Fragments, Data storage, Intents, Data sharing, Audio playback, Photo capture

UNIT V

Advanced Android Development : Animations. OpenGL ES, Wireless connections, Data syncing, Location aware applications, Best practices for development, Security, Distribution and Monetizing Lab: Exercises using PhoneGap and the Android SDK using various features of Android.

Text Book

Ed Burnette, 2010, Hello Android: Introducing Google's Mobile Development Platform, 3rd edition., The Pragmatic Programmers.

References

Wallace Jackson, 2012, Android Apps for Absolute Beginners, 2nd Edition, Apress.

Jeff Mc Wherter , Scott Gowell, 2012, Professional Mobile Application Development, 1st Edition.

Course Objectives (CO)

- To learn basics of Cloud computing.
- To learn different Cloud Computing services
- To know the concepts of event management and its applications
- To learn the basic Green computing strategies and its applications
- To learn the challenges and economics involved in shifting computing hardware to the cloud
- To learn about the environmental impact of Green Computing

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
2. Use and Examine different cloud computing services
3. Understand and explore event management application and explore web-based databases.
4. Understand the role of Green computing and its top ten strategies which impacts environment
5. Relate green IT to sustainable development,
6. Discuss how the choice of hardware and software can facilitate a more sustainable operation

UNIT I

Understanding cloud computing: An introduction to cloud computing- what it is & what it is not- History - The network is the computer: How cloud computing works. Companies in the cloud: cloud computing today. The pros and cons of cloud computing- benefits- developing cloud services.

UNIT II

Cloud computing for the community- Cloud computing for the corporation- Using Cloud services: collaborating on calendars, schedules, and Task management. Exploring online calendar applications- Exploring online schedule applications- Exploring online planning and task management.

UNIT III

Collaborating on Event Management: Event Management applications - Exploring Event Management Applications – Collaborating on project Management : Exploring project Management Applications – Collaborating on databases :how it works-Exploring Web-Based Databases.

UNIT IV

Green Computing Strategies That Companies Should Be Aware Of - The Climate Savers Computing Initiative Top Ten Strategies - CSCI: Computer Science or Computer Software Configuration Item? - Expectations from the CSCI Degree - CSCI Major Requirements Disclosed - The 12 Green Computer Companies.

UNIT V

Green Computing for Environmental Impact Management - Green Initiative Business: Good For IT Business? - Organization Planning for Green Computing - Tips for Green Computing Strategic Initiative - Green Computing: Tips for Strategic Planning Organization - Implementing Green Computing in a Business Organization Beneficial to All

Text Books

Michael Miller, 2009, CLOUD COMPUTING Web-Based Applications That Change The Way You Work and Collaborate Online, Pearson Education.

Bud E.Smith, 2014, Green Computing: Tools and Techniques for Saving energy, money and resources, CRC press.

References

Haley Beard, 2008, Cloud Computing Best Practices for Managing and Measuring Processes for on demand computing, Applications and Data Centers in the Cloud with SLAs, 1st Edition, Emereo Pvt. Ltd.

15SSD301	Soft Skill Development - II	Semester-III L T P C 2 0 0 0
----------	-----------------------------	---

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impart knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives (CO)

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Acquire proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precise Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Text Book

Juneja. P. Om and Aarati Mujumdar, “Business Communication -Techniques and Methods”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

References

Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.

Balasubramanian M and G Anbalagan. Performance in English. 2007,Anuradha Publications: Kumbakonam

Mohan, Krishna and Meenakshi Raman.2008, Effective English Communication, Tata McGraw Hill: New Delhi.

Selley, John. Oxford Guide to Effective Writing and Speaking. 2005, OUP: New Delhi.

Course Objectives (CO)

- To learn client and server-side scripting languages
- Understand the technologies used in Web designing.
- Know the importance of object-oriented aspects of Scripting.
- To understand and practice embedded dynamic scripting on client-side Internet Programming
- To master the theory behind scripting and its relationship to classic programming
- To gain some fluency programming in HTML, ASP, JavaScript and related languages, to design and implement one's own scripting language.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Choose, understand, and analyze any suitable real time web application
2. Design simple web pages using markup languages like HTML and XHTML
3. Create dynamic web pages using ASP and java script that is easy to navigate and use.
4. Program server-side web pages that have to process request from client-side web pages.
5. Develop web pages using ASP, JSP and VBScript.
6. Develop embedded dynamic scripting on client-side Internet Programming

UNIT I

Introduction to HTML: Introduction-HTML Browsers-History of HTML and SGML-HTML Command Tags-Quotation Marks-Spacing-Special Symbols-Tags with Automatic Line Breaks-URLs-Understanding Domain Names-Links-Defining Web Page-Main Body of Text- Headers-Adding Paragraph-Formatting Text-Font Type, Size, Predefined Fonts, Bold, Italic-Setting Colors-Text Color, Superscripts and Subscripts-Underlining Text-Preformatted Text-Blinking Text-Block Quotes-Margins-Line Breaks-Ordered and Unordered List-Links-Scaling an Image-Images Alignment. More on HTML: Creating Table-Dividing Table into Columns-Dividing Table into Rows- Creating Headers- Adding Border –Putting a Background Image- Heading across two or More Columns-Changing Color of a Cell-Aligning the Contents of a Cell-Display of Tables.

UNIT II

HTML, Forms, Frames and Style Sheets: HTML : Working with Forms-Creating Forms-Working with Menus-Working with Radio Buttons-Check Boxes-Text Boxes -Text Areas-Password Boxes-Submit Button-Resetting the Form-Working with Frames-Creating Frameset-Creating Columns-Creating Rows and Columns-Combining Framesets-Giving Colors to the Borders-Space between Frames-Nesting Framesets-Showing or Hiding Scrollbars-Alternatives to Frames. Cascading Style Sheets: Introduction to CSS-Creating Style Sheets-Common Tasks with CSS-Colors-The Font Family-Assigning Classes-The Layer Tag-CSS Tags

UNIT III

eXtensive Markup Language: Introduction-Features of XML-XML Support and Usage-Compatibility of XML with Others-Structure of XML Document-Common Errors-Structures in XML-Creating Document Type Declarations-Flow Objects-Length-Colour and Background Properties

UNIT IV

ASP: How Active Server Pages Really Work?-Variables-Procedures-ASP Forms-Date Types-Operators. More on ASP: Introduction to Object Hierarchies-Getting Information from the Visitor-Sending Information to Visitors-ASP Applications-Getting in at the Top (Server Object)-Response Object Methods.

UNIT V

Java Script and VB Script : Java Script: Introduction-Operators-Assignments-Comparisons-Reserved Words-Browsers to Use-Software Requirement-Starting with Java Script-Using Quotes, Alert-Functions-Eval Function-Using Statements in Java Script-Working with Objects-Properties-Browser objects-Date object-Math Object-String Object-Defining Objects-Handling Events in Java Script-Event Handling Attributes-Window Events-Working with Forms-Form Elements-User Actions-windows and Frames-Window Object-Frame Object-Document Object-Navigator Object-Screen Object-Using Images and Math-Images and Animation-Area Object-Math Object-Java Script Objects.

VB Script: Introduction-Adding VB Script code to HTML- Adding VB Script code to Documents-Data Types-Getting the Message Across.

Text Books

Thomas A.Powell, 2010, The Complete Reference HTML and CSS, 5th Edition, Tata MC-Graw Hill Publications, New Delhi.

Ramesh Bangia, 2010, Web Technology, 1st Edition, Firewall Media Publications, New Delhi.

David Flanagan, 2011, Javascript: The Definitive Guide, 6th Edition, O'Reilly Media.

References

Abbey Deitel, Harvey Deitel, Paul Deitel, 2012, Internet and World Wide Web: How to Program, 5th Edition, Prentice Hall.

Rohit Khurana, 2002, JavaScript, 1st Edition, A.P.H Publishing, New Delhi.

Xavier C, 2008, World Wide Web With HTML, 1st Edition, Tata MC-Graw Hill Publications, New Delhi.

Danny Goodman, 2003, Javascript Bible 3rd Edition, IDG Books India(p) Ltd, New Delhi.

Achyut S. Godbole, 2003, Web Technologies , 2nd Edition, Tata Mc Graw Hill.

Chris Bates, 2007, Web programming Building Internet Applications, 3rd edition, Wiley.

Xavier C., 2003, Web Technology & Design, 1st edition, New Age Publication.

Web Sites

www.w3schools.com/

www.htmlcodetutorial.com/

jmarshall.com/easy/

Course Objectives

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

UNIT I

Introduction to Java: Object Oriented Paradigm and Concepts-Structured versus Object Oriented Approach. Java Language: Features of Java -Environment-Java Architecture-Java Development Kit-Types of Java Program. Variable Declaration and Arrays: Data Types-Java Tokens –Variable Declaration – Type Casting and Conversion – Arrays, Operators, And Control Statements: Selection Constructs – Iteration Constructs –Jump Statements.

UNIT II***Classes and Objects***

Introduction to classes: Instance variables, Class variables, Instance Methods, Constructors, Class methods, Declaring Objects, Garbage Collection, Method Overloading - Constructor Overloading - This Reference. Inheritance: Super class variables- Method Overriding - final Keyword, Abstract Classes and Interfaces.

UNIT III

Exception Handling: Fundamentals – Hierarchy of Classes – Types of Exceptions-Exception Class – Uncaught Exceptions – Handling Exceptions – User Defined Exceptions. Multithreaded Programming: The Java Thread Model – Runnable Interface - Thread Class – Thread Creation – Thread's Life Cycle – Thread Scheduling -Synchronization and Deadlock.

Packages and Access Modifiers: Package Declaration – The CLASSPATH variable - import statement – The Java Language Packages - Access Protection.

UNIT IV

Strings: Creation – Operation on strings - Character Extraction Methods – Comparison – Searching and Modifying –Data Conversion and valueOf() Methods – Changing case of characters - String Buffer Class and its methods. Collection and Utilities: Collection of Objects – Core Interfaces and Classes – Iterators – List, Set, Map Implementations.

UNIT V

Input Output Classes: I/O Operations –Hierarchy of Classes – File class – Input Stream, Output Stream, FileInputStream, FileOutputStream, Reader and Writer classes – Random Access File class –Stream Tokenizer. Applets: Basics – Life Cycle –Methods –Graphics Class- Color, Font, and Font Metrics Class – Using the Status window – Passing parameters to Applets – getDocumentBase() and getCodeBase(). AWT Components: AWT Classes – Basic Component and Container Classes – Frame Window in an Applet.

Text Books

Herbert Schildt, 2014, Java Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.

ISRD Group, 2007, Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi.[Unit-I (3-104), Unit-II (105-127), Unit-III (129-164), Unit-IV (219-236, 253-280), Unit-V (165-199, 283-307)]

References

Deitel H.M. and P.J.Deitel, 2005, Java-How to Program, 6th Edition, Pearson Education, New Delhi.

Dr.S Somasundaram, 2004, Java Programming, 1st Edition, Techmedia. New Delhi.

E.Balagurusamy, 2010, Programming with Java – A Primer, 4th Edition, Tata McGraw Hill, New Delhi.

Web Sites

www.java.sun.com

www.knking.com

www.webdeveloper.com

www.forums.sun.com

www.netbeans.com

Course Objectives (CO)

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
 2. Use the Java programming language for various programming technologies (understanding)
 3. Develop software in the Java programming language (application)
 4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
 5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
 6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)
-
1. Write a program to find the sum of series $1+x+x^2+x^3+\dots$
 2. Write a program to find maximum and sum of an array
 3. Write a Program to generate Fibonacci Series and Factorial for a number
 4. Define a class for Employee with name and date of appointment. Create employee objects and sort them as per their date of appointment.
 5. Create a method to calculate the area & perimeter of a circle. Extend the semicircle class child of circle class and override the method to calculate the area and perimeter of a semicircle (if possible use this & super keywords)
 6. Create an interface called arithmetic, which defines methods for sum, multiplication, division, subtraction, percentage and implement of them.
 7. Write a program to an exception out of bounds, if mark is greater than 100 throw an exception
 8. Write a program to generate multiplication table by multithreading

9. Create a package, which holds the class and an interface defined in the question 5 & 6 and use them in your main method/class.
10. Write a program to perform string operations
11. Create a StringBuffer object and illustrate the operation of the append() and reverse() methods.
12. Write a program to create an applet and draw any shapes using color
13. Write an Applet Program to create Menus
14. Write an Applet Program to perform operations in listbox
15. Write an application that converts between meters and feet. its first command-line argument is a number. Its second command-line argument if either “feet” or “meters”. If this argument equal “feet”, display a string reporting the equivalent number of meters. If this argument equal “meters”, display a string reporting the equivalent number of feet. Otherwise, report that the unit system is not recognized

Course Objectives (CO)

This course enables the students to

- To learn the basic concepts and applications of linear programming.
- To impart knowledge in concepts and tools of Operations Research.
- To know the constructive techniques to make effective business decisions
- Define and formulate linear programming problems and appreciate their limitations
- To Identify and develop operational research models from the verbal description of the real system
- To Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. Understand the basic concepts and application of operation research in various fields.
2. Understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively
3. Define and formulate linear programming problems and appreciate their limitations
4. Recognize the importance and value of Operations Research and mathematical modeling in solving practical problems in industry
5. Identify and develop operational research models from the verbal description of the real system
6. Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

UNIT I

Linear Programming: Formulation of LPP – Graphical solution to LPP –Simplex method – Big M method and Duality in LPP.

UNIT II

Transportation model: Introduction – Mathematical Formulation –Finding initial Basic Feasible solutions – Optimum solution for non degeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem

UNIT III

The Assignment problem - Mathematical formulation of the problem – Hungarian method – Unbalanced Assignment problem- Maximization case in Assignment problem.

Queuing theory : Introduction – Characteristics of queuing system. Problems in (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) models .

UNIT IV

Inventory Control: Introduction – Costs involved in inventory – Deterministic EOQ models – Purchasing Model without and with shortage, Manufacturing Model without and with shortage -Price break.

UNIT V

PERT and CPM: Network representation – Calculation of Earliest expected time, latest allowable occurrence time. CPM - various floats for activities – critical path.

PERT –Time estimates in PERT- Probability of meeting scheduled date of completion of projects .

Text Book

Kanthi Swarup, Gupta P.K., Man Mohan., 2006, Operations Research, Sultan Chand & Sons, New Delhi. (For Unit I – V)

References

Sharma J.K., 2009, Operations Research: Theory and Applications, Macmillan publishers India Ltd, New Delhi.

Sundaresan V, Ganapathy Subramanian K.S., and Ganesan K., 2005 (III edition), Resource Management Techniques, A. R. Publications, Nagapatinam.

Shanthi Sophia Bharathi D.,1999 (II edition),Operations Research/Resource management techniques, Charulatha Publications.

Course Objectives (CO)

- To recognize the error in the number generated by the solution.
- To compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
- To apply method of interpolation and extrapolation for prediction.
- To recognize elements and variable in statistics and summarize qualitative and quantitative data.
- To calculate mean, median and mode for individual series.
- To outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

Course Outcomes (COs)

Upon completion of the course students shall be able to:

1. Recognize the error in the number generated by the solution.
2. Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method.
3. Apply method of interpolation and extrapolation for prediction.
4. Recognize elements and variable in statistics and summarize qualitative and quantitative data.
5. Calculate mean, median and mode for individual series.
6. Outline properties of correlation and compute Karl-Pearson's coefficient of correlation.

UNIT-I

Meaning and definition of statistics – Classification of data - Frequency distribution - Diagrammatic Presentation – Bar diagram and Pie diagram – Graphic Presentation – Histogram, Frequency Polygon, Frequency curve and Ogives.

UNIT – II

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion- Range, standard deviation, Coefficient of variation.

UNIT – III

Correlation – Meaning and definition - Scatter diagram –Karl pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – IV

Probability theory : Axioms of Probability–Addition theorem – Multiplication theorem– conditional Probability.

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution & Normal distribution (No derivations) and simple problems.

UNIT – V

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit.

Text book

R.S.N.Pillai , Bagavathy, 2002, “Statistics”, S. Chand & Company Ltd. New Delhi.

References

Jerrold H.Zar, 2003, Bio-Statistical Analysis, Fourth Edition, Pearson Education, (Pvt) .Ltd, New Delhi.

PA.Navnitham. 2006. Business Mathematics and Statistics, Jai Publishers, Trichy – 21.

S.P. Gupta , 2001, “Statistical methods”. Sultan Chand & Sons, New Delhi.

15ITU403C	Allied Elective-II Discrete Mathematics	Semester IV L T P C 4 2 0 4
-----------	---	-----------------------------------

Course Objectives (CO)

- To learn the basic concepts of sets, types of sets, functions and relations
- To understand about Pigeonhole principle, Permutation and Combination, Mathematical Induction
- To solve the problems using Recurrence relations and generating functions.
- To know the basic concepts of Logical Connectives, Graphs and Trees.
- To express ideas using mathematical notation
- To solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course, students will be able to

1. Familiar with elementary algebraic set theory.
2. Acquire a fundamental understanding of the core concepts in growth of functions.
3. Describe the method of recurrence relations.
4. Get wide knowledge about graphs and trees
5. Initiate to knowledge from inference theory
6. Solve problems with the help of tools of mathematical analysis.

UNIT-I

Mathematical logic: Connections well formed formulas, Tautology, Equivalence of formulas, Tautological implications, Duality law, Normal forms, Predicates, Variables, Quantifiers, Free and bound Variables.

UNIT-II

Relations: Properties of Binary relations – Equivalence relations - composition of relations, Closure of relations – Order relations – Partial order relations.

Functions: one-to-one, onto, one-to-one-onto functions – composition of functions, Inverse functions.

UNIT-III

Formal languages and Automata: Grammars: Phrase–structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata- Deterministic finite automata and Non deterministic finite automata-conversion of non deterministic finite automata to deterministic finite automata.

UNIT-IV

Lattices and Boolean algebra: Partial ordering, Poset, Lattices, Boolean algebra, Boolean functions, Theorems, Minimization of Boolean functions.

UNIT-V

Graph Theory: Directed and undirected graphs, Paths, Reachability, Connectedness, Matrix representation, Euler paths, Hamiltonian paths, Trees, Binary trees simple theorems, and applications.

Text Book

Tremblay J.P., and R.P Manohar., 1975 . Discrete Mathematical Structures with applications to computer science, Tata Mc.Graw Hill, New Delhi. (For Unit I – V)

References

Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2002. Discrete Mathematics, A.R. Publications, Nagapatinam.

Veerarajan T., 2007, Discrete mathematics with graph theory and combinatorics, Tata McGraw hill companies, New Delhi.

Sharma.J.K, 2005 , Discrete Mathematics, Second Edition , Macmillan India Ltd.

		Semester IV			
		L T P C			
15SSD301	Soft Skill Development – II	2	0	0	1
Instruction Hours / week: L: 2 T: 0 P: 0		Marks: Internal: 100 External: Nil Total: 100			

Course Objectives (CO)

- Students will be able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills
- To impact knowledge on both Aptitude and Soft skills to the students
- To actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
- To critically evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- To reinforce competencies in soft skills which are crucial in a social setting

Course Outcomes (COs)

On successful completion of the course the students will be able to:

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Actively do mathematics—such as analyzing data, constructing hypotheses, solving problems, reflecting on their work, and making connections.
5. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

		Semester V
		L T P C
15ITU501	.NET Programming	5 0 0 5

Course Objectives (CO)

- To design, formulate, and construct applications with VB.NET
- To integrate variables and constants into calculations applying VB.NET
- To determine logical alternatives with VB.NET decision structures
- To implement lists and loops with VB.NET controls and iteration
- To separate operations into appropriate VB.NET procedures and functions
- To assemble multiple forms, modules, and menus into working VB.NET solutions

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Grasp the fundamentals of a programming language and know the basic differences between programming languages
2. Choose the architecture based on the problem to be solved.
3. Differentiate between the types of applications supported by .Net
4. Build, compile and execute a VB .Net program
5. Apply techniques to develop error-free software
6. To build integrated VB.NET solutions using files and structures with printing capabilities.
Translate general requirements into data-related solutions using database concepts

UNIT I

Introduction to .NET: .NET Framework features & architecture, CLR, Common Type System, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of project in .Net, IDE of VB.NET- Menu bar, Toolbar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object Browser. The environment: Editor tab, format tab, general tab, docking tab. visual development & event driven Programming -Methods and events.

UNIT II

The VB.NET Language: The VB.NET Language- Variables -Declaring variables, Data Type of variables, Forcing variables declarations, Scope & lifetime of a variable, Constants, Arrays, types of array, control array, Structure Programming – Modularity – Information Hiding – Abstraction – Events – subroutines and functions– Message box – Input box. Control flow statements: conditional statement, loop statement.

UNIT III

Working with WPF: Introduction : Understanding Windows Graphics - WPF: A Higher-Level API - The Architecture of WPF. XAML: Basics, Properties and Events in XAML – Loading and compiling -Layout-.Classic Controls: The Control Class - Content Controls - Text Controls - List Controls - Range-Based Controls.

UNIT IV

Objects and collections: Understanding objects, Properties, Methods. Understanding collections. Files : Introduction – Classification of files – Processing files – handling files and folder using class – Directory class – file class.

UNIT V

Database programming with ADO.NET: Overview of ADO, from ADO to ADO.NET, Accessing Data using Server Explorer. Creating Connection, Command, Data Adapter and Data Set with OLEDB and SQLDB. Display Data on data bound controls, display data on data grid. Generate Reports Using CrystalReportViewer.

Text Books

Bryan Newsome, 2012, Beginning Visual Basic 2012, John Wiley & Sons, Inc.

Shirish Chavan, 2007, Visual Basic .Net, 1st Edition, Pearson Education, New Delhi.

Matthew MacDonald Pro, 2008, Windows Presentation Foundation with .NET 3.5, Apress.(Chapters 1,2,4 and 7 only).

Duncan Mackenzie and Kent Sharkey, 2006, Sams Teach Yourself Visual Basic.Net, 1st Edition, Techmedia, New Delhi.

References

Ian Griffiths, Chris Shells, 2005, Programming Windows Presentation Foundation. 1st Edition, O'Reilly Publishers.

Jeffrey R. Shapiro, 2002, The Complete Reference Visual Basic.Net, Tata -McGraw-Hill Edition, New Delhi.

Web Sites

www.startvb.net

www.functionx.com

www.devarticles.com

www.dotnetspider.com

www.developerfusion.com

[http://www.wpftutorial.net/HelloWPF.html](http://www.wpftutorial.net>HelloWPF.html)

Course Objectives (CO)

- To learn the fundamental concepts of networking standards, protocols and technologies.
- Introduce the concept of communication protocols and give an overview of Data Communication Standards.
- To learn different techniques for framing, error control, flow control and routing.
- To learn OSI and TCP/IP Layers and protocols Design
- To learn the layering concepts in computer networks.
- To understand the functions of each layer

Course Outcomes (COs)

After completion of this course the student will be able to:

1. Analyze the requirements for a given organizational structure to select the most appropriate networking architecture, topologies, transmission mediums, and technologies.
2. Conceptualize and explain the functionality of the different layers within a network architecture
3. Understand design issues, flow control and error control
4. Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols.
5. Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community.
6. Understand and analysis structure of Authentication Service and Electronic Mail Security, web security and IP security

•

UNIT I

Introduction: The uses of Computer Networks, Networks Hardware, Network Software, OSI Reference Model, TCP/IP Reference Model.

UNIT II

Physical Layer: Theoretical Basis for Data Communication- Transmission Media- Wireless Transmission- Communication Satellites- The Public Switched Telephone Network- The Mobile Telephone System- Cable Television.

UNIT III

Data Link Layer Design Issues- Error Detection and Correction – Elementary data Link Protocols, Medium Access Control Sub layer: The Channel Allocation Problem – ALOHA – Collision- Free Protocols – Wireless LAN Protocols – Ethernet: Ethernet Cabling.

UNIT IV

The Network Layer: Network layer design issues- Routing Algorithms- Congestion control Algorithms- The Transport Layer: The Transport Services – Elements of Transport Protocols – Remote Procedure Call.

UNIT V

Presentation Layer: Presentation Layer design issues- Data Compression Techniques- Cryptography. The Application Layer: Application Layer Design issues- Files Transfer, Access and Management- Electronic Mail- Virtual Terminals- Other Applications.

Text Book

Andrews S. Tanenbaum, 2013, Computer Networks. 5th Edition, Prentice Hall of India, New Delhi.

References

Ciiwan-Hwa Wu , J. Dawicl Irwin, 2011, Introduction to Computer Networks and Cybersecurity, CRC Press, New York.

Andrews S. Tanenbaum, 2003, Computer Networks, 4th Edition, Prentice Hall of India, New Delhi.

Douglas E. Comer, 2000, Computer Networks and Internets, 2nd Edition, Pearson Education Asia, New Delhi.

Stanford H. Rowe and Marsha L. Schuh, 2005, Computer Networking, 1st Edition, Pearson Education,

William Stallings, 2007, Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

Web Sites

www.mhhe.com/engcs/compsci/forouzan/

www.amazon.com/Data-Communications-Networking-Behrouz-Forouzan/dp/0072923547

highered.mcgraw-hill.com/sites/0072515848/information_center_view0/ -

Course Objectives (CO)

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To explain methods of capturing, specifying, visualizing and analyzing software requirements.
- To understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.
- To understand the need of project management and project management life cycle.
- To understand project scheduling concept and risk management associated to various type of projects.
- Implement a given software design using sound development practices.

Course Outcomes (COs)

1. Apply their knowledge of mathematics, sciences, and computer science to the modeling, analysis, and measurement of software artifacts.
2. Work effectively as leader/member of a development team to deliver quality software artifacts.
3. Analyze, specify and document software requirements for a software system.
4. Verify, validate, assess and assure the quality of software artifacts.
5. Design, select and apply the most appropriate software engineering process for a given project, plan for a software project, identify its objectives and risks, and estimate its cost and time.
6. Express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment.

UNIT I

Introduction to Software Engineering: The Evolving Role of Software-Software-Software Myths- A Generic View of process: Software Engineering –A Layered Technology- Process Models: Prescriptive Models- Waterfall Model- Incremental process Models. Evolutionary Process Models: Prototyping, The Spiral Model- Specialized process Models. Capability Maturity Model.

UNIT II

Requirement Engineering: Requirement Engineering tasks – Initiating requirement engineering process – Eliciting requirements. Building the Analysis Model: Requirements Analysis-Analysis Modeling Approaches-Data Modeling Concepts: Data Objects-Data attributes-Relationships Cardinality and Modality-Flow Oriented Modeling: Creating Data Flow Model-Creating a Control Flow Model-The Control Specification-The Process Specification- Creating a Behavioral Model.

UNIT III

Design Engineering: Design with the Context of Software Engineering-Design Process and Design Quality-Design Concepts-Creating An Architectural Design: Software Architecture-

Data Design-Architectural Design- Assessing Alternative Architectural Designs-Mapping Data Flow into Software Architecture. Modeling Component level Design: Designing Class based components- Designing conventional components

UNIT IV

Performing User Interface Design: The Golden Rules: Place the User in Control-Reduce the User's Memory Load-Make the Interface Consistent- User Interface Analysis and Design: Interface Analysis and Design Models- The Process- Interface Analysis: User Analysis - Task analysis and Modeling. Interface Design Concepts-Appling Interface Design Steps- User Interface Design Patterns-Design Issues –Design Evaluation.

UNIT V

Testing Tactics: Testing Strategies-Testing strategies for conventional software-Unit Testing- Integration Testing- Validation Testing- System Testing. Software Testing Fundamentals- Black -Box and White-Box Testing- White Box Testing-Basis Path Testing- Control Structure Testing: Condition Testing- Data Flow Testing-Loop Testing- Black Box Testing- Quality Concepts: Quality- Quality Control –Quality Assurance –Cost Of Quality – Software Quality Assurance – ISO 9000 Quality standards.

Text Books

Roger S. Pressman, 2010, Software Engineering – A Practitioner's Approach, 7th Edition, McGraw Hill International Edition, New Delhi.[Unit-1:-33-39,45-47,52-54,59-63,77-93 Unit-2:-176-190,207-217,226-232,248-253 Unit-3:-258-273,286-291,298-320,330-339,347-353 Unit-4:- 357-383 Unit-5:- 394-404, 406-411 ,420-441,745-750]

Ian Sommerville, 2009, Software Engineering 8th Edition, Pearson Education Publication, New Delhi.[Unit-1:-27-32,87-101,Unit-3 :-210,217,Unit-4:-385- 400 Unit-5:- 466]

References

Kalkar S.A, 2007, Software Engineering a Concise Study, 1st edition, Prentice Hall India, New Delhi.

Richard Fairley, 1998, Software Engineering Concepts, 1st Edition, Tata McGraw Hill Publishing, New Delhi.

Stephen Schach, 2007, Software Engineering , 7th Edition, Tata McGraw Hill, New Delhi.[Unit-1:- 51-54,60-64].

Daniel Hoffman and Paul Strooner, 1995, Software Design Automated Testing and Maintenance, Thomson Publications, Asia.

Web Sites

www.bleading-edge.com
www.astrainfotech.com
www.edistalearning.com
www.indiaedu.com
www.claensoft.com

Course Objectives (CO)

- To understand the main components of an OS & their functions.
- To study the process management and scheduling.
- To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC. To understand the concepts and implementation Memory management policies and virtual memory.
- To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
- To understand the structure and organization of the file system
- To learn case studies based on different operating system.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Describe the important computer system resources and the
2. Perform the role of operating system in their management policies and algorithms.
3. Understand the process management policies and scheduling of processes by CPU
4. Evaluate the requirement for process synchronization and coordination handled by operating system
5. Describe and analyze the memory management and its allocation policies.
6. Identify use and evaluate the storage management policies with respect to different storage management technologies, identify the need to create the special purpose operating system.

UNIT I

Introduction: What is an OS? – Mainframe systems Desktop Systems – Multiprocessor systems – distributed systems – real time systems. Process: - Process concepts – Operation on process – cooperation process - Inter process Communication - Mutual Exclusion - Critical sections- primitives – Semaphores

UNIT II

Processor Scheduling: Deadlock: Deadlock prevention, avoidance, detection, recovery from deadlock-preemptive scheduling: - Scheduling Criteria – Scheduling Algorithms – FCFS- SJF- Priority – Round Robin –Multilevel Queue – Multilevel Feedback Queue.

UNIT III

Storage management: Memory Management - swapping- Contiguous memory allocation – paging, segmentation – segmentation with paging – Virtual memory: Virtual storage organization – Demand Paging, Process Creation – Page replacement – Thrashing.

UNIT IV

File systems: Introduction – File System Concepts – Access Methods – Directory structure – File Sharing – Allocation Methods –Efficiency and performance – Recovery Disk Performance Optimization: Introduction – Disk structure – Disk scheduling – Disk management.

UNIT V

Case studies: LINUX, Windows 2000, Windows XP: History- Design principles- File system

Text Book

Silberschatz Galvin Gagne, 2012, Operating system concepts, 9th Edition, Wiley India (pvt) Ltd, New Delhi.

References

Achyut S. Godbole and Atul Kahate, 2011, Operating Systems, 3rd Edition, Tata Mc Graw Hill Education Pvt. Limited, New Delhi.

Deitel H.M, 2005, Operating systems, 3rd Edition, Addison Wesley Publication, New Delhi.

Pramod Chandra P. Bhatt, 2007, An Introduction to Operating Systems, 2nd Edition, Prentice Hall India, New Delhi.

Tanenbaum Woodhull, 2005, Operating Systems, 2nd Edition, Pearson Education (LPE) , New Delhi.

William Stallings, 2009, Operating Systems internals and Design Principles, 6th Edition, Prentice Hall India, New Delhi.

Web Sites

www.webopedia.com

searchwindowsserver.tech.target.com

www.ghu.org

www.computerhope.com

www.answers.com

www.osdata.com

Course Objectives (CO)

- To design, formulate, and construct applications with VB.NET
- To integrate variables and constants into calculations applying VB.NET
- To determine logical alternatives with VB.NET decision structures
- To implement lists and loops with VB.NET controls and iteration
- To separate operations into appropriate VB.NET procedures and functions
- To assemble multiple forms, modules, and menus into working VB.NET solutions

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Grasp the fundamentals of a programming language and know the basic differences between programming languages
2. Choose the architecture based on the problem to be solved.
3. Differentiate between the types of applications supported by .Net
4. Build, compile and execute a VB .Net program
5. Apply techniques to develop error-free software
6. To build integrated VB.NET solutions using files and structures with printing capabilities. Translate general requirements into data-related solutions using database concepts

List of Programs

1. Write a VB.NET program to calculate Simple interest and compound Interest
2. Write a VB.NET program to implement Calculator.
3. Write a VB.NET program to implement Notepad
4. Write a VB.NET program to draw several shapes and fill with color.
5. Write a VB.NET program to perform the following in list box
 - a) Add an item
 - b) Delete an item
 - c) List count
 - d) Clear the List
6. Write a program to calculate the total marks of the student and print the grades
7. Write a VB.NET Program to implement Employee Payroll System.
8. Write a VB.NET program to create and manipulate a File.
9. Write a Program to implement a Web Browser
10. Write a program to maintain the details of doctors in a hospital with their specialization.
11. Write a program to animate the picture using Timer Control.
12. Write a program to move the object from one location to another. Change the color and size of object at different time interval.

13. Write a program to place ten pictures in the list box. Using timer control take the picture from List box and change the form background after specific time interval.
14. Write a program to implement speaking program. Get the text input from the user and convert into voice.
15. Write a program to implement chatting.

15ITU505A	Core Elective – II	Oracle 10g Administration	Semester V			
			L	T	P	C
			5	0	0	5

Course Objectives (CO)

- To learn Install the Database and Back up and recover data.
- To administer users and manage data.
- To transport data between databases and configure the network.
- To optimize schemas, tables, indexes and views
- To manage database services and clients
- To take backup and perform recovery.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Create, maintain and manipulate an Oracle Database.
2. Understand various schema and transaction methods
3. Understand and implement connectivity and user management
4. Create and understand the application of user roles, privileges, and the security of the database.
5. Understand various concept involved in database security
6. Understand and perform backup and recovery process

UNIT I

Oracle DBA's: The Oracle DBA's Role- Different DBA Job Classifications- Types of Databases, Oracle Database 10g Architecture: Oracle Database Structures- Oracle Processes- Oracle Memory Structures-Oracle Database Transaction.

Creating an Oracle Database: Create the Database- Creating the parameter file- Creating a New Database- Using a server parameter File(SPFIL)- Starting Up and Shutting Down the Database from SQL * Plus.

UNIT II

Schema Management: Type Of SQL Statements- Oracle Schemes- Table spaces- Tables- Indexes- Integrity Constraints- Views- Synonyms-Sequences- Triggers- Object information. Transaction Management: Transactions- Properties- Concurrency Control- Isolation Levels and the ISO Standard- Implementing Concurrency Control- Read Consistency.

UNIT III

Connectivity and user Management: Using SQL * Plus and iSQL*Plus-Loading and Transforming Data - Using Data Pump Export and Import- Managing the operational Oracle Database: Managing and Monitoring the operational Database- Oracle Enterprise Manager:

UNIT IV

User Management and Database Security: Managing Users- Resource Manager- Controlling Access - Auditing - Authenticating Users- Enterprise User Security .

UNIT V

Backing up Databases: Examining the Flash Recovery Area –The RMAN- Control File- Backup Tool-User Managed Backups- Database Corruption Detection- Enhanced Data Protection For Disaster Recovery-Database Recovery

Text Books

Sam R. Alapatti, 2007, Expert Oracle Database 10g Administration, Springer (India) Private Limited, New Delhi.

Loney, 2008, Oracle Database 10g DBA Handbook, Tata McGraw-Hill Education.

References

Sam Alapati, 2005, Expert Oracle Database 10g Administration, 1st Edition, Grace Wong Publishers.

			Semester V
			L T P C
15ITU505B	Core Elective – II Data Mining and Ware housing	5	0 0 5

Course Objectives (CO)

- Understand various data mining functionalities
- Inculcate knowledge on data mining query languages.
- Know in detail about data mining algorithms
- Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Learn Multidimensional schemas suitable for data warehousing
- Understand and implement classical models and algorithms in data warehouses and data mining

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Preprocess the data for mining applications
2. Apply the association rules for mining the data
3. Design and deploy appropriate classification techniques
4. Cluster the high dimensional data for better organization of the data
5. Discover the knowledge imbibed in the high dimensional system
6. Evaluate various mining and data warehousing techniques

UNIT I

Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.

UNIT II

Classification: Introduction – Statistical – based algorithms - distance – based algorithms – decision tree - based algorithms - neural network – based algorithms –rule - based algorithms – combining techniques.

UNIT III

Clustering: Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms - Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules – advanced association rules techniques – measuring the quality of rules.

UNIT IV

Data warehousing: an introduction - characteristics of a data warehouse – data marts – other aspects of data mart. Online analytical processing: introduction - OLTP & OLAP systems – data modelling –star schema for multidimensional view –data modelling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the Internet

UNIT V

Developing a data WAREHOUSE: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data

mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining.

Text Books

Margaret H. Dunham, 2003, Data mining introductory and advanced topics, Pearson education.

C.S.R. Prabhu, Data warehousing concepts, techniques, products and a applications, 2nd Edition, Prentice Hall India.

Sam Anahory and Dennis Murray, 2009, Data Warehousing in the Real World, Pearson Education, New Delhi.

Jiawei Han, Micheline Kamber, Jian Pei, 2012, Data Mining: Concepts and Techniques: Concepts and Techniques, Morgan Kaufmann Publishers

References

Arun K.Pujari, 2003, Data mining Techniques, Universities Press (India) Pvt. Ltd.

Alex Berson, Stephen J. Smith, 2001, Data warehousing, data mining, & OLAP, TMCH.

Jiawei Han & Micheline Kamber, 2001, Data mining Concepts & Techniques, Academic press.

Course Objectives (CO)

- To provide an overview of an exciting growing field of big data analytics.
- To impart to students the skills required to design scalable systems that can accept, store, and analyze large volumes of unstructured data.
- The objective of this course is to ascertain that the students know the fundamental techniques and tools used to design and analyze large volumes of data.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.
- To understand, and practice big data analytics and machine learning approaches

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Explain the motivation for big data systems and identify the main sources of Big Data in the real world.
2. Demonstrate an ability to use frameworks Hadoop to efficiently store retrieve and process Big Data for Analytics.
3. Implement several Data Intensive tasks using the Map Reduce Paradigm
4. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
5. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
6. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

UNIT I

Introduction to Big Data : Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs. Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

UNIT II

Mining Data Streams: Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III

Hadoop: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

UNIT IV

Hadoop Environment: Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

UNIT V

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

Text Books

Tom White, 2012, Hadoop: The Definitive Guide, 3rd Edition, O'reilly Media.

Michael Berthold and David J. Hand, 2007, Intelligent Data Analysis, Springer.

References.

Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, 2012, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing.

Anand Rajaraman and Jeffrey David Ullman, 2012, Mining of Massive Datasets, Cambridge University Press.

15OEU501	Intranet Technology	Semester V L T P C 0 0 0 3
-----------------	----------------------------	---

Course Objectives (CO)

- Able to share and view information within the organization
- To have access to the intranet all the time.
- Promote fundamental concepts within the company over intranet
- Cost effective, saves money - this is one of the greatest benefits of the intranet.
- Messages, event and information can be placed on the intranet as they are quick. This saves time.
- To learn to maintain database and its applications

Course Outcomes (COs)

After completion of this course, the students will be able to:

1. Understand the advantage of intranet over groupware technologies
2. Understand the concept of sharing of files over Intranet
3. Work on Intranet chat tools and Intranet phones
4. Gain knowledge over the Intranet usage of Group scheduling, Message boards, News Feeds and other applications
5. Understand how to integrate intranet with existing applications
6. Understand impact to f security issues and its mechanisms

UNIT I

Introduction: Intranets: Internet Definition – The Internet in Action – Intranets Versus traditional Groupware – Client server basics and Theory. Building Intranet – Server Software – Starting with the Server – Connectivity – wide area networks – Selecting an Intranet Service Provider – Client Issues – Security.

UNIT II

Applications: Business applications – Viewing corporate Information with HTML – Authoring Tool – Creating a Dynamic & Functional site – Presentations: PDF – SGML-Audio – Video.

UNIT III

Intranet: Intranet Corporate data – Sharing files – using databases – Direct access. Communication – E-Mail – Intranet chat tools – Intranet phones.

UNIT IV

Intranet applications: Developing Intranet applications – Intranet tools – Creating real word applications – Group scheduling – Message boards – Contact Databases – Alert messaging and real time chat – News Feeds – Group Document creation and Editing – Private Messaging areas – Document submission – Search functions – Help Desk – Reference Desk.

UNIT V

Administering Intranet: Integrating existing applications – Maintaining a user Databases – Designing a successful file structure – Maintaining Security – Hardware and software upgrades – the Future of Intranets.

Text Book

David Garrett, 1998, Intranet Unleashed, 2nd Edition, Techmedia publication, New Delhi.[Unit-I(3-220), Unit-II(299-390), Unit-III(393-499), Unit-IV(513-698), Unit-V(701-802)]

References

Dasgupta, Subhasish. 2001. Managing Internet and Intranet Technologies in Organizations: Challenges and opportunities, 1st Edition, Idea Group Publishing.

Rolf Oppliger, 2002, Internet and Intranet Security, 2nd edition, Artech House Inc.

Course Objectives (CO)

- To understand the various characteristics of Intelligent agents
- To learn about the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.
- Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.

Course Outcomes (COs)

At the end of the course, the student should be able to:

1. Identify problems that are amenable to solution by AI methods.
2. Identify appropriate AI methods to solve a given problem.
3. Formalize a given problem in the language/framework of different AI methods.
4. Implement basic AI algorithms.
5. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
6. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

UNIT I

What is Artificial Intelligence?: The AI Problems - The Underlying Assumption - What is an AI Technique? - The Level of the Model - Criteria for Success.

Problems, Problem Spaces , and Search: Defining the Problem as a State Space Search - Production Systems - Problem Characteristics - Production System Characteristics - Issues in the Design Of Search Programs.

UNIT II

Heuristic Search Techniques: Generate-and-Test - Hill Climbing - Best-First Search - Problem Reduction - Constraint Satisfaction - Means-Ends Analysis

UNIT III

Knowledge Representation Issues: Representations and Mappings - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem. *Using Predicate Logic*: Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. *Weak Slot-and-Filler Structures*: Semantic Nets - Frames. *Strong Slot-and- Filler Structures*: Conceptual Dependency - Scripts – CYC.

UNIT IV

Lisp: Why Lisp? – Lisps - Typing at Lisp - Defining Programs - Basic Flow of Control in Lisp - Lisp Style - Atoms and Lists - Building Up List Structure - More on Predicates – Properties - The for function – Recursion - Scope of Variables

UNIT V

Expert Systems: A Little History - Features Of an Expert System – Players in the Expert System Use of Expert Systems - Real Experts Vs Expert Systems. Organizing Knowledge - Representing Knowledge. Expert Systems Vs Conventional Programs: Basic Characteristics of an Expert System, Expert Systems Make Mistakes.

Expert System Applications: Basic Activities Of Expert Systems - The Types Of Problems that Expert Systems Solve. *Application-Oriented AI Research: Medicine – Overview - Medical Systems: MYCIN*

Text Books

Elaine Rich, Kevin Knight and Shiva Shankar B. Nair, 2009, Artificial Intelligence, 3rd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.(Page Nos.: 4-20, 25-47; 50-74; 79-96; 99-125; 128-142, 422-429)

Nils J.Nilsson, 2013, Artificial Intelligence A New Synthesis, Morgan Kaufmann Publishers. Inc.

Elaine Rich, Kevin Knight, 1999, Artificial Intelligence, ,7th Edition, Tata McGraw-Hill.(Unit I, Unit II, Unit III)

Eugene Charniak, Drew McDermott, 1998, Introduction to Artificial Intelligence, Addison-wesley.(Unit IV)

Donald A. Waterman, 2004, A Guide To Expert Systems, 5th Edition, Pearson Education.(Unit V)

Avron Barr, Edward A.Feigenbaum, 1986, The Handbook of Artificial Intelligence, Addison-Wesley Publishing Company(Unit V)

References

Nils J.Nilsson, 2003, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publishers.

Ben Coppin, 2005, Artificial Intelligence Illuminated, Narosa Publishing House Pvt.Ltd.

Course Objectives (CO)

- To understand the multimedia communications systems, application and basic principles,
- To analyze of the multimedia streaming,
- To perform and establish multimedia communication terminals,
- To present multimedia communications
- Explore a brief history of multimedia in education
- Analyze instructional and informational media (print materials, audio/visual materials and/or web-based materials, games/simulations, etc.)

Course Outcomes (COs)

Upon successful completion the student will be able to:

1. Define multimedia to potential clients.
2. Identify and describe the function of the general skill sets in the multimedia industry.
3. Identify the basic components of a multimedia project.
4. Identify the basic hardware and software requirements for multimedia development and playback.
5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
6. Use appropriate tools for the design, development and creation of digital media artefacts.

UNIT I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images – Tagging images - Searching for images - Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects. Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks.

UNIT V

Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic ActionScript concepts: ActionScript basics – Data type basics. Learning basic ActionScript Programming: Applying ActionScript – Using ActionScript to Control actions – Using Actionsript to control properties – Understanding Actions and Event Handlers.

Text Books

Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill . (Unit I, Unit II)

Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill. (Unit III)

Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press. (Unit IV, Unit V)

References

Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, Tata McGraw-Hill.

Bill Sanders. 2001. Flash5 Action Script, 1st Edition, DreamTech Press, New Delhi.

Course Objectives (CO)

- To understand the multimedia communications systems, application and basic principles,
- To analyze of the multimedia streaming,
- To perform and establish multimedia communication terminals,
- To present multimedia communications
- Explore a brief history of multimedia in education
- Analyze instructional and informational media (print materials, audio/visual materials and/or web-based materials, games/simulations, etc.)

Course Outcomes (COs)

Upon successful completion the student will be able to:

1. Define multimedia to potential clients.
2. Identify and describe the function of the general skill sets in the multimedia industry.
3. Identify the basic components of a multimedia project.
4. Identify the basic hardware and software requirements for multimedia development and playback.
5. Describe the process of digitizing (quantization) of different analog signals (text, graphics, sound and video).
6. Use appropriate tools for the design, development and creation of digital media artefacts.

Flash

1. Change a Shape to Another Shape. (Shape Animation)
2. Create a Man to walk with the help of Key Frame Animation.
3. Change the Colors of an object with the help of Animation.
4. Draw a Bird with Flash tools and make it fly with key Frame Animation.
5. Create a Shining Stores with the help of Movie Clip.
6. Create an animation to represent a growing moon using frame by frame animation
7. Create an animation to bounce a ball on steps.
8. Simulate movement of a cloud.
9. Create Morphing between two images in Flash.
10. Create an Action script to execute for a event in a Flash application.

Photoshop

1. Create Water Drops using Photoshop.
2. Animate Plane Flying with the Clouds using Photoshop.
3. Create Plastic Surgery for Nose using Photoshop.
4. Create a Web Page using Photoshop
5. Given a picture of a flower with a background, Extract the flower and organize on a different background.
6. Display the given picture through your name using mask.

Course Objectives (CO)

- To describe different parallel architectures, inter-connect networks, programming models and algorithms for common operations such as matrix-vector multiplication.
- To define problem, develop an efficient parallel algorithm to solve it.
- To analyze processors time complexity as a function of the problem size and number of processors.
- Given a parallel algorithm, an input to it, and the number of processors, show the steps performed by that algorithm on that input.
- To learn various Parallel programming languages:
- To learn parallel processing algorithms and analyze their performance

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand basic construction and use of parallel computers
2. Understand different type of processor organizations like mesh, binary tree, hyper tree and pyramid networks
3. Understand parallel algorithms and key technologies.
4. Analyze the performance issues in parallel computing and trade-offs.
5. Understand, appreciate and apply parallel algorithms in problem Solving.
6. make of the terminology to measure the performance of parallel algorithms and parallel computers

UNIT I

Computational Demands of modern science-advent of practical parallel processing-parallel processing terminology. PRAM algorithms: A model of serial computation-PRAM model of parallel computation-PRAM algorithms: parallel reduction-list ranking-preorder tree traversal merging two sorted lists.

UNIT II

Processor organizations: mesh networks-binary tree networks-hyper tree networks-pyramid networks. Processor arrays-connection machine Multiprocessors: uniform memory access multiprocessors-non-uniform memory access multiprocessors

UNIT III

Parallel programming languages: programming parallel processes-an illustrative example-a sample application-FORTRAN 90-Fortran 90 programmer's model-Fortran 90 language features. nCUBE C: the run-time model-extensions to the c language-sample program-OCCAM programmer's model-language constructs-sample program-CLINDA-programmer's model – language constructs-sample programs

UNIT IV

Elementary parallel algorithms-classifying MIMD algorithms-reduction: hypercube SIMD model shuffle-exchange SIMD model-2-D mesh SIMD model-UMA multiprocessor model Matrix multiplication-sequential matrix multiplication-algorithms for multiprocessors

UNIT V

Sorting: Enumeration sort-lower bounds on parallel sorting-odd even transposition sort-quick sort based algorithms-parallel quick sort-hyper quick sort. Combinatorial search-divide and conquer-branch and bound-traveling salesperson problem parallel branch and bound algorithms.

Text Book

Lin and Snyder,.2008, Principles of Parallel Programming, 2nd Edition, Addison-Wesley Publication.

References

Yun Calvin Lin, Lawrence Snyder, 2008, Principles of parallel programming, 2nd Edition, Pearson/Addison Wesley Publication, India.

Lin, 2011, Principles of Parallel Programming, 3rd Edition, Addison-Wesley Publication.

Course Objectives (CO)

- To provide students with basic concepts in information system and the benefits with these systems in modern society
- To differentiate between data, information, and knowledge
- To understand systems definition, systems requirements, and information needed for decision maker
- To understand several requirement and operations that the analyst needed to analyze, design, and implement the systems in what is called system development life cycle (SDLC)
- Appraise the interrelationships among elements that comprise a modern security system, including hardware, software, policies, and people
- Assess the role of strategy and policy in determining the success of information security

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the basic of computer network threat and vulnerability and overview of digital crime.
2. Understand the various types of cyber attacks and criminals planning activities for cracking the system.
3. Understand the cryptography and its application and some of the important terms used in information security
4. Understand various Information Security Policies
5. Identify, Assess and control risk that occur while handling information transmission
6. Understand various security technologies available to handle different types of threats

UNIT I

Introduction : History, What is Information Security?, Critical Characteristics of Information, NISTSSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II

SECURITY INVESTIGATION : Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and obstacles to security, Ten steps to building a secure organization.

UNIT III

Security analysis : Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV

Logical Design: Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V

Physical Design: Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Text books

Michael E Whitman and Herbert J Mattord, 2003, Principles of Information Security, 1st Edition, Vikas Publishing House, New Delhi,

John R. Vacca, 2013, Computer and Information Security Handbook, Elsevier.

References

Micki Krause, Harold F. Tipton, 2004, Handbook of Information Security Management, CRC Press LLC.

Stuart Mc Clure, Joel Scrambray, George Kurtz, Hacking Exposed, 2nd Edition, Tata McGraw-Hill.

Course Objectives (CO)

- To learn the fundamental principles and practices associated with each of the agile development methods:
- To learn how agile methods scale to large and distributed projects, including the role of systems engineering. And, to learn the essentials of collaboration as they apply to agile methods.
- To perform in-depth explorations into aspects of agile development that are particularly relevant to each student through detailed discussion sessions.
- To understand the benefits and pitfalls of working in an Agile team.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To understand Agile development and testing through various case studies

Course Outcomes (COs)

After completion of this course the students will be able to:

1. Realize the importance of interacting with business stakeholders in determining the requirements for a software system
2. Perform iterative software development processes: how to plan them, how to execute them.
3. Point out the impact of social aspects on software development success.
4. Develop techniques and tools for improving team collaboration and software quality.
5. Perform Software process improvement as an ongoing task for development teams.
6. Show how agile approaches can be scaled up to the enterprise level.

UNIT I

Introduction :Software is new product development – Iterative development – Risk-Driven and Client-Driven iterative planning – Time boxed iterative development – During the iteration, No changes from external stakeholders – Evolutionary and adaptive development - Evolutionary requirements analysis – Early “Top Ten” high-level requirements and skilful analysis – Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery – The most common mistake – Specific iterative and Evolutionary methods.

UNIT II

Agile And Its Significance: Agile development – Classification of methods – The agile manifesto and principles – Agile project management – Embrace communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive process – Principle-based versus Rule-Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods. The facts of change on software projects – Key motivations for iterative development – Meeting the requirements challenge iteratively – Problems with the waterfall. Research evidence

UNIT III

Agile Methodology : Method overview – Lifecycle – Work products, Roles and Practices values – Common mistakes and misunderstandings – Sample projects – Process mixtures – Adoption strategies – Fact versus fantasy – Strengths versus “Other” history.

UNIT IV

Case Study: Agile – Motivation – Evidence – Scrum – Extreme Programming – Unified Process – Evo – Practice Tips.

UNIT V

Agile Practicing and Testing: Project management – Environment – Requirements – Test – The agile alliances – The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams.

Text Books

Craig Larman, 2004, Agile and Iterative Development – A Manager’s Guide, 1st Edition, Pearson Education.

Thomas Stober, Uwe Hansmann, 2010, Agile Software Development: Best Practices for Large Software Development Projects, 1st Edition, Springer Publications.

References

James Shore, Chromatic, 2008, The Art of Agile Development, 2nd edition, O’Reilly Media Inc. Publishers, USA.

15ITU506	TCP/IP Protocol Suite	Semester V L T P C 0 0 0 4
-----------------	------------------------------	---

Course Objectives (CO)

- To understand fundamental concepts of computer networking.
- To familiarize with the basic taxonomy and terminology of the computer networking area.
- To understand the function of each layer of the TCP/IP protocol suite
- To understand why a protocol is essential for communication between computers
- To familiarize the functions of IP protocol
- To learn the requirements of IP routing and choose appropriate routing methods

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Identify the different types of network devices and their functions within a network.
5. Understand and building the skills of subnetting and routing mechanisms.
6. Able to analyze IP addressing requirements and design an addressing scheme

UNIT I

Introduction: History of internet – Interconnecting devices - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices – Routing Concept - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum .

UNIT III

Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records.

UNIT V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets-VPN.

Text Book

Behrouz A. Forouzan, 2010, TCP/IP Protocol Suite, 4th Edition, Tata McGraw Hill Publication, New Delhi.

References

Andrews S Tanenbaum, 2003, Computer Networks, 4th Edition, Prentice Hall of India Private Ltd, New Delhi.

Buck Graham, 2007, TCP/IP Addressing, 2nd Edition, Harcount India Private Limited, New Delhi.

Douglas E Comer, 2000, Computer Networks and Internets, 4th Edition, Pearson Education Asia, New Delhi .

William Stallings, 2007, Data and Computer Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

Web Sites

en.wikipedia.org/wiki/Internet_protocol_suite

www.yale.edu/pclt/COMM/TCPIP.HTM

www.w3schools.com/tcpip/default.asp

Course Objectives (CO)

- To Architect J2EE applications using industry-recognized best practices
- To understand the importance of extension JDBC package in Enterprise Java applications.
- To Integrate J2EE applications with external systems
- To Identify and resolve J2EE security issues
- To Design and develop Web applications using JSP
- To implement and access Web Service components using EJB

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand J2EE technology and its applications
2. Understand JDBC components and its functionality
3. Invoke the remote methods in an application using Remote Method Invocation (RMI)
4. Develop a session using servlets and understand inter servlet communications
5. Make a reusable software component, using Java Bean
6. Develop a EJB application

UNIT I

Introducing J2EE basics: Need for enterprise programming– J2EE advantages – Enterprise architecture types – J2EE Multi-Tier Architecture – Architecture of J2EE – Introducing J2EE components – J2EE containers – Types of J2EE technologies .

UNIT II

Databases: JDBC objects –concept of JDBC – JDBC driver types – JDBC packages – overview of JDBC process-Database connection-statement objects - Resultset. Remote Method Invocation: RMI concept –Sever side – Client side.

UNIT III

Java servlets: simple java servlet – anatomy of a java servlet – deployment descriptor – session tracking with servlets – cookies. Inter servlet communication: chaining – tunneling.

UNIT IV

Java server pages: Introduction- JSP tags – variables and objects – methods – control statements – loops – tomcat -cookies – session objects.

UNIT V

Enterprise Java Beans: EJB container ,classes, Interfaces – Deployment descriptors – Session java Bean – Entity Java Bean- Message driven Bean.

Text books

Jim Keogh, 2012, J2EE 1.4 Complete Reference, Tata McGraw–Hill Publishing Company, New Delhi

Dreamtech Software Team, 2007 , Java server programming (J2EE 1.4) Black Book, Kogent Solutions Inc.

Reference

James McGoven, Rahim Adatis & Group, 2006, J2EE 1.4 Bible, Dreamtech Publishing.

		Semester V			
		L T P C			
15ITU507	Knowledge Management and Information Technology	0	0	0	5

Course Objectives (CO)

- To know the fundamentals of Knowledge Managements and its applications.
- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To learn the Evolution of Knowledge management.
- To learn and assess various types of security threats in information security

Course Outcomes (COs)

After the completion of this course, a successful student will be able to

1. Identify and analyze the applications of knowledge management (KM)
2. Understand knowledge management models and technologies to business situations.
3. Create a KM system to capture and evaluate knowledge of Expert
4. Understand the basic concepts in information system and the benefits with these systems in modern society
5. Analyze information security needs of an organization.
6. Understand the need of security mechanism and risk management.

UNIT I

Knowledge Management Km Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT II

Knowledge Management System Life Cycle Challenges in Building KM Systems – Conventional vs. KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT III

Capturing Knowledge Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding

UNIT IV

Information Security History, What is Information Security ?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT V

Security Investigation Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues – Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

Text Books

Elias.M. Award & Hassan M. Ghaziri, 2008, Knowledge Management, 2nd Edition Pearson Education , India.

Michael E Whitman and Herbert J Mattord, 2011, Principles of Information Security, 2nd Edition, Vikas Publishing House, New Delhi.

References

C.W. Holsapple, 2009, Handbooks on Knowledge Management, 1st Edition, International Handbooks on Information Systems.

Guus Schreiber, 2001, Knowledge Engineering and Management, 3rd Edition Universities Press.

Course Objectives (CO)

This subject provides students with

- To learn basic system concept and definitions of system simulation and modeling
- To learn various methods to generate and test random variable
- Techniques to model and to simulate various systems
- The ability to analyze a system and to make use of the information to improve the performance.
- To learn Discrete, Poisson, Geometric, Gamma distribution methods to design a simulation model
- To learn simulation language and generate model

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the principles within computer modelling and simulation
2. Generate and test random number by applying various techniques
3. Understand and evaluate various distribution models
4. Create a manual simulation even scheduling
5. Design and evaluate simulation experiments
6. Implement simulation case studies and analyze the result

UNIT I

Principle of computer modeling and simulation, Monte Carlo simulation. Nature of computer modelling and simulation. Limitations of simulation, areas of application. System and environment – components of a system – Discrete and continuous systems. Models of a system – A variety of modelling approaches.

UNIT II

Random number generation, technique for generating random numbers – Midsquare method – The midproduct method – Constant multiplier technique – Additive congruential method – Linear congruencies method – Tests for random number – The Kolmogorov Smirnov test – The chi-square test. Random variable generation – Inverse transform technique – Exponential distribution – Uniform distribution – Weibull distribution, empirical continuous distribution – Generating approximate normal variates.

UNIT III

Empirical discrete distribution – Discrete uniform distribution – Poisson distribution – Geometric distribution – Acceptance – Rejection technique for Poisson distribution – Gamma distribution.

UNIT IV

Design and evaluation of simulation experiments – Input – Output analysis – Variance reduction technique – Verification and validation of simulation models. Discrete event simulation – Concepts in discrete – event simulation – Manual simulation using event scheduling, single channel queue, two server queue, simulation of inventory problems.

UNIT V

Simulation languages – GPSS – SIMSCRIPT – SIMULA – Programming for discrete

event systems in GPSS and C. Case Study : Simulation of LAN – Manufacturing system – Hospital management system.

Text Books

Jerry Banks and John S. Carson II, 1984, Discrete Event System Simulation, Prentice Hall Inc.

Narsingh Deo, 1979, System Simulation with Digital Computer, Prentice Hall of India.

Andrei Borshchev, 2013, The Big Book of Simulation Modeling: Multimethod Modeling with AnyLogic 6, AnyLogic North America.

References

Peter Fritzson, August 2011, Introduction to Modeling and Simulation of Technical and Physical Systems with Modelica, Wiley-IEEE Press.

Francis Neelamkovil, 1987, Computer Simulation and Modeling, John Wiley & Sons,.

Averil M. Law and W. David Kelton, 1991, Simulation Modeling and Analysis, McGraw Hill International Editions.

கற்பகம் உயர்கல்வி கலைக்கழகம்

15LAU101

தமிழ்த்துறை

5H-5C

பகுதி - I தமிழ்ப் பாடத்திட்டம் (2013 - 2015)

முதல்பருவம்

(இளநிலை கலையியல் பட்ட வகுப்புகளுக்குரியது)

(For I-UG Arts Degree Classes)

15LAU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	5	3	40 / 60	100	4

அலகு I தற்கால இலக்கியம்

- | | | |
|-------------------|---|--|
| 1.மனோன்மனீயம் | - | சுந்தரம்பிள்ளை |
| 2.பாரதியார் | - | பாரதியார் கவிதைகள் |
| 3.பாரதிதாசன் | - | குன்றம் (அழகின் சிரிப்பு) |
| 4.நாமக்கல் கவிஞர் | - | தமிழன் இதயம் |
| 5.அப்துல் ரகுமான் | - | கூடுதூறக்கும் பறவைகள் |
| 6.சிற்பி | - | ஒடு ஒடு சங்கிலி (ஒரு கிராமத்து நதி) |
| 7.வைரமுத்து | - | மரங்களைப்பாடுவேன் |
| 8.தாமரை | - | அவசரம் ஒரு அகர ஊசி |
| 9.புதியமாதவி | - | (ஒருகதவும் கொஞ்சம் கள்ளிப்பாலும்)
மகளே வந்துவிடு (ஹேராம்) |

அலகு II பக்தி இலக்கியம்

1. சைவம் - பன்னிரு திருமுறைகளில் 12 பாடல்கள்
2. வைணவம் - ஆழ்வார் பாடல்கள் 12)

அலகு III உரைநடை

- | | | |
|----------------------------------|---|-----------------------|
| 1. பழந்தமிழ்நாடு | - | டாக்டர். கு. கதிரேசன் |
| 2. நொய்யல் நாகரிகம் | - | புலவர் செ. இராக |
| 3. அறிவியல் தமிழாக்கம் இற்றைநிலை | - | வா.செ. குழந்தைசாமி |
| 4. கணிப்பொறி | - | சுஜாதா |
| 5. சுற்றுச்சூழல் மேலாண்மை | - | தமிழ்நாடு அரசு |

அலகு IV பயிற்சி

இலக்கணம், கடிதங்கள் - அலுவலகநிலை, மொழிபெயர்ப்பு
நிகழ்ச்சித் தொகுப்புகள்
(பயிற்சி ஏடு - கல்லூரி வெளியீடு)

அலகு V இலக்கிய வரலாறு

- 1.தற்காலத் தமிழ்க் கவிதைகளின் வரலாறும், வளர்ச்சியும்
- 2.புதுக்கவிதைப் பிதாமகன்கள் குறித்த அறிமுகம்
- 3.பாரதியார், பாரதிதாசனின் தமிழ்த்தொண்டு
- 4.உரைநடையின் தோற்றமும் வளர்ச்சியும்

(For all undergraduates students admitted from 2015 onwards)

Course Objectives:

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes:

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

15BAU101

PRINCIPLES OF MANAGEMENT**Semester - I**
5H – 5C

Instruction Hours / week L: 5 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To define the concepts of management.
- To assess the functions of management and help the students to develop cognizance of the importance of management principles.
- To understand the concept of staff line function in decision making
- To help the students gain understanding of the functions and responsibilities of managers
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyze and understand the environment of the organization.

COURSE OUTCOMES**Learners should be able to**

1. Apply the basic concepts in understanding the business organizations
2. Discuss the managerial functions of planning, organizing, staffing, directing and controlling (including decision making).
3. To study the functions and principles of management.
4. To learn the application of the principles in an organization.
5. To enable the effective and barriers communication in the organization
6. To study the system and process of effective controlling in the organization.

UNIT I Nature and Scope of Management:

Meaning – Definition - Management is a Science or Art – Development of Management – Scientific Management – Functions - Social responsibilities and Ethics

UNIT II Planning:

Meaning and Characteristics of Planning – Steps in Planning – Objectives - Types of Planning - Policies, Procedures and Methods.

UNIT III Organizing:

Meaning – Definition - Functions of Organization – Types of Organizational Structure - Process of Decision making – Type of Decisions – Problems. – Span of control –Delegation - Decentralization and Centralization.

UNIT IV Staffing:

Line and Staff relationship – Co-ordination – Features. Motivation – Maslow's theory – Leadership – Qualities - Techniques.

UNIT V Controlling:

Meaning and Importance of Control – Control process – Controlling Techniques – Preventive control – Budgetary and Non-budgetary control - Business Ethics – Ethics and Morals – Nature of Ethics – Need for Business Ethics.

TEXT BOOKS

1. Dinkar Pagare, (2015), Principles of Management, S.Chand & Co Ltd., New Delhi.

REFERENCES

1. T.Ramasamy, (2014), Principles of Management, Himalaya Publishing house, Mumbai.
2. Koontz and Harold, (2014), Management Essentials, Tata Mc Graw Hill Publishers Pvt. Ltd. New Delhi.
3. S.P.Arora. (2009). Office Organization and Management,. Vikas Publishing House Pvt. Ltd. New Delhi.
4. Dr.Saxen,(2009), Business Administration and Management, Sahitya Bhavan Publications, New Delhi.

COURSE OBJECTIVES**To make the students**

- To state the concepts and conventions of accounting and basic accounting framework
- To demonstrate the fundamentals of accounting procedure
- To illustrate calculating non-trading concerns accounts
- To define concepts and formats of different types of accounts
- To interpret business data to prepare appropriate accounting statements
- To demonstrate and apply various accounting practices applicable to business

COURSE OUTCOMES**Learners should be able to**

1. Understand the basic concepts underlying the accounting practices and its techniques with special reference to Sole-Proprietorship.
2. Identify the various aspects of accounting related to Non-trading Concerns.
3. Apply principles of financial accounting and their applications in business organizations.
4. Describe the role of accounting information and its limitations
5. Equip with the knowledge of accounting process and preparation of final accounts of sole trader
6. Identify and analyze the reasons for the difference between cash book and pass book balances

UNIT I Accounting:

Meaning – Distinction Between Book-keeping and Accountancy – Objectives – Limitations – Rules of Double Entry system - Accounting Principles - Accounting Conventions – Journal – Ledger - Trial Balance.

UNIT II Subsidiary Book:

Purchase Book – Sales Book – Purchase Return book - Sales Return Book Errors - Meaning - Importance - Merits of Errors – Demerits of Errors - Types of Errors - Rectification of Errors - Bank Reconciliation Statement -Meaning – Importance - Merits of BRS – Demerits of BRS - Preparation of Bank Reconciliation Statements.

UNIT III Final Accounts:

Double Entry System – Single Entry System – Difference between Double Entry and Single Entry System. Final Accounts - Trading Account – Profit and Loss Account - Balance Sheet. Accounting for Non-Trading Institutions.

UNIT IV Depreciation:

Depreciation - Meaning- Importance – Causes of Depreciation - Methods of Depreciation - Straight Line Method – Written Down Value Method – Annuity Method

UNIT V Account Current:

Meaning – Importance – Objectives - Methods of Calculation of Interest – By Interest Tables – By product method – Red Ink Method – Epoque Method – Periodic Balance Sheet - Average Due Date – Meaning – Importance – Objectives - Methods of Ascertaining the Average Due Date.

Note : Distribution of marks between problems and theory shall be 80% and 20%.

TEXT BOOKS

1. R.L.Gupta, V.K.Gupta, (2014) Financial Accounting, Sultan Chand & Sons, New Delhi

REFERENCES

1. N.Vinayakam, (2011), Financial Accounting, S.Chand & Company Ltd., New Delhi
2. T.S.Grewal (2010), Introduction to Accountancy, S.Chand & Company Ltd., New Delhi.
3. T.S.Grewal, S.C.Gupta and M.C.Shukla, (2013), Advanced Accountancy, Sultan Chand & Sons, New Delhi.
4. K.L.Narang and S.N.Maheswari (2012), Advanced Accountancy, Kalyani Publishers, Ludhiana.

15BAU103

BASIC MATHEMATICS FOR MANAGERS

Semester - I
6H – 4C

Instruction Hours / week L: 4 T: 2 P : 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES**To make the students**

- To Understand the recent techniques of Operations Research and their applications
- To demonstrate the ability to model real-life scenarios using functions
- To solve nonlinear equations using analytic methods.
- To use mathematics concepts in real life situations.
- To explain the concepts and use equations, formulae, and mathematical expressions and relationships in a variety of contexts
- To apply the knowledge in mathematics (algebra, matrices, calculus) in solving business problems

COURSE OUTCOMES**Learners should be able to**

1. Calculate Simple and compound interests, Annuities, optimal assignments and Network scheduling with various applications of Mathematics in business management.
2. Distinguish between the concepts of sequence and series, and determine limits of sequences and convergence and approximate sums of series.
3. Analyze first-order difference equations and first-order differential equations and small systems of such equations using analytic, graphical, and numeric techniques, as appropriate,
4. Be able to modify a CPM and PERT use the Fundamental Insight of Linear Programming to identify the new solution, or use the Dual Simplex Method to restore feasibility,
5. Interpret the dual variables and perform sensitivity analysis in the context of economics problems as shadow prices, imputed values, marginal values, or replacement values,
6. Produce and interpret graphs of basic functions of these types, Solve equations and inequalities, both algebraically and graphically, and Solving and model applied problems.

UNIT I

Basic concept – Simple and compound interest – Effective rate of interest – Depreciation. Annuities – Present value of an immediate annuity, Present value of an annuity due, Amount of an immediate annuity, Amount of an annuity due.

UNIT II

Linear Programming Problem Formulation – Solution by Graphical Method -Solution by Simplex Method (problems using slack variables only)

UNIT III

Transportation model: Introduction – Mathematical formulation of the problem-Initial Basic Feasible solution – Optimum solution for non degeneracy Transportation problem – Unbalanced Transportation problem and Maximization case in Transportation problem.

UNIT IV

The Assignment problem - Mathematical formulation of the problem – Hungarian method – Unbalanced Assignment problem- Maximization case in Assignment problem.

UNIT V

CPM – Principles – Construction of Network for projects – Critical Path –Various floats for activities.PERT – Time Estimates – Critical Path – Probability of Completion of Project – Advantages and Limitations.

TEXT BOOKS

1. Navanitham Pa., (2004). Business Mathematics and Statistics, Jai Publications, Trichy. (Unit – I)
2. Kanthi Swarup, Gupta P.K., Man Mohan., (2006), Operations Research, Sultan Chand & Sons, New Delhi. (unit II – V)

REFERENCES

1. Sharma J.K, (2012). Operations Research: Theory and Applications, Macmillan publishers India Ltd, New Delhi.
2. Anand Sharma, (2004), Operations Research, Himalaya Publishing House,
3. Shanthi Sophia Bharathi D,(1999) (II edition), Operations Research/Resource management techniques, Charulatha Publications.
4. Sundaresan V, Ganapathy Subramanian K.S., and Ganesan K., (2005) (III edition), Resource Management Techniques, A. R. Publications, Nagapatinam.
5. Hamdy A.Taha, (2007), Operations Research: An introduction,, Pearson education, Prentice Hall of India.

15FCA101

**FOUNDATION COURSE – A
VALUE EDUCATION****Semester - I
2H – 5C**

Instruction Hours / week L: 2 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES**To make the students**

- Analyze the integral development of human begins
- Demonstrate the students towards sustainable lifestyle
- To discover awareness about the values and their significance and role
- Employ the concept of discipline and freedom
- To teach and inculcate the importance of value based living by giving the students a deeper understanding about the purpose of life.
- To teach and inculcate the essential qualities to become a good leader.

COURSE OUTCOMES**Learners should be able to**

1. Apply a sense of competitive spirit, co-operation, leadership, diligence, punctuality, and team-spirit
2. Develop a backdrop for the development of their creative talents
3. To gain deeper understanding about the purpose of their life.
4. To understand and start applying the essential steps to become good leaders.
5. To understand and start applying the essential steps to become good leaders by becoming value based professionals.
6. To emerge as responsible citizens with clear conviction to practice values and ethics in life

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisations of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

15SSD101

SOFT SKILL DEVELOPMENT - I

Semester I
2H – 0C

Instruction Hours / week L: 2 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- Identify knowledge on both Aptitude and Soft skills to the students
- Identify various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- Apply the competencies in soft skills which are crucial in a social setting
- To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- To develop and nurture the soft skills of the students through individual and group activities.
- To expose students to right attitudinal and behavioral aspects and to build the same through activities

COURSE OUTCOMES**Learners should be able to**

1. Apply the analytical and reasoning competencies
2. Appraise communication and presentation skills
3. Communicate effectively through verbal/oral communication and improve the listening skills
4. To write precise briefs or reports and technical documents
5. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
6. Become more effective individual through goal/target setting, self motivation and practicing creative thinking

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Arts Degree Classes) 15LAU201

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
இரண்டு	II	5	3	40 / 60	100	4

அலகு I செய்யுள்**1.சங்கஇலக்கியம்**

அகநானூறு, புறநானூறு, நற்றிணை, குறுந்தொகை, ஐங்குறுநூறு,
பதிற்றுப்பத்து, பரிபாடல்

2. நீதி இலக்கியம்

திருக்குறள் (ஈகை, தெரிந்து செயல்வகை)
நாலடியார் (நல்லினம் சேர்தல்)

3.பக்தி இலக்கியம்

திருஞானசம்பந்தர் தேவாரம், திருவாசகம், பெரியாழ்வார் திருமொழி,
நாச்சியார் திருமொழி

அலகு II சிறுகதை

காலனும் கிழவியும்	- புதுமைப்பித்தன்
அக்கினிப்பிரவேசம்	- ஜெயகாந்தன்
கண்ணகி	- இராஜம் கிருஷ்ணன்
பாதுகை	- பிரபஞ்சன்
உருமாற்றம்	- சு. வேணுகோபால்

அலகு III இலக்கணம்

அகம், புறம், திணை, துறை

அலகு IV. பயிற்சி

விண்ணப்பங்கள்- கட்டுரைகள்- கடிதங்கள்

அலகு V இலக்கிய வரலாறு

- 1.எட்டுத்தொகை, பத்துப்பாட்டு நூல்கள் அறிமுகம்
2. பன்னிரு திருமுறை, நாலாயிரதிவ்யபிரபந்தம்
3. சைவ, வைணவ இலக்கியங்கள் தமிழுக்குச் செய்த தொண்டு
4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்

(For all undergraduates students admitted from 2015 onwards)

Course Objectives:

- To enable the learners to acquire English language skills.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I:

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

15BAU201

PRINCIPLES OF MARKETING**Semester - II
6H – 5C****Instruction Hours / week L: 5 T: 1 P : 0****Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES****To make the students**

- To define the concepts and functions of marketing
- To develop the strategies of marketing and to relate the impact of marketing and its integration.
- Apply the knowledge on promotional steps in marketing
- To understand marketing is carried out by an organization to meet the requirements of domestic and international buyers, both households and businesses, within the bounds of ethics and the legal environment.
- To apply key frameworks and methods, and develop analytical skills to solve marketing problems.
- To provide a firm foundation in marketing theory and marketing lexicon.

COURSE OUTCOMES**Learners should be able to**

1. Analyzing the marketing environment, consumer behavior, marketing mix and product life cycle.
2. Developing best products in terms of goods and services that bring consumer satisfaction.
3. Evaluate the knowledge of the individual components of marketing mix and . marketing functions.
4. Demonstrate an understanding of how marketing fits with the other business disciplines within an organization.
5. Relate the impact of marketing and its integration with your own major or field of interest.
6. Identify wants and environmental factors that shape marketing activities for certain target markets ,

UNIT I

Marketing: Meaning – Definition - Concept – Marketing Management – Meaning - Importance – Functions of Marketing – Marketing Environment - Factors affecting the Marketing Functions.

UNIT II

Consumer Behaviour and CRM: Buyer Behaviour – Buying Motives – Market Segmentation – Meaning – Definition – Bases – Marketing Strategy – Market Structure – Customer Relationship Management – Meaning – Importance – Consumer Protection Act 1986

UNIT III

Product: Product – Marketing Characteristics – Consumer Goods – Industrial Goods – Production Policy – Product Life Cycle (PLC) – Product Mix – Modification and Elimination –Developing New Products – Strategies.

UNIT IV

Pricing: Pricing Policies – Objectives - Factor Influencing Pricing Decision –Pricing Strategy - Physical Distribution – Management of Physical Distribution – Marketing Risk – Storage and Warehousing

UNIT V

Promotion: Advertisement – Personal Selling and Sales Promotion – Importance – Channels of Distribution – Meaning – Types - Functions of Middlemen – Elimination of Middlemen.

TEXT BOOKS

1. Philip Kotler. (2012), Marketing Management, Prentice Hall of India Pvt. Ltd. New Delhi.

REFERENCES

1. R.L.Varshney and B.Bhattacharya, (2007), International Marketing Management. Sultan Chand & Sons, New Delhi.
2. C.B.Mamoria and Satish Mamoria, (2013), Marketing Management, Kitab Mahal, Patna.
3. Philip Kotler and Gary Armstrong, (2011), Principles of Marketing, Prentice Hall of India Pvt. Ltd. New Delhi.
4. Rajan Nair. (2005), Marketing Management, Sultan Chand & Sons, New Delhi.

COURSE OBJECTIVES**To make the students**

- To Apply practical knowledge about the computer package
- To develop knowledge in MS Office and recognize when to use each of the Microsoft Office programs to create professional and academic documents
- To dramatize knowledge on presentation
- Use Microsoft Office programs to create personal, academic and business documents following current professional and/or industry standards.
- Demonstrate the ability to effectively prioritize, plan, and organize resources for task completion
- Recognize the social and ethical issues which face users of computer information technology.

COURSE OUTCOMES**Learners should be able to**

1. Employ insight into the basic knowledge on MS Office
2. Manipulate the students to know about the preparation of word documents, excel sheet and power point presentation
3. Create personal, academic and business documents following current professional and/or industry standards
4. Recognize when to use each of the Microsoft Office programs to create professional and academic documents.
5. Provide education for office careers by focusing on developing human relations skills, communication skills, as well as skills in modern office technology systems and procedures
6. Compete in today's world of technology and achieve success in computer-related occupations in whatever field they choose to pursue

MS WORD

1. Type Chairman's speech/ Auditor's report / Minutes/ Agenda and perform the following operations:
Bold, Underline, Font Size, style, Background color, Text color, Line spacing, Spell Check, Alignment, Header & Footer, Inserting pages and page numbers, Find and Replace.
2. Prepare an invitation for the college function using Text boxes and Clip Art.
3. Design an invoice and Account sales by using Drawing tool bar, Clip Art, Word Art, Symbols, Borders and Shading.
4. Prepare a Class Time Table and perform the following operations: Inserting the table, Data Entry, Alignment of Rows and Columns, Inserting and Deleting the Rows and Columns and Change of Table Format.
5. Prepare a Shareholders meeting letter for 10 members using mail merge operation.
6. Prepare Bio-Data by using Wizard/ Templates.

MS EXCEL

1. Prepare a mark list of your class (minimum of 5 subjects) and perform the following operations:
Data Entry, Total, Average, Result and Ranking by using arithmetic and logical functions and sorting.
2. Prepare Final Accounts (Trading, Profit & Loss Account and Balance Sheet) by using formula.
3. Draw the different type of charts (Line, Pie, Bar) to illustrate year-wise performance of sales, purchase, profit of a company by using chart wizard.
4. Prepare a statement of Bank customer's account showing simple and compound interest calculations for 10 different customers using mathematical and logical functions.
5. Prepare a Product Life Cycle which should contain the following stages:
Introduction, Growth, Maturity, Saturation, Decline.

MS POWERPOINT

1. Design presentation slides for a product of your choice. The slides must include name, brand name, type of product, characteristics, special features, price, special offer etc. Add voice if possible to explain the features of the product. The presentation should work in manual mode.
2. Design presentation slides for organization details for 5 levels of hierarchy of a company by using organization chart.
3. Design slides for the headlines News of a popular TV Channel. The Presentation Should contain the following transactions: Top down, Bottom up, Zoom in and Zoom out. - The presentation should work in custom mode.
4. Design presentation slides about an organization and perform frame movement by interesting clip arts to illustrate running of an image automatically.

5. Design presentation slides for the Seminar/Lecture Presentation using animation effects and perform the following operations: Creation of different slides, changing background color, font color using word art.

MS ACCESS

1. Prepare a payroll for employee database of an organization with the following Details: Employee id, Employee name, Date of Birth, Department and Designation, Date of appointment, Basic pay, Dearness Allowance, House Rent Allowance and other deductions if any. Perform queries for different categories.
2. Create mailing labels for student database which should include at least three Table must have at least two fields with the following details: Roll Number, Name, Course, Year, College Name, University, Address, Phone Number.
3. Gather price, quantity and other descriptions for five products and enter in the Access table and create an invoice in form design view.
4. Create forms for the simple table ASSETS.
5. Create report for the PRODUCT database.

TEXT BOOKS

1. R.K.Taxali. (2010), P.C.Software Made Simple, Tata McGraw-Hill Publishing Company Ltd, New Delhi.

15BAU202

ALLIED - BUSINESS STATISTICS

Semester- II
6H – 5C

Instruction Hours / week L: 4 T: 2 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES**

- To apply the students to understand the meaning, definition and functions of statistics through collection, representation, finding various measures such as mean, median, mode, correlation etc.
- Apply the procedures to analyze, and make recommendations on, a range of practical business problems
- Offer a critical knowledge of statistical practices in the various functional areas of business (accounting, finance, management and marketing)
- Describe and explain basic statistical concepts (including their empirical applications in a business context)
- Understand how to organize and summarize data by using descriptive statistics and appropriate statistical graphic
- Analyze and contrast techniques and biases of quantitative methods within the context they are to be applied in business decision making.

COURSE OUTCOME

1. Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.
2. Analyze statistical data using measures of central tendency, dispersion and location.
3. Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.
4. Analyze and contrast techniques and biases of quantitative methods within the
 - i. context that are to be applied and evaluate sampling methodologies and them
 - ii. associated analysis.
5. Translate real-world problems into probability models and derive the probability density function of transformation of random variables.
6. Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables and Type of correlation.

UNIT I

Statistical description of data - Tabular Representation – Diagrammatic Representation – Frequency distribution- Graphical Representation – Ogives.

UNIT II

Measures of Central Tendency: Introduction to Mean - Median - Harmonic Mean – Standard deviation – Quartile Deviation – Mode – Mean Deviation – Range.

UNIT III

Probability – definitions – addition and multiplication rules (only statements) – simple business problems.

Probability distribution - Binomial, Poisson and Normal – simple problems applied to business.

UNIT IV

Correlation : Definition , Type of correlation , Method of correlation - scatter diagram – Karl Pearson's coefficient of correlation – Spearman's Rank correlation.

Regression: Definition, Regression equations – Methods of forming the regression equations - Problems.

UNIT V

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre's, Paasche's and Fischer's method – Tests for an ideal index number – Wholesale and Cost of living index .

TEXT BOOKS

1. Pillai R.S.N, and Bagavathi V, (2002), Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCES

1. Dr.P.N.Arora, (1997). A foundation course statistics, S.Chand & Company Ltd, New Delhi.
2. Navnitham P.A , (2004). Business Mathematics And Statistics, Jai Publications, Trichy,
3. Gupta S.P, (2001). Statistical methods, Sultan Chand & Sons, New Delhi.
4. Richard .I.Levin, and David.S.Rubin, (1998), Statistics for management, Seventh edition, Prentice Hall of India, New Delhi.

15FCB201

**FOUNDATION COURSE - B
ENVIRONMENTAL STUDIES****Semester - II
2H – 1C****Instruction Hours / week L: 2 T: 0 P : 0****Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES****To make the students**

- To demonstrate awareness about environmental problems among people.
- To develop an attitude of concern for the environment and think holistically about sustainability using perspective across multiple disciplines.
- To prepare public to participate in environment protection and improvement.
- To learn ways in which natural resources are used to produce what they consume, such as the food they eat, the water they drink, and the energy they use.
- To understand ways in which their lifestyle and well-being are interconnected with those of diverse producers and consumers around the world, including impoverished communities. Sustainability knowledge and skills
- To learn core concepts of ecology and develop skills relevant to their chosen field to provide a basis for environmental sustainability.

COURSE OUTCOMES**Learners should be able to**

1. Demonstrate various renewable and nonrenewable resources of the region, enables environmentally literate citizens (by knowing the environmental acts, rights, rules, legislation, etc.)
2. Design an appropriate judgments and decisions for the protection and improvement of the earth.
3. Will be able to articulate basic understanding of various social science theories/frameworks and how they apply to environmental issues.
4. Understand key concepts in the life and physical sciences and will apply them to environmental issues.
5. Analyze and evaluate ideological and philosophical approaches used to understand environmental relationships.
6. Articulate a coherent philosophy of the environment, & consider ethical bases for responding to environmental questions

Unit - I

Eco system and natural resources: Environment – Definition – components - Ecosystem - Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

Unit - II

Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit – III

Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit – IV

Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilitation. Natural resources and associated problems and sustainable utilization. Environmental Education

Unit – V

Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, (2002). A TEXT BOOKS of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, (2002). Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, (2004). Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K, (2005). Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. (2009). Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, (1942). Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L.Abbott, (2008). Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

15SSD201

SOFT SKILL DEVELOPMENT - I

Semester - II
2H – 1C

Instruction Hours / week L: 2 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES**To make the students**

- Construct knowledge on both Aptitude and Soft skills to the students
- To evaluate and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- Interpret reinforcing competencies in soft skills which are crucial in a social setting
- To encourage the all round development of students by focusing on soft skills. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- To develop and nurture the soft skills of the students through individual and group activities.
- To expose students to right attitudinal and behavioral aspects and to build the same through activities

COURSE OUTCOMES**Learners should be able to**

1. Employ the Analytical and reasoning competencies
2. Express their communication and presentation skills
3. Effectively communicate through verbal/oral communication and improve the listening skills
4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking
5. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
6. Develop problem-solving skills and apply those skills through the high-impact practice of experiential learning

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

15ENU301

ENGLISH III

Semester - III

Instruction Hours / week L: 4 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**Communicative English****Course Objectives:**

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcomes:

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.
6. Betterment of language competence

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages –making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose – Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Reference Books:

Language in Use: Kenneth Anderson, Cambridge University Press.

Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.

Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.

Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let’s Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

15BAU301

PRODUCTION AND MATERIALS MANAGEMENT**Semester III
5H – 5C****Instruction Hours / week L: 4 T: 1 P : 0****Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours****COURSE OBJECTIVES****To make the students**

- To practice the concepts and functions of production
- To apply the knowledge in the concept of inventory
- To assess knowledge in purchase procedure and quality control
- To understand how the knowledge of materials management can be an advantage to logistics and supply chain operations.
- To sensitize the students on the materials management functions – Planning, Purchase, Controlling, Storing, Handling, Packaging, Shipping and Distributing, and Standardizing.
- To realize the importance of materials both in product and service.

COURSE OUTCOMES**Learners should be able to**

1. Employ the whole process of manufacturing a product or a service
2. Interpret the concept of optimum utilization of resources and minimization of cost
3. Understand the concept of materials management, concept of inventory and quality control.
4. Develop the knowledge and skills needed to plan and control manufacturing of goods and services in an industrial setting, TQM and ISO
5. Identifying the scope for integrating materials management function over the logistics and supply chain operations. Integrate the organization wide materials requirement to develop an overall plan (MRP).
6. Identify, study, compare, and evaluate alternatives, select and relate with a good supplier

UNIT I

Production Management – Functions – Scope – Plant location – Factors – Site location – Plant layouts – Principles - Process – Product Layout for Production Planning and Control – Principles - Information Flow – Routing – Scheduling – Dispatching – Control.

UNIT II

Materials Handling – Importance – Principles – Criteria for selection of material handling equipment's. Maintenance – Types – Breakdown – Preventive – Routine – Methods study – Time Study – Motion Study – Principles – Work Measurement.

UNIT III

Organization of Materials Management – Fundamental Principles – Structure – Integrated Materials Management – Purchasing – Procedure – Principles – Import Substitution and Import Purchase Procedure – Vendor Rating – Vendor Development.

UNIT IV

Functions of Inventory – Importance – Tools – ABC Analysis – EOQ – Levels of stock- Reorder Point – Safety Stock – Lead Time – JIT - Store Keeping – Objectives – Functions – Store Keeper – Duties – Responsibilities – Location of Store – Stores Ledger – Bin card.

UNIT V

Quality Control – Factors Determining Quality – Quality circle - TPM - 5 s - Types of Inspection – Centralized and Decentralized - TQM - Meaning – Objectives – Elements – Benefits – Bench Marking - Meaning – Objectives – Advantages – ISO - Features – Advantages – Procedure for obtaining ISO - Balanced Score Card.

TEXT BOOKS

1. Khanna O.P, (2010), Industrial Engineering and Management, Dhanpat Rai Publications Pvt. Ltd. New Delhi.

REFERENCES

1. Banga.T.R, (2007) Industrial Engineering and Management Science, Khanna Publishers. New Delhi.
2. Varma. M.M., (2010), Materials Management, Sultan Chand & Sons. New Delhi.
3. Gopalakrishnan, (2004) Materials Management, Prentice Hall of India Pvt. Ltd. New Delhi.

COURSE OBJECTIVES**To make the students**

- To employ the student's knowledge on direct tax
- To Practice the students with the Income tax law
- To prepare students to understand the concepts of tax authorities
- To acquaint the students with the legal regime governing the direct taxes.
- To gain knowledge and understanding of the provisions of the direct tax laws.
- To acquire the ability to apply the knowledge of the provisions of the direct tax laws to the various situation in actual practice.

COURSE OUTCOMES**Learners should be able to**

1. Computation of gross total income
2. Illustrate basis of charge the residential status of an individual, HUF and all other persons
3. Construct Assessment procedure of individuals and computation of tax liability.
4. Define the procedure of direct tax assessment.
5. File IT return on individual basis.
6. Able to compute total income and define tax complications and structure.

UNIT I

Income Tax Act – Definition – Income – Agricultural Income – Assessee – Previous year – Assessment year – Residential status – Scope of Total Income – Exempted Incomes – Heads of income.

UNIT II

Computation of Income from Salaries – Allowances – Perquisites – Deductions out of gross salary - Income from House Property – Annual value – Net annual value.

UNIT III

Computation of Profits and Gains of Business or Profession – Capital Gain- Long term Capital Gain – Short term Capital Gain – Exempted Capital Gain.

UNIT IV

Computation of Income from other sources – Set-Off and Carry Forward of Losses - Deduction from Gross Total Income – Assessment of Individuals

UNIT V

Income Tax Authorities – Procedures for assessment – Collection of Tax

Note: Theory and problems shall be distributed at 40% & 60% respectively.

TEXT BOOKS

1. Gaur and Narang, (2014), Income Tax Law and Practice, Kalyani Publishers, Ludhiana.

REFERENCES

1. Dingare Pagare, (2014), Business Taxation, Sultan Chand & Sons, New Delhi.
2. Dinkar Pagare,(2014), Law and Practice of Income Tax, Sultan Chand & Sons, New Delhi.
3. Bhagavathi Prasad, (2014), Income Tax Law and Practice, Wishwa Prakshan Publishers, New Delhi.
4. T.N.Manoharan, (2014), Students Handbook on Income Tax Law, Snow White Publications Pvt. Ltd. Mumbai.

COURSE OBJECTIVES**To make the students**

- To design the concept of human behavior and provide the students to analyze specific strategic human resources demands for future action.
- To employ the students knowledge with various factors involved in human behaviour
- To apply students to understand about the organizational climate
- To gain an appreciation of the relevance of the study of organizational behaviour to the practice of human resource management
- To enable students to describe how people behave under different conditions and understand why people behave as they do.
- 4. To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior and improve results.

COURSE OUTCOMES**Learners should be able to**

1. Understanding the human behavior aspects in achieving the organization goal
2. Construct individual and group behavior in organization.
3. Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
4. Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
5. Analyze the complexities associated with management of the group behavior in the organization.
6. Develop cognizance of the importance of human behavior.

UNIT I

Organizational Behaviour - History - Evaluation - Importance and Scope of Organizational Psychology – Individual Differences – Intelligence Tests – Measurement of Intelligence – Personality - Determinants of Personality - Personality Tests – Nature, Types and uses.

UNIT II

Perception – Perceptual process, Applications in Perception, Factors Affecting Perception – Motivation – Theories - Maslow's Theory – Herzberg – McGregor - X and Y Theory – Financial and Non-financial Motivation – Techniques of Motivation.

UNIT III

Job Satisfaction – Meaning – Factors – Management of Job Satisfaction – Morale – Importance – Employee Attitude and Behaviour - Significance to Employee Productivity - Values and behavior - Factors - Job Enrichment – Job Enlargement.

UNIT IV

Hawthorne Experiment – Importance – Groups Dynamics – Cohesiveness – Co-operation – Competition – Conflict – Types of Conflict – Resolution of Conflict – Sociometry – Groups Norms – Role – Status – Supervision Style – Training for Supervision.

UNIT V

Leadership – Types – Theories – Traits, Managerial Grid - Fiedler's Contingency - Organizational Climate – Organizational Effectiveness – Organizational Development – Counseling and guidance – Importance of counselor – Types of counseling – Merits of counseling.

TEXT BOOKS

1. K.Aswathappa, (2014), Organizational Behaviour., Himalaya Publishing House, Mumbai.

REFERENCES

1. Fred Luthans, (2010), Organizational Behaviour. Tata Mc Graw Hill International, New Delhi.
2. L.M.Prasad, (2011), Organizational Behaviour, S.Chand & Co. New Delhi.
3. Stephen P. Robbins, (2013), Organizational Behaviour. Prentice Hall of India Pvt.Ltd. New Delhi.
4. Dr.P.C.Sekar, (2012), Organizational Behaviour. Enpee Publications, Madurai.

15BAU311

PRACTICAL - TALLY**Semester- III**
4H – 2C

Instruction Hours / week L: 0 T: 0 P : 4

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES**To make the students**

- To apply practical knowledge about the accounting package
- To employ in computerization of accounts in various vouchers
- To express in system computation accounting procedures
- To learn Basics of Accountancy, its principles, concepts, conventions, recording procedures, Bank reconciliation, final accounts etc
- To learn and practice Computerized Accounting Systems using Tally.ERP.9
- To, learn how to record accounting transactions with the help of tally ERP software

COURSE OUTCOMES**Learners should be able to**

1. Demonstrate the basic knowledge on accounting package
2. Assess voucher and various accounting statements
3. Construct in computing procedures and develop various types of Financial Statements.
4. Create a company, enter accounting voucher entries including advance voucher entries, do reconcile bank statement, do accrual adjustments
5. Understanding of basic Accounting concepts and principles and generate Accounting and Inventory Masters, Vouchers and Basic Reports in Tally
6. Gain practical knowledge of accounting and competent in preparation of Accounts for the Business Entities.

Practical List

1. Create a new company in integrate accounts mode and account with inventory mode
2. Create a primary and sub groups using single or multiple ledger mode
3. Create minimum 10 ledgers using single or multiple ledger, and alter and delete any 2 ledger
4. Enter the following voucher
 - Payment vouchers
 - Receipt
 - Purchase
 - Sales
 - Credit note
 - Debit note
 - Journals
 - Memo
 - Optional

5. Create stock, stock groups and enter the vouchers
6. Prepare inventory statements using (calculate inventory using all methods)
 - FIFO
 - LIFO
 - Simple Average Method
 - Weighted Average Method
7. Prepare the following ratio analysis
 - Financial ratio
 - Operating ratio
 - Investment ratio
8. Prepare the following
 - Cash flow statement
 - Fund flow statement
9. Preparation of reports for the following
 - Trial Balance
 - Profit & loss a/c
 - Balance sheet
 - Bank reconciliation statement
 - Back up and restore the company information

TEXT BOOKS

1. Nellai Kannan, (2010), Tally. Nels Publishing Company, New Delhi.

15BAU304A

BUSINESS ECONOMICS

Semester - III
6H – 5C

Instruction Hours / week L: 6 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To employ students with the knowledge of pricing under different market conditions
- To develop the students skills in managing capital and profit
- To Practice students knowledge in national income analysis
- To integrate the concept of price and output decisions of firms under various market structure
- To impart the knowledge of economics as a subject and its importance
- To take business decisions scientifically on the basis of all available information.

COURSE OUTCOMES**Learners should be able to**

1. Understand the concept of demand, supply, market equilibrium, production functions and market structure
2. Apply the economic theory and integrate the concept of price and output decisions of firms under various market structure.
3. Develop the knowledge on economic concepts help for management decisions
4. To understand the concepts of cost, nature of production and its relationship to Business operations.
5. To apply marginal analysis to the “firm” under different market conditions
6. To analyze the causes and consequences of different market conditions.

UNIT I

Business Economics and Economic Theory: Scope of Business Economics –Profit Maximization- Economic Cost of using Resources - Social Responsibilities of Business - Maximizing the Value of a Firm – Basic Techniques of a Firm.

UNIT II

Demand, Supply and Market Equilibrium: Demand - Law of Demand – Determinants – Elasticity - Demand Function – Forecasting - Theories of Demand - Supply – Law of Supply – Elasticity of Supply - Supply Functions - Market Equilibrium - Changes in Market Equilibrium.

UNIT III

Production and Cost Analysis: Production Function- Iso-quant curves - Production in the short run and long run - Law of Diminishing Marginal Product - Short run and long run cost of production – Short run Total Costs - Cost Curves - Cost Analysis - Concept of Cost - Types - Cost Output Relationship in Short and Long Period.

UNIT IV

Market Structure And Pricing Decisions: Classification of Markets – Pricing Under Perfect Competition – Pricing Under Monopoly – Price Discrimination – Dumping – Pricing Under Monopolistic Competition – Monopsony - Pricing Under Oligopoly Kinked Demand Curve Model – Cournot’s Model Of Duopoly.

UNIT V

National Income Analysis: National Income Analysis – Theories of Income, Output and Employment – Classical - Keynesian theory - Theory of Trade Cycles-Concept and Causes of Trade Cycles -Measures to Control Trade Cycles - Macro Economic Policy - Monetary and Fiscal - Theories of Inflation- Causes and Control of Inflation.

TEXT BOOKS

1.Sundaram K.P and Sundaram E. (2008). Business Economics. Sultan Chand & Sons, New Delhi.

REFERENCES

1. H.L.Ahuja. (2007), Business Economics, S.Chand & Company Ltd, New Delhi.
2. P.N.Reddy and H.R.Appanaiah, (2005), Principles of Business Economics, S.Chand & Company Ltd., New Delhi.
3. Paul R. Ferguson, Glenys J. Ferguson and R.Rothschild, (2010), Managerial Economics, Macmillan Press Ltd, Hong Kong.
4. S.K.Agarwala, (2009), Principles of Economics, Excel Books, New Delhi.

15BAU304B

MANAGEMENT INFORMATION SYSTEM

Semester - III
6H – 5C

Instruction Hours / week L: 6 T:0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- Formulate the management information system and their applications in Management
- To develop the awareness among students in telecommunication revolution
- To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
- To enable students understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
- To enable the students to use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
- To provide the theoretical models used in database management systems to answer business questions.

COURSE OUTCOMES**Learners should be able to**

1. Comply knowledge to get an exposure to the experts' theories and practices in the field of MIS
2. Analyze how technology can be used to synthesize complex data to make sound business decisions information support systems and management operations needs
3. Compare the processes of developing and implementing information systems.
4. Outline the role of the ethical, social, and security issues of information systems.
5. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
6. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

UNIT I

Introduction to Information Systems - Definition - Features - Steps in Implementation of MIS - Need for Information - Information System for Decision making- MIS as Competitive Advantages – MIS Structures.

UNIT II

MIS - Strategic Information System - MIS Support for Planning - Organising - controlling - MIS for Specific Functions – Personnel – Finance - Marketing Inventory Production Data Base Management System Models - Hierarchical - Network - Relational - Modular.

UNIT III

Computer Hardware - Description of Electronic Computers – CPU Operations - Classification of Computers - Main - Mini – Workstations - Micro Computers - Super Computers - Personal Computers. Computer Software - Types of Software - Data Representation in Computers - Introduction to Client-Server.

UNIT IV

Input Devices - Mouse - Touch Screens - MICR - OCR - Keyboard - Pen Based Input - Digital Scanners - Voice Input Devices - Sensors. Output Devices - Impact Printers - Non-Impact Printers - Video Display Terminals - Plotters - Voice Output Devices. Secondary Storage Devices - Magnetic Disk, Floppy, Magnetic Tape, Optical Disk Storage - DROM

UNIT V

Telecommunication Revolution - Introduction to Email- Internet - Intranet – Teleconferencing - www Architecture - Introduction to E-Commerce - Models B_B, B_C, and EDI, EDI Applications in Business - Electronic Payment Cash - Smart Cards - Credit Cards - Fundamentals of ERP- Information Technology Act, 2000.

TEXT BOOKS

1. James O Brien, (2014), Management Information System, Tata Mc Grew Hill, New Delhi.

REFERENCES

1. Kenneth Laudon and Jane Laudon , (2011), Management Information System- A contemporary perspective, Pearson Prentice Hall of India, New Delhi.
2. Gordon B Davis, (2012), Management Information System, Tata Mc Grew Hill, New Delhi.
3. Sudalaimuthu S, (2014), Computer applications in business, Himalaya Publishing House Pvt.Ltd, Mumbai.

COURSE OBJECTIVES**To make the students**

- To employ the students to understand the concepts of Information technology
- To understand the components of computer system
- To Practice the Knowledge in operating system
- Demonstrate knowledge of information technologies and digital cultures, both historic and contemporary, and be aware of the social, ethical and philosophical issues related to technological development.
- Demonstrate that they can evaluate and explain the on-going changes in digital technology and their impacts on society.
- Demonstrate that they can apply a variety of information technologies to their own work, demonstrating their competence in researching, creating, and presenting projects using a variety of digital information tools.

COURSE OUTCOMES**Learners should be able to**

1. Categorize the fundamentals of computers and Understand basic concepts and terminology of information technology
2. Apply in computer language and electronic data processing
3. Have a basic understanding of personal computers and their operations
4. Demonstrate that they can use a personal computer or mobile device for accessing the internet and use basic computer applications
5. Demonstrate that they can use digital technology in research, analysis, and critical inquiry.
6. Demonstrate an understanding of the concepts of online security and privacy.

UNIT I

Computer system : Introduction - Types of computer systems - micro, mini, mainframe and super computers - analog, digital and hybrid computers - business and scientific computer systems - first, second, third and fourth generation computers.

UNIT II

Components of computer system: input, output and storage devices. software: system software and application software - programming language – machine language – assembly language – high level languages – flow chart and programmed flow charts – steps in developing a computer programmer.

UNIT III

Hardware and software: computer systems - importance of computers in business - data and information - data processing - data processing systems batch-online and real time systems - time sharing-multi programming and multi processing systems.

UNIT IV

Operating systems: DOS –windows – UNIX - window NT –window'98 – E-Commerce – internet – intranet – email its uses and importance – world wide web sites and computers.

UNIT V

System analysis and design - computer based information systems – transaction processing – office automation – management information systems – decision support systems – expert system.

TEXTBOOKS

1. Alexis and Mathews Leon, (2008), Introduction to Computers, Tara McGraw Hill Publishing House, New Delhi.

REFERENCES

1. Roger Hunt and John Shelly, (2004), Computer and Commonsense, Prentice Hall of India (P) Ltd, New Delhi.
2. Henry C. Luca, (2009), Information Technology for Management, Himalaya Publishing House. Bangalore.

15SSD301

SOFT SKILL DEVELOPMENT - II

Semester - III
2H – 0C

Instruction Hours / week L: 2 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To apply knowledge on both Aptitude and Soft skills to the students
- To compose and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- Demonstrate reinforcing competencies in soft skills which are crucial in a social setting
- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills and re-engineer attitude and understand its influence on behavior

COURSE OUTCOMES**Learners should be able to**

1. Understand the analytical and reasoning competencies and to improve their communication and presentation skills
2. Effectively communicate through verbal/oral communication and improve the listening skills
3. Write precise briefs or reports and technical documents.
4. Become more effective individual through goal/target setting, self motivation and practicing creative thinking
5. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
6. Become more effective individual through goal/target setting, self motivation and practicing creative thinking.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

COURSE OBJECTIVES**To make the students**

- .To enhance the learner's communication skills by giving adequate exposure in LSRW listening, speaking, reading and writing skills and the related sub-skills. ...
- To impart better writing skills by sensitizing the learners to the dynamics of effective writing.
- To train the students in understanding the concepts of communication and produce short and simple connected texts on familiar topics.
- To train the students in developing their written communication and presentation skills.
- To understand simple texts and a range of high frequency vocabulary in context
- To describe aspects of personal and everyday life in both oral and written form and demonstrate some control of essential grammatical structures with occasional inconsistencies

COURSE OUTCOMES**Learners should be able to**

1. Understand and extract the essential information from a written or spoken text on a familiar topic
2. Examine a short written text for specific information and organize a range of isolated words and phrases dealing with concrete everyday topics.
3. Describe people, places, likes and dislikes and daily routines in a series of simple phrases and Sentences.
4. Construct short and simple descriptive paragraphs about people, places and events.
5. Write a clear topic sentence for a paragraph and understand the form and function of the basic official correspondences.
6. Perform a range official support through formal and informal writings,

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks,

Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference:

Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.

Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam

Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.

Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

COURSE OBJECTIVES**To make the students**

- To develop the students to acquire knowledge in financial management
- Estimate the knowledge in finance functions, cost of capital, capital structure, capital budgeting, working capital management.
- To enable students to describe how people analyze the corporate leverage under different conditions and understand why people value different corporates in different manner.
- To provide the students to analyze specific characteristics of Supply Chain Industry and their future action for cash flow
- To enable students to synthesize related information and evaluate options for most logical and optimal solution such that they would be able to predict and control Debt Equity incurrence and improve results.
- To enable students to describe how people analyze the corporate leverage under different conditions and understand why people value different corporate in different manner.

COURSE OUTCOMES**Learners should be able to**

1. Construct the fundamental decisions in corporate
2. Understand the finance function and to calculate working capital management
3. Demonstrate an understanding of the overall role and importance of the finance function.
4. Demonstrate basic finance management knowledge. and Communicate effectively using standard business terminology.
5. Analyze the main ways of raising capital and their respective advantages and disadvantages in different circumstances
6. Integrate the concept and apply the financial concepts to calculate ratios and do the capital budgeting

UNIT I

Finance Functions: Meaning - Definition and Scope of Finance Functions - Objectives of Financial Management - Profit Maximization and Wealth Maximization. Sources of Finance - Short term - Bank Sources – Long term - Shares - Debentures, Preferred Stock - Debt.

UNIT II

Financing Decision: Cost of Capital - Cost of Specific Sources of Capital - Equity - Preferred Stock - Debt – Retained Earnings - Weighted Average Cost of Capital. Leverage - Operating Leverage - Financial Leverage.

UNIT III

Capital Structure: Meaning - Definition - Factors Influencing Capital Structure – Optimal Capital Structure - Dividend and Dividend policy – Meaning - Classification - Sources Available for Dividends - Determinants of Dividend Policy.

UNIT IV

Working Capital Management: Concepts - importance -Determinants of Working Capital. Cash Management - Motives for Holding Cash - Objectives and Strategies of Cash Management. Receivables Management - Objectives - Cost of Credit Extension, Benefits - Credit Policies - Credit Terms - Collection Policies – Inventory Management – Techniques.

UNIT V

Capital Budgeting: Meaning – Objectives - Methods of Evaluation of Capital Budgeting – Traditional Methods – Pay Back Period Method – Rate of Return - Discounted Cash flow Methods – Net Present Value Method - Internal Rate of Return – Profitability Index Method.

Note : Distribution of marks for theory and problems shall be 60% and 40% respectively.

TEXT BOOKS

1. S.N.Maheswari, (2014), Financial Management, Sultan Chand & Sons. New Delhi.

REFERENCES

1. P.V.Kulkarni, (2011), Financial Management, Himalaya Publishing house, Mumbai.
2. Khan and Jain, (2007), Financial Management, Tata Mc Graw Hill, Publishers Pvt. Ltd.New Delhi.
3. I.M. Pandey, (2009), Financial Management, Vikas Publications, New Delhi.

COURSE OBJECTIVES**To make the students**

- To define the essential elements of contract
- To develop the students to understand about the creation of agency and sale of goods Act.
- To Demonstrate how criminal law relates to business
- To Demonstrate recognition of intellectual property, identify how computer law affects business Analyze the nature and terminology of contract law
- To Demonstrate recognition of the requirements of the contract agreement
- To Demonstrate understanding of contract consideration and capacity and memorize knowledge in the Negotiable Instruments Act.

COURSE OUTCOMES**Learners should be able to**

1. Prepare contract forum and discharge of contract
2. Understand the essential elements of contract and awareness of the global business laws and its impacts on businesses
3. Employ the agency towards negotiable instruments Act and apply basic legal knowledge to business transaction
4. Ability to apply concepts, principles and theories to understand simple business laws.
5. Demonstrate an understanding of the Legal Environment of Business.
6. Communicate effectively using standard business and legal terminology.

UNIT I

Contracts -Essentials of Contract - Agreements - Void - Voidable and Illegal Contracts - Express and Implied Contract - Executed And Executory Contract – Absolute And Contingent Contract – Offer – Legal Rules as to Offer and Lapse of Offer – Acceptance –Rules as to Acceptance – To Create Legal Relation – Capacity Of Parties to Create Contract – Consideration – Legal Rules as to Consideration – Flaw In Consent.

UNIT II

Legality of Object – Unlawful and Illegal Agreements – Effects of Illegality – Wagering Agreements – Agreement Opposed To Public Policy – Agreements In Restraint of Trade – Exceptions – Void Agreements –Restitution – Quasi Contracts – Discharge of Contract – Breach of Contract – Remedies for Breach of Contract.

UNIT III

Creation of Agency- Classification of Agents - Relations of Principal and Agent - Delegation of Authority - Relation of Principal With Third Parties - Personal Liability of Agent - Termination of Agency.

UNIT IV

Formation of Contract of Sale - Sale and Agreement to Sell - Hire Purchase Agreement – Sale and Bailment - Capacity to Buy and Sell - Subject Matter of Contract of Sale - Effects of Destruction of Goods - Documents of Title to Goods – Conditions and Warranties - Rules of Caveat Emptor.

UNIT V

Common Carriers: Definition - Rights and Duties of Common Carriers – Contract of Carriage of Goods by Sea – Bill of Lading and Charter Party – Distinction – Negotiable Instruments Act 1881 – Negotiable Instruments – Characteristics – Cheque – Essential Requirements - Crossing – Types – Endorsements – Kinds – Demand Drafts – Bill of Exchange.

TEXT BOOKS

1. N.D. Kapoor. (2013). Elements of Mercantile Law. S.Chand & Co. Ltd, New Delhi.

REFERENCES

1. Shukla. M.C. (2010), Mercantile Law. Phi India Pvt., Ltd., New Delhi.
2. Kandasamy K.P., (2012). Banking Law and Practice. S.Chand & Co. Ltd, New Delhi.
3. P.Saravanel, Syed Badre Alam. (2009). Fundamentals of Business Law. Himalaya Publishing House. Mumbai.
4. S.S.Gulshan, G.K.Kapoor.(2011), Business Law , New Age International Pvt. Ltd, New Delhi.

15BAU403 PERSONNEL MANAGEMENT AND INDUSTRIAL RELATIONS**Semester - IV
6H – 5C****Instruction Hours / week L: 6 T: 0 P : 0****Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours****COURSE OBJECTIVES****To make the students**

- To understand the functions of personnel management
- To assess knowledge in wage and salary administration
- To introduce the basic concepts, functions and processes of Personnel Management.
- To create an awareness of the role, function and functioning of personnel management in industrial organization.
- To identify the importance of trade union
- To be aware of basic aspects of human resource management to understand the functioning of human resource management in an organizational setting

COURSE OUTCOMES**Learners should be able to**

1. Construct knowledge on primary functional aspect of personnel management
2. Understand the roles and responsibilities of HR professionals
3. Assess Functional aspects of manpower planning, performance appraisal and industrial relations
4. To familiarize students with the basic concepts of organization and management
5. know the structure, functions and various principles of management
6. Elaborate the concept of Industrial Relations. By illustrating the role of trade union in the industrial setup

UNIT I

Personnel Management – Meaning, Nature, Scope and Objectives – Functions of Personnel Department – The role of Personnel Manager – Organization of Personnel Department – Personnel Policies and Procedures.

UNIT II

Manpower Planning – Meaning, Definition ,Nature and Process of Human resource planning - Job Description .– Job Analysis - Purpose and Uses of Job analysis, Steps and Techniques in Job analysis– Job Specification – Recruitment – Sources, Methods or techniques of recruitment and factors affecting recruitment - Selection – Essentials of selection, Steps in selection procedure – Training – Need - importance and methods of training.

UNIT III

Performance Appraisal – Meaning, Definition, Importance and Methods of performance appraisal - Job Evaluation and Merit Rating – Promotion, Transfer and Demotion.

UNIT IV

Wages and Salary Administration – Incentive System – Labour Welfare and Social Security – Safety, Health and Security – Retirement Benefits to Employees – Awareness of PF and ESI

UNIT V

Industrial Relations – Trade Unionism – Grievance Handling – Collective Bargaining - Workers Participation in Management – Overview of Labour Laws.

TEXT BOOKS

1. C.B.Memoria. (2014), Personnel Management and Industrial Relations. Himalaya Publishing House, Mumbai

REFERENCES

1. N.G.Nair, Latha Nair. (2004). Personnel Management and Industrial Relations S.Chand & Company Ltd, New Delhi.
2. N.D.Kapoor. (2015). Elements of Industrial Law. Sultan Chand & Sons, NewDelhi.
3. Tripathy. (2013). Personnel Management and Industrial Relations. Sultan Chand & Sons, New Delhi.

15BAU404A

INDIAN FINANCIAL SYSTEM

Semester - IV
6H – 5C

Instruction Hours / week L: 6 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To apply the knowledge in structure and functioning of money market and capital market
- To estimate the knowledge about the growth and functioning of financial intuitions in India
- Understand the regulatory frameworks in various financial institutions and Develop knowledge on the allocation, management and funding of financial resources
- To Improve students' understanding of the time value of money concept and the role of a financial manager in the current competitive business scenario.
- To enhance student's ability in dealing short-term dealing with day-to-day working capital decision; and also longer-term dealing, which involves major capital investment decisions and raising long-term finance.
- To give a clear understanding and knowledge of Financial system in the present scenario.

COURSE OUTCOMES**Learners should be able to**

1. Identify familiarity in the functions of commercial banks and role of financial institutions
2. Understand the regulatory frame work of financial institutions
3. Calculate the value of money market share through banking innovations
4. Understand the role and function of the financial system in reference to the macro economy.
5. Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
6. Evaluate and create strategies to promote financial products and services.

UNIT I

Financial System: Institutions - Primary Market – Secondary Market Money -Capital markets - Instruments of Money Market - Functions - Economic Significance.

UNIT II

Commercial Banks: Functions – Structure of Commercial banks in India – sources of funds, Investment norms – Factors Determining Liquidity of Banks – Asset Structure of Commercial Banks – Profitability of Banks.

UNIT III

Financial Institutions: IDBI, SFCS, SIDCS, LIC, SIDBI, ICICI, EXIM Bank – Constitution, objectives and functions.

UNIT IV

Regulatory Institutions: RBI – Organisation – Objectives - Role – Functions - Monetary policy of the RBI - NABARD - Securities and Exchange Board of India - Organisation and Objectives.

UNIT V

Banking Innovations: New technology in Banking – E-services – Debit and Credit cards. Internet Banking, ATM, Electronic fund transfer, MICR.

TEXT BOOKS

1. Meir Kohn, (2013) Financial Institutions and Markets, Tata McGraw Hill Publication, New Delhi.

REFERENCES

1. L M Bhole, (2006) Financial Institutions and Markets, Tata McGraw Hill Publication, New Delhi.
2. Vasantha Desai , (2002), The Indian Financial System, Himalaya Publishing House, New Delhi.
3. M Y Khan, (2004), Indian Financial System, Tata McGraw Hill Publication, New Delhi.
4. P N Varshney and D K Mittal, (2010), Indian Financial System, Sultan Chand & Sons, New Delhi
5. E Gardon and K Natarajan, (2004), Financial Markets & Services, Himalaya Publishing House, New Delhi.

COURSE OBJECTIVES**To make the students**

- To apply the knowledge on the fundamental concepts of E - Commerce
- Understand the various concepts regarding Business-to-Business Model
- To demonstrate an understanding of retailing in E-commerce by:
 - analyzing branding and pricing strategies,
 - using and determining the effectiveness of market research
 - assessing the effects of disintermediation.
- Analyze the impact of E-commerce on business models and strategy
- To provide an introduction to information systems for business and management.
- To familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

COURSE OUTCOMES**Learners should be able to**

1. Apply E-commerce models and Analyze the impact of E-commerce on business models and strategy
2. Discover intranet, extranet and electronic marketing
3. Analyze the fundamentals of electronic commerce determining the effectiveness of market research
4. Demonstrate an understanding of the foundations and importance of E-commerce
5. Demonstrate an understanding of retailing in E-commerce by analyzing branding and pricing strategies,
6. Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational

UNIT I

Foundations of Electronic commerce : - Definitions and Content of the field – Driving force of EC-Impact of EC-Managerial issues – Benefits and Limitations of EC retailing in EC:- Business models of E-marketing-Aiding comparison shopping – The impact of EC on Traditional Retailing system.

UNIT II

Internet consumers and Market Research: - The consumer behavior model – personal characteristics and the Demographics of Internet surfers – Consumer purchasing Decision making – One-to-One Relationship marketing – Delivering customer service in cyberspace – market research of EC- intelligent agents for consumers – Organizational buyer behavior.

UNIT III

Advertisement in EC:- Web advertisement – Advertisement methods – Advertisement strategies – push technology and intelligent agents – Economics and Effectiveness or Advertisement –

online catalogs Intranet and Extranet : - Architecture of Intranet and extranet – Applications of intranet and extranet.

UNIT IV

Business-to-Business Electronic Commerce: Characteristics of B2B EC-Models of B2B EC – procurement management using the buyer's internal marketplace – suppliers and buyer Oriented marketplace – Other B2B models auctions – and services – Integration with back-end information system- The role of s/w agents in B2B – Electronic marketing in B2B – electronic marketing in B2B.

UNIT V

Public policy: from Legal Issues to privacy:- Legal, Ethical and other public policy Issues – Protecting Privacy – Free Speech, Internet Indecency and censorship – taxation and Encryption policies – consumer and seller protection in EC.

TEXT BOOKS

1. Ravi Kalakota, Andrew Winston, (2009), Frontiers or Electronic Commerce, Addison Wesley, New Delhi.

REFERENCES

1. S. Jaiwal, (2010), E – Commerce, Galgota Publications Pvt. Ltd, New Delhi.
2. P.T. Joseph, (2008), E – Commerce – A Managerial Perspective, Kalyani Publications, Ludhiana.
3. Geg Holden, (2007), Starting an E-Commerce Business for Dummies, IDG Books India Pvt. Ltd, New Delhi.

COURSE OBJECTIVES**To make the students**

- To assess the various insurance mechanism
- To apply the knowledge towards the principles and practice of insurance
- To develop the knowledge on deposits and credit insurance mechanism
- To provide a basic understanding of the Insurance Mechanism identify the relationship between Insurers and their customers
- To know the importance of insurance contacts give an overview of major Life Insurance and General Insurance Products
- To understand the theories, regulatory framework of insurance, types of insurance, and the major types of insurance products.

COURSE OUTCOMES**Learners should be able to**

1. Memorize the concept of general life, life insurance and marine insurance
2. Demonstrate the features of deposits and credit insurance mechanism
3. Practices of various mechanisms in insurance familiarize themselves with major insurance products, such as life insurance, health insurance, property and liability insurance.
4. Have knowledge about various types of insurance and its basic principles.
5. Understand the Life Insurance policy along with its policy conditions.
6. Know about the IRDA guidelines related to detection and monitoring of Insurance Frauds.

UNIT I

Risk and Uncertainty - Definition - Classification of risk - Sources of Risk - External and Internal Insurance – Meaning - Nature - Significance - Essential Requirements and Principles of Risk Insurance – Reinsurance - Privatization of Insurance Business in India - Insurance Regulatory Development Authority – Recent Developments in the Insurance Sector.

UNIT II

Life Insurance - Law Relating to Life Insurance - General Principles of Life Insurance Contract - Proposal and Policy - Assignment and Nomination - Title and claims - Concept of trust in life policy - LIC - Role and Functions.

UNIT III

General Insurance - Law relating to general insurance - Different types of general insurance - General Insurance Vs Life Insurance - Nature of Fire Insurance - various types of Fire Policy

subrogation - Double Insurance - Contribution - Proximate cause - Claims of Recovery - Accident and Motor Insurance - Nature, Disclosure, Terms and Conditions Claims And Recovery - Third Party Insurance - Compulsory Motor Vehicle Insurance - Accident Insurance.

UNIT IV

Deposit and Credit Insurance – Nature - Terms and Conditions - claim - Recovery etc., Public Liability Insurance - Emergency Risk Insurance Structure and Power, function of General Insurance Corporation of India - Deposit Insurance and Credit Guarantee Corporation.

UNIT V

Marine Insurance - Law relating to Marine Insurance - Scope and Nature - Types of Policy - Insurable Interest - Disclosure and Representation - Insured Perils - Proximity Cause - Voyage – Warranties - Measurement – Subrogation – Contribution - Under Insurance.

TEXT BOOKS

1. M.N.Mishra, (2012), Insurance Principles and Practices, S.Chand & Co, New Delhi.

REFERENCES

1. N.D.Kapoor , (2010), Elements of Business Law, Sulthan Chand & Sons, New Delhi.
2. Murthy, (2012), Principles and Practices of Insurance, Margham Publications, Mumbai.
3. Senth Jyotsna and Bhatia Nishwa, (2008), Elements of Banking and Insurance, PHI India Pvt., Ltd., New Delhi.
4. P.Periyasamy , (2010), Principles and Practices of Insurance, Himalaya Publishing house, New Delhi.

15SSD401

SOFT SKILL DEVELOPMENT - II

Semester - IV
2H – 1C

Instruction Hours / week L: 2 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To develop knowledge on both Aptitude and Soft skills to the students
- To discover and demonstrate various principles involved in solving mathematical problems and to adopt new and faster methods of calculations.
- Identify the competencies in soft skills which are crucial in a social setting
- To improve customer service by practicing soft skills in the workplace
- To Improve employee retention in the organization by retaining more talented professionals
- To improve knowledge retention and equip employees to take ownership of their personal development

COURSE OUTCOMES**Learners should be able to**

1. Apply the analytical and reasoning competencies
2. Appraise communication and presentation skills
3. Communicate effectively through verbal/oral communication and improve the listening skills
4. To write precise briefs or reports and technical documents
5. Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
6. Become more effective individual through goal/target setting, self-motivation and practicing creative thinking

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

COURSE OBJECTIVES

To make the students

- To understand the concepts of cost and management accounting
- To assess the knowledge in financial statement analysis
- To estimate the budget preparations and enable students to acquire sound Knowledge of concepts, methods and techniques of management accounting
- To develop competence with their usage in managerial decision making and control.
- To Acquire conceptual knowledge of basics of accounting
- To identify events that need to be recorded in the accounting records

COURSE OUTCOMES

Learners should be able to

1. Prepare a cost sheet and evaluate the process of accounting
2. Calculate the various elements of cost and Compute cash flow and fund flow statements
3. Able to identify, use and interpret the results of costing techniques appropriate to different activities and decisions;
4. Formulate and use standards and budgets for planning and control purposes; understand the role of responsibility accounting and performance
5. Analyze and provide recommendations to improve the operations of organizations through the application of Cost and Management accounting techniques
6. Evaluate the costs and benefits of different conventional and contemporary costing systems

UNIT I

Accounting – Financial Accounting – Cost Accounting - Management Accounting - Meaning – Definition – Scope – Objectives - Function - Merits and Demerits - Distribution between Cost, Management and Financial accounting – Elements of Cost - Cost Concepts and Costs Classification.

UNIT II

Preparation of Cost Sheet – Stores Control – EOQ – Maximum, Minimum, Reordering levels - Pricing of Materials Issues – FIFO, LIFO, Average Cost, Standard price - Methods of Labour Cost .

UNIT III

Financial Statement Analysis – Preparation of Comparative and Common size Statements – Ratio Analysis - Classification of Ratios – Liquidity Ratio – Profitability Ratio – Solvency Ratio – Inter Firm Comparison.

UNIT IV

Funds Flow Statement - Schedule of Changes in Working Capital – Calculation of Funds from Operation - Sources and Applications of Funds. Cash Flow Statement – Cash from Operation – Inflow and Outflow of Funds.

UNIT V

Standard Costing – Variance Analysis – Material Cost , Material Price, Material Usage and Labour Variances. Marginal Costing – Cost Volume Profit Analysis. Budgeting and Preparation of Various Budgets.

Note : Distribution of marks for theory and problems shall be 20% and 80% respectively.

TEXT BOOKS

1. Nigam and Sharma. (2010). Cost Accounting, Prentice Hall India Pvt. Ltd, New Delhi.

REFERENCES

1. R.K. Sharma & K.Gupta. (2009), Advanced Cost Accounting, Kalyani Publishers, Ludhiana.
2. S.N. Maheswari, (2009), Management Accounting, Sultan Chand & Sons, New Delhi.
3. Jain and Narang, (2013), Cost Accounting. Kalyani Publishers, Ludhiana.
4. Bhattacharya S.K., (2013), Cost and Management Accounting, Sultan Chand & Sons , New Delhi.

COURSE OBJECTIVES**To make the students**

- To understand the concept of research methodology.
- To estimate knowledge in sampling techniques
- To discover knowledge in writing a good research report.
- To identify the overall process of designing a research study from its inception to its report.
- Be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research
- To familiarize participants with basic of research and the research process and conduct research work and formulating research synopsis and report

COURSE OUTCOMES**Learners should be able to**

1. Identify the conceptual framework of the research process
2. Apply parametric and non parametric test
3. Demonstrate research tools and techniques in research work
4. Demonstrate the ability to choose methods appropriate to research aims and objective and understand the limitations of particular research methods
5. Develop skills in qualitative and quantitative data analysis and presentation and Develop advanced critical thinking skills
6. Familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction

UNIT I

Research: Meaning - Scope and Significance - Characteristics of Good Research Types of Research – Research Process - - Problems in Research - Identifying Research Problem – Research Design - Features of Good Design – Types

UNIT II

Sampling Design: Meaning - Concepts - Steps in Sampling - Criteria for Good Sample Design - Types of Sample Designs - Probability and Non-Probability Samples. Data Collection - Sources of Data - Methods of Data Collection – Observation – Questionnaire – Interview - Schedule – Secondary Data - Data Processing – Editing - Coding - Classification - Tabulation.

UNIT III

Hypothesis: Meaning - Sources - Types - Formulation - Scaling Techniques - Meaning - Types of scales - Scale Construction Techniques.

UNIT IV

Test of Significance: Parametric Test - T test, F Test and Z test - Non Parametric Test –Chi square test. U Test, Kruskal Wallis, Sign test. Multivariate Analysis -Factor - Cluster.

UNIT V

Interpretation: Meaning - Techniques of Interpretation - Report writing:-Significance - Report Writing:- Steps in Report Writing - Layout of report – Types of Reports - Oral Presentation - Executive Summary - Mechanics of Writing Research Report - Precautions for Writing Report - Norms for using Tables, Charts - and Diagrams - Appendix:- Norms for using Index and Bibliography.

Note : Distribution of marks for theory and problems shall be 80% and 20% respectively.

TEXT BOOKS

1. Kothari C.R., (2009) Research Methodology, Wishwa Prakashan, Publications, New Delhi

REFERENCES

1. Rao K.V. (2012) Research methods for management and commerce, Sterling Publishers Pvt., Ltd., Himalaya Publishing house, Mumbai.
2. Zikmund, (2005), Business Research Methods, Sulthan Chand and sons, New Delhi.
3. Donald R.Cooper and Pamela S.Schindler, (2008), Business Research Methods Tata McGraw Hill. New Delhi.
4. Uma Sekaran, (2007), Research Methods for Business, Wiley Publications. New Delhi.

COURSE OBJECTIVES**To make the students**

- To discover awareness in the advertisement functions.
- To employ the various types of advertisement
- To examine the importance of market segmentation, position and action objectives to the development of an advertising and promotion program.
- To develop creative strategies for advertising.
- Plan media strategy, scheduling, and vehicle selection. Assess strategic uses of sales promotions.
- To indicate the knowledge in sales promotional strategy

COURSE OUTCOMES**Learners should be able to**

1. Practice knowledge to utilize the right advertising media for sales promotion
2. Identify Roles and Responsibilities of advertising agency
3. Demonstrate the sales promotional activities in business
4. Examine the importance of market segmentation, position and action objectives to the development of an advertising and promotion program.
5. Develop creative strategies for advertising and identify and make decisions regarding the most feasible advertising appeal and media mix.
6. Gain the knowledge about the various range of tools available for marketing communication, and the various facets of advertising, public relation and promotion management

UNIT I

Advertising – Meaning - Importance – Objectives – Media - Forms of Media- Press - Newspaper, Trade Journal- Magazines- Outdoor Advertising – Posters - Banners- Neon Signs, Publicity, Literature Booklets, Folders - House Organizations - Direct Mail Advertising- Cinema and Theatre Programme – Radio and Television Advertising- Exhibition - Trade Fair – Transportation Advertising.

UNIT II

Advertising Agencies – Advertising Budgets - Advertising Appeals - Advertising organisations – Social Effects of Advertising - Advertising Copy - Objectives – Essentials – Types - Elements of Copy Writing - Headlines, Body Copy- illustration- Catchy Phrases and Slogans - Identification Marks.

UNIT III

Advertising Layout – Functions - Design of Layout- Typography Printing Process- Lithography – Printing Plates and Reproduction Paper, and Cloth - Size Of Advertising - Repeat Advertising - Advertising Campaign - Steps In Campaign Planning.

UNIT IV

Sales Force Management - Importance- Sales Force Decision- Sales Force Size – Recruitment and Selection - Training – Methods - Motivating Salesman Controlling - Compensation and Incentives - Fixing Sales Territories - Quota – Evaluation.

UNIT V

Sales Promotion - Meaning - Methods – Promotional Strategy – Marketing Communication and Persuasion – Promotional Instruments - Techniques of Sales Promotion – Consumer and Dealers Promotion - After Sales Service – Packing – guarantee – Personal Selling – Objectives – Salesmanship – Process of Personal Selling – Types of Salesman.

TEXT BOOKS

1. Sontaki C.N. (2007). Advertising and Sales Management. Kalyani Publishers, Ludhiana.

REFERENCES

1. Chunawalla, Reddy, Appanaiah. (2014). An Introduction to Advertising and Marketing Research. Himalaya Publishing House, Mumbai
2. S.A.Chunuwalla, K.C.Sethia. (2011). Foundations of Advertising Theory and Practice, Himalaya Publishing House, Mumbai.
3. Julian Cummins. (2010). Sales Promotion, Universal Book Stall, New Delhi.
4. Sandage Fryburger Rotzoll. (2013). Advertising Theory and Practice. A.I.T.B.S Publishers and Distributors, New Delhi.

COURSE OBJECTIVES**To make the students**

- To construct awareness among the students about the concepts of Entrepreneurship.
- To identify the skills of entrepreneur and project management
- To discover knowledge about the financial Institutions.
- To acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities,
- To develop the ability of analyzing and understanding business situations in which entrepreneurs act and to master the knowledge necessary to plan entrepreneurial activities
- To develop the ability of analyzing various aspects of entrepreneurship – especially of taking over the risk, and the specificities as well as the pattern of entrepreneurship development

COURSE OUTCOMES**Learners should be able to**

1. Assess the skills of entrepreneur and understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship.
2. Run a small enterprise with small capital for a short period and experience the science and art of doing business Preparation and evaluation of Project formulations
3. Employ the process in project management and run a small enterprise with small capital for a short period and experience the science and art of doing business
4. Know the parameters to assess opportunities and constraints for new business ideas
5. Understand the systematic process to select and screen a business idea
6. Understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship.

UNIT I

Concept of Entrepreneurship – Definition, Characteristics and Functions of entrepreneur – Types of Entrepreneurs – Role of Entrepreneurship in Economic Development. Intrapreneur vs Entrepreneur - Factors affecting entrepreneur growth

UNIT II

Entrepreneurship Development Programmes – Need – Objectives - Phases- Evaluation. Institutional Support to Entrepreneurs – SFC – SIDCs – SIPCOT – TIIC - SIDBI

UNIT III

Institutional Setup – District Industries Centres (DICs) – Micro Small Medium Enterprises (MSMED) – Small Industries Development Organization (SIDO) – National Small Industries Corporation (NSIC) - Small Industries Service Institutes (SISIs) - Indian Investment Centre (IIC) – Khadi and Village Industries Commission (KVIC).

UNIT IV

Project Management - Meaning of Project - Concepts – Categories – Project life cycle Phases – Characteristics of a Project – Project Manager – Role and Responsibilities of Project Manager- Special Economic Zones (SEZs).

UNIT V

Project Formulation – Steps - Project Identification – Importance – Project Evaluation – Project Feasibility Analysis - Project Report.

TEXT BOOKS

1. Vasant Desai. (2013). Dynamics of Entrepreneurial Development and Management. Himalaya Publishing House, Mumbai.

REFERENCES

1. S.S.Khanka. (2012). Entrepreneurial Development. Sultan Chand & Sons, New Delhi.
2. C.B.Gupta & N.P.Srinivasan. (2007). Entrepreneurial Development. Sultan Chand & Sons, New Delhi.
3. P.Saravanavel. (2001). Entrepreneurial Development. Ess Pee Kay Publishing House, Madras.
4. M.Gangadhara Rao (2001). Entrepreneurship and Entrepreneurial Development. S.Chand & Co, New Delhi.

COURSE OBJECTIVES**To make the students**

- To apply the knowledge in indirect tax
- To analyze the knowledge on the fundamentals of indirect tax
- To make students understand the concept of forward charge mechanism, reverse charge mechanism, composite supply, mixed supply and various exemptions
- To provide a general understanding of the Service Tax in the country with a practical perspective and to make the students understand the basics of Customs Law
- To provide an in depth study of the various provisions of indirect taxation laws and their impact on business decision-making
- To Identify and analyze the procedural aspects under different applicable statutes related to indirect taxation

COURSE OUTCOMES**Learners should be able to**

1. Discover the concepts of various tax and describe indirect taxes and criticisms of these taxes
2. Compare and contrast direct tax and indirect tax
3. Apply the existence of various indirect tax
4. Calculate the tax according to the laws
5. Maintain the financial statements of a business entity
6. Familiar with the computation of capital gain with the computation of income from other sources

UNIT –I

Tamil Nadu general sales Tax Act – Definition of Business, Dealers, Casual Trader, Goods, Sales, Declared goods, Turnover – Procedure for Registration –VAT (Value Added Tax) Meaning, Applicability, Coverage of goods under VAT,-- Tax Payers Identification Number (TIN) – Modes of charging sales tax – Levy of purchase tax.

UNIT –II

Central Sales Tax Act, - Definitions of Dealer, Registered dealer, Turnover, Business,- Inter State Sales- Determination of taxable Turnover- Registration of Dealer under the CST Act.

UNIT – III

Central Excise Act, 1944 – Levy and Collection – Purpose of charging excise duty – Excisable goods – Concepts of manufacturer –Exemption from Excise duty – Valuation of Excisable goods – Licensing provisions- CENVAT .

UNIT –IV

Customs Act, 1962- Definitions, -Types of duty –Prohibition on importation and exportation of goods – Dutiable Goods U/S 26, Power of grant exemption from duty U/S 25, Restrictions on custody and removed in imported goods U/S 45-Duty Draw back.

UNIT-V

Service Tax – Concepts and general principles. Charge of service tax and taxable services.

TEXT BOOKS

1. Dingare Pagare, (2014), Business Taxation, Sultan Chand & Sons, New Delhi.

REFERENCES.

1. V.S.Datey, (2015), Indirect Taxes Law and Practices, Taxmann Publications (P) Ltd., New Delhi.
2. Balachandran. (2014). Indirect Taxation. Sultan Chand & Sons, New Delhi.
3. R.L.Gupta V.K.Gupta, (2012), Indirect Tax, Sultan Chand &Co., New Delhi.

COURSE OBJECTIVES**To make the students**

- Identify the knowledge on formation of company, Documents required and company meetings.
- To defend knowledge in the area of secretarial practice and apply their minds to have a bird's eye view of the Company Secretary.
- Identify the various stages involved in the Formation of Joint Stock Companies.
- Identify the various Documents required to bring the Company into Existence.
- Enumerate the Mode and Method of Appointment/Removal/Powers/Duties of Directors in Corporate Governance.
- Identify the various Statutory Provisions to be complied with in conducting various types of Company Meetings.

COURSE OUTCOMES**Learners should be able to**

1. Discover the companies requirements as a company secretary
2. Practices according to the law in companies
3. Demonstration the importance of company secretary in formation of a company
4. Evaluate the Role and importance of Company Secretary and key managerial personnel.
5. Understanding the various types of Companies and the issues associated with Companies
6. Understanding the roles and responsibilities of various persons involved and related documents

UNIT I

Companies Act 1956 Vs Companies Act 2013 - Formation of Companies – Promotion – Meaning – Promoters – Functions – Duties of Promoters – Incorporation – Meaning – Certificate of Incorporation – Memorandum of Association – Meaning – Purpose – Alteration of Memorandum – Doctrine of Ultravires – Articles of Association - Meaning – Forms – Contents – Alteration of Articles.

UNIT II

Directors – Qualification and Disqualification of Directors – Appointment of Directors – Removal of Directors – Director's remuneration – Powers of Directors – Duties of Directors – Liabilities of Directors.

UNIT III

Company Meetings – Kinds - Board of Directors Meeting – Statutory Meeting – Annual General Meeting – Extra Ordinary General Meeting - Drafting of Correspondence – Relating to the Meetings – Notices – Agenda – Chairman's Speech – Writing of Minutes.

UNIT IV

Company Secretary – Meaning - Definition – Types – Positions – Qualities – Qualifications – Appointment and Dismissal – Power – Rights – Duties – Liabilities of a Company Secretary – Role of a Company Secretary

UNIT V

Accounts of Companies – Audit and Auditors’ – Prevention of Oppression and Mismanagement – Winding up – Official Liquidators – National Company Law Tribunal.

TEXT BOOKS

1. M.C.Shukla and S.S.Gulshan, (2010), Principles of Company Law, S.Chand & Co.New Delhi.

REFERENCES

1. N.D.Kapoor, (2010), Elements of Company Law, Sultan Chand & Sons, New Delhi.
2. M.C.Kuchhal, (2008), Secretarial Practice, Vikas Publications, New Delhi.
3. Avtar Singh, (2014), Introduction to Company Law, Eastern book Company, New Delhi.

COURSE OBJECTIVES**To make the students**

- To estimate awareness about the office management by providing opportunity to a learner for vertical up-gradation by acquiring skill sets
- To provide opportunities of Community Service to the qualified and experienced staff benefiting the country according to the Skill Development Mission of the Government.
- To discover the knowledge to impart in record management and understand the office environment
- To develop managerial skills and competencies in the learner to manage the office activities.
- To provide digital empowerment by providing hands on experience on Computer and enable industrial employees to improve their qualifications without leaving their existing careers and enhance their employability in to higher positions post completion of their studies.
- To train and develop skilled manpower as per the need of the country and impart skill training at very low cost .

COURSE OUTCOMES**Learners should be able to**

1. Apply the knowledge in modern office management
2. Discover and reveal record in office
3. Practice with office environment and culture
4. Recognize basic traditional office management practices, emerging management trends, administrative management resource areas, and restructured office systems and training needs.
5. Practice leadership and communication skills in business environments, including groups, teams, and conflict resolution.
6. Manage human resources in the office including staffing, on-the-job employee practices, workforce improvement, conflict resolution, job stress, time management, as well as work ethics and business etiquette issues.

UNIT I

Office Management and Organization: Basic concepts of Office – Importance – Functions – Size of the Office – Office Management – Relations with other Departments – Scientific Office Management – Office Manager - Principles of Office Organization – Types / Systems of Organization – Charts – Centralization vs. Decentralization.

UNIT II

Office Environment & Communication: Office Location – Characteristics / Qualities of Office Building – Environment – Physical – Hazards in Office Safety – Security – Secrecy – Communication – Meaning – Essential Features – Classification – Barriers to Communication.

UNIT III

Office Correspondence & Record Management: Centralized Vs Departmental Correspondence – Departmental Typing and Typing Pools – Classification of Records – Principles of Record Keeping – Filing – Methods.

UNIT IV

Office Systems & Procedures: Systems – Procedure – Advantages – Characteristics of Sound Office System & Procedures – Work Simplification – Principles – Kinds Of Reports.

UNIT V

Office Personnel Relations: Personnel Management – Definitions – Functions – Office Committees- Employee Morale – Productivity – Employee Welfare – Grievances – Work Measurement – Control Of Office Work.

TEXT BOOKS

1. Joan Gallagher (2014) Modern office management, Gill & Macmillan Ltd, New Delhi.

REFERENCES

1. S.P Arora, (2009), Office Organization And Management, Vikas publishing House Pvt Ltd., New Delhi.
2. Dr. I.M.SAHAI, (2006), Modern office management, Kitab Mahal , India.
3. S.K. Sharma (2014) Handbook of Office Management A Modern Management, Bharat Law House, New Delhi.
4. N. Kumar, N. Kumar Et Al., R. Mittal, (2001) Office Organisation and Management, Anmol Publications Pvt. Limited, New Delhi.

COURSE OBJECTIVES**To make the students**

- To discover with the knowledge of banking law.
- To construct awareness in commercial bank lending policies
- To disseminate knowledge among the students inculcate with theoretical structures about banking and insurance.
- To train and equip the students with the skills of modern banking and insurance
- To develop and inculcate the traits of professionalism amongst the students.
- To inculcate Professional attire, professional communication skills and professional discipline

COURSE OUTCOMES**Learners should be able to**

1. Practice banking law and practice
2. Discover various types of accounts maintained towards bank
3. Manipulate the process in banking sector
4. Disseminate knowledge among the students with theoretical structures about banking and insurance
5. Equip the students with the skills of modern banking and insurance is run
6. To develop and inculcate the traits of professionalism amongst the students. Professional attire, professional communication skills and professional discipline will be inculcated

UNIT I

Definition of Banker and Customer – Relationships between Banker and Customer – Special Feature of RBI, Banking Regulation ACT 1949. RBI Credit Control Measure – Secrecy of Customer Account.

UNIT II

Opening of Account – Special Types of Customer – Types of Deposit – Bank Pass Book – Collection of Banker – Banker Lien.

UNIT III

Cheque – Features Essentials of Valid Cheque – Crossing – Making and Endorsement – Payment of Cheques Statutory Protection Duties to Paying Banker and Collective Banker - Refusal of Payment Cheques Duties Holder & Holder ID due course.

UNIT IV

Loan and Advances by Commercial Bank Lending Policies of Commercial Bank - Forms of Securities – Lien Pledge Hypothecation and Advance against the documents of title to goods – Mortgage.

UNIT V

Position of Surety – Letter of credit – Bills and Supply Bill. Purchase and Discounting Bill Traveling Cheque, Credit Card, Teller System.

TEXT BOOKS

1. Sundharam and Varshney, (2014), Banking Theory Law & Practice, Sultan Chand & Sons., New Delhi.

REFERENCES

1. Natarajan and Gordon, (2014), Banking Theory Law and Practice, Himalaya Publications, New Delhi
2. Reserve Bank of India, Report on currency and Finance 2012-2013.
3. Basu, (2014), Theory and Practice of Development Banking, Asia Publishing House, London.
4. Reddy and Appanniah, (2001), Banking Theory and Practice, Himalaya Publishing House, New Delhi.

15OEU501

OPEN ELECTIVE- PRINCIPLES OF MANAGEMENT**Semester - V**
0H – 3C

Instruction Hours / week L: 0 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To understand the concepts of management.
- To demonstrate knowledge in the functions of management.
- To apply knowledge to make decision
- To apply the concepts & principles of management in real life industry and design by developing organization chart & structure for an enterprise.
- Able to apply the concepts of HRM in Recruitment, Selection, Training & Development .
- To observe and evaluate the influence of historical forces on the current practice of management and in how organizations adapt to an uncertain environment and identify techniques managers use to influence and control the environment

COURSE OUTCOMES**Learners should be able to**

1. Understanding of managerial functions like planning, and have same basic knowledge on international aspect of management
2. Employ knowledge on various principles applied to manage business
3. Understand the functional aspect in management Recognize the importance of employee motivation and how to promote it.
4. Analyze various problems in making a decision
5. Analyze effective application of Principles of Management and knowledge to diagnose and solve organizational problems and develop optimal managerial decisions.
6. Understand the complexities associated with management of human resources in the organizations and integrate the learning in handling these complexities.

UNIT I

Nature and Scope of Management: Meaning – Definition - Management is a Science or Art – Development of Management – Scientific Management – Functions - Social responsibilities and Ethics

UNIT II

Planning: Meaning and Characteristics of Planning – Steps in Planning – Objectives - Types of Planning - Policies, Procedures and Methods.

UNIT III

Organizing: Meaning – Definition - Functions of Organization – Types of Organizational Structure - Process of Decision making – Type of Decisions – Problems. – Span of control – Delegation - Decentralization and Centralization.

UNIT IV

Staffing: Line and Staff relationship – Co-ordination – Features. Motivation – Maslow's theory – Leadership – Qualities - Techniques.

UNIT V

Controlling: Meaning and Importance of Control – Control process – Controlling Techniques – Preventive control – Budgetary and Non-budgetary control - Business Ethics – Ethics and Morals – Nature of Ethics – Need for Business Ethics.

TEXT BOOKS

1. Dinkar Pagare, (2015), Principles of Management, S.Chand & Co Ltd., New Delhi.

REFERENCES

1. T.Ramasamy, (2014) Principles of Management, Himalaya Publishing house, Mumbai.
2. Koontz and Harold. (2014). Management Essentials. Tata Mc Graw Hill Publishers Pvt. Ltd. New Delhi.
3. S.P.Arora. (2009). Office Organization and Management, Vikas Publishing House Pvt. Ltd. New Delhi.
4. Dr.Saxena.(2009), Business Administration and Management, Sahitya Bhavan Publications. New Delhi.

COURSE OBJECTIVES**To make the students**

- To discover and describe the various investment alternatives.
- To Assess need of portfolio management and its application.
- To introduce the intuition and concepts of Investment analysis and portfolio management.
- To apply knowledge on the fundamentals of valuation of securities.
- To allocate and select investment assets based on the trade-off between risk and return, availability of the risk mitigating tools and investment horizon with other parameters.
- To developing skills required to conduct assessment of current issues covered by media and specialized journals.

COURSE OUTCOMES**Learners should be able to**

1. Practice the investment risk and investment alternatives
2. Analyse the companies' portfolios
3. Understand and apply ethical standards in the investment profession
4. Manipulate the portfolio constraints and management
5. Develop investment policy statements for institutional and individual investors.
6. Able to develop an appropriate portfolio for a given investor and market conditions.

UNIT I

Investment – Nature - Meaning - Scope of Investment – Importance of Investment – Factors influencing investment - Investment Media – Features of an Investment programme – Investment process – Alternative forms of Investment- Mutual Funds. Risk – Systematic risk – Unsystematic risk.

UNIT II

Securities Market – Capital Market – Mechanics of Security trading in stock exchange - Valuation of Securities – Valuation of Bonds – Valuation of Preference and Equity Shares – Derivatives- Asset pricing theory – CAPM.

UNIT III

Fundamental Analysis - Economic analysis – Economic Forecasting – Forecasting Techniques. Industrial analysis – Industry classification – Economy and Industry Analysis – Industry life cycle.

UNIT IV

Company Analysis – Measuring Earnings – Forecasting Earnings – Technical Analysis – Charting Methods – Market Indicators – Trend – Moving Average - Fundamental Vs Technical Analysis.

UNIT V

Portfolio Analysis - Markowitz Theory – Optimum Portfolio – Portfolio Construction – Performance Evaluation – Portfolio Revision.

TEXT BOOKS

1. Preethi Singh. (2015), Investment Management. Himalaya Publications, Mumbai.

REFERENCES

1. Dr.Avadhani, (2014), Investment Management. Himalaya Publications, Mumbai.
2. Jack Clark Francis, (2001), Investments Analysis and Management. Mc Graw Hill International Edition, Singapore.
3. R.M.Srivatsava, (2010), Management of Indian Financial Institution, Himalaya Publishing House, Mumbai.
4. V.K. Bhalla. (2010), Investment Management. Sultan Chand & Sons, New Delhi.

15BAU602

RETAIL MANAGEMENT**Semester-VI
5H – 5C**

Instruction Hours / week L: 4 T: 1 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES**

To make the students

- To provide them with an overview of the retail industry, its concepts and processes and an opportunity to understand the areas of accountability for a retail Manager.
- To discover knowledge in the theories of retail development
- To identify knowledge in global retail markets.
- To Learn how retailing works and the factors that influence its success.:
- To understand how Selling and Service to create a shopping experience that builds customer loyalty
- To enable the students to become retail planners and decision makers and focus on change and adoption

COURSE OUTCOMES**Learners should be able to**

1. Sketch the concepts of retailing and types of retail outlet
2. Apply the strategies in supply chain management Integrate the various Supply Chain partners and how to collaborate with them
3. Demonstrate the ethics in national and international retailing Comprehend retailing's role in society and, conversely, society's impact on retailing
4. Know the responsibilities of retail personnel in the numerous career positions available in the retail field.
5. Understand, key drivers of retail supply chain and how to select a retail store location
6. Analyze Retail Market and Financial Strategy including product pricing.

UNIT

Retail - Meaning – Functions and Special Characteristics of Retailer - Types of Retailers – Franchising – The Evolution of retail in India – Retailing as a Career– Consumer Behaviour in Retail Context

UNIT II

Retail Strategies – Retail Location – Site Selection – Merchandise Management – Managing Service and Quality – Strategic planning - Global retail markets: Strategic planning process for global retailing - Factors affecting the Success of a Global Retailing Strategy .

UNIT III

Organization Structure and Human Resource Management in Retail – Retail Store Operations – Financial Aspects of Retail – Retail Marketing and Communication.

UNIT IV

Servicing the Retail Customer – Retail Store Design and Visual Merchandising – Retail Management Information Systems – Supply Chain Management.

UNIT V

IT Applications in Retail – Data Base Marketing – Electronic Retailing – International Retailing Trends – Ethics in Retailing – Competition Commission of India.

TEXT BOOKS

1. Swapna Pradhan, (2014), Retailing Management, Second Edition, The Mc Graw- Hill Companies, New Delhi

REFERENCES

1. Burman barry and Joel Evan, (2006), Retail Management, Macmillan, New Delhi.
2. Geroage H. Lucas, Robert P. Bush, Larry G. Gresham, (2004), Retailing, All India Publishers. New Delhi.
3. Gibson Vedamani, (2009), Retail Management, Second Edition, Jaico Publishers. Mumbai.

COURSE OBJECTIVES**To make the students**

- To employ the concepts of International business
- To know the Basic and broad knowledge in international business environment, strategies and management.
- Ability to apply concepts, principles and theories to simple business situations.
- Global Perspective: Awareness of the different thinking and viewpoints of diverse cultures and Awareness of the global business environment and its impacts on businesses.
- To Apply export procedure for production and shipment
- To practice the student's knowledge in EXIM policy

COURSE OUTCOMES**Learners should be able to**

1. Estimate the export and import duty liable
2. Apply the International trading activities
3. Assess the trade agreement procedures and shipment
4. Explain the concepts in international business with respect to foreign trade/international business
5. Apply the current business phenomenon and to evaluate the global business environment in terms of economic, social and legal aspects
6. Understand the most widely used international business terms and concepts and Identify the role and impact of political, economic, social and cultural variables in international business

UNIT I

International Business – Meaning – Domestic Trade Vs. International Trade – Theories of International trade., Comparative cost theory – Opportunity cost theory, Heckscher – Ohlin Theory – Gains from Trade, Terms of trade.

UNIT II

Balance of Payments, Nature of BOP – Components – Disequilibrium of BOP – Trade Barriers., Tariff – Classification – Impact – Nominal, effective, optimum tariff – Non tariff barriers

UNIT III

EXIM Policy - Export procedure – Offer and receipt of confirmed order – production, shipment and banking procedure – Negotiation – Documents for export trade – Export incentives to Indian exporters.

UNIT IV

Export Finance- Payment terms, Pre & Post shipment credit, Institutional finance for exports, EXIM Bank, Letter of Credit and financing of foreign trade, ECGC.

UNIT V

International Agencies and agreements – IMF –IBRD – Functions and Features – WTO and its features, GATT, IFC, UNCTAD.

TEXT BOOKS

1. T.A.S Balagopal, (2010), Export Management, Himalaya Publications. Mumbai.

REFERENCES

1. Francis Cherunilam, (2013), International Trade and Export Management. Himalaya Publications, Mumbai.
2. Dr.Varma & Agarwal, (2006), Foreign Trade Management: Forward Book Depot, New Delhi.
3. Manab Adhikary, (2011), Global Business Management., Macmillan India Limited., New Delhi.

COURSE OBJECTIVES**To make the students**

- To Understand the concept of strategic principles and practice
- To introduce the concepts of strategic management and understand its nature in competitive and institutional landscape
- To provide an underpinning of a. Strategy formulation process and frameworks, tools and techniques of strategic analysis and its application.
- To Apply the students knowledge in culture and strategic advantages
- Develop capabilities and competence in creating a business execution plan
- Provide practical guides in strengthening the participants' program, portfolio, and project management skills

COURSE OUTCOMES**Learners should be able to**

1. Assess the strategic framework, value chain and core competencies in strategic management
2. Demonstrate a clear understanding of the concepts, tools & techniques used by executives in developing and executing strategies and will appreciate its integrative and interdisciplinary nature.
3. Demonstrate effective application of concepts, tools & techniques to practical situations for diagnosing and solving organizational problems
4. Understand and apply the matrix in strategic management
5. Demonstrate implementing strategic principles and practice and Devise strategic approaches to managing a business successfully in a global context
6. Devise strategic approaches to managing a business successfully in a global context

UNIT I

Introduction-concept of Strategy – Need – Dimensions - Strategic Planning - Process- Benefits – McKinsey's 7S Model – Strategic vision – Corporate Mission – Objectives – Goals – Social Responsibility – Business ethics – Linking Strategies with ethics – Social audit.

UNIT II

Environmental analysis – Need – Scanning – Approaches – Forecasting – Techniques. Internal Analysis – Need – SWOT analysis – Value Chain – Functional Analysis – Grid approach – Criteria for evaluating internal capabilities.

UNIT III

Strategic Decision framework – Developing alternatives – Strategy Options – Diversification strategies – Retrenchment Strategy – Factors influencing strategy – generic strategy – cultural context of strategy – comparing alternatives – BCG Model.

UNIT IV

Implementation – Role of top management – Process – Matching Structure of strategy – Resource allocation – Planning and Controlling system. Evaluation – Criteria – Quantitative and Qualitative factors – Feedback and Information – Industry attractiveness – Application of 9 Cell Matrix.

UNIT V

Core Competencies – Building core competencies – Building Strategic Supportive Corporate Culture Strategic advantage – Managing Strategic Change – Strategic Change Process – Diagnosing change need.

TEXT BOOKS

1. P.K Ghosh, (2013), Strategic Planning and Management, Sultan Chand & Sons, New Delhi.

REFERENCES

1. V.S. Ramaswamy and S.Namakumari, (2007), Strategic Planning – Formulation of Corporate Strategy, Macmillan Business Books. New Delhi.
2. John A Pearce, Richard B Robinson, (2006), Strategic Management, AITBS Educational Books. New Delhi.
3. Micheal E Porter, (2004), Competitive Strategy, Prentice Hall Publications, New Delhi.

15BAU603C

HUMAN RESOURCE DEVELOPMENT**Semester - VI**
5H – 5C

Instruction Hours / week L: 5 T: 0 P : 0

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES****To make the students**

- To analyze the knowledge in the concepts and functions of HRD
- To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
- To help the students focus on and analyze the issues and strategies required to select and develop manpower resources
- To develop relevant skills necessary for application in HR related issues
- To Enable the students to integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions
- To employ the knowledge in principles and practices of developing human resources

COURSE OUTCOMES

1. Develop the understanding of the concept of human resource management and to understand its relevance in organizations.
2. To develop necessary skill set for application of various HR issues and Understand the emerging trends in HRD
3. Appraise the key performance areas in HRD
4. To analyze the strategic issues and strategies required to select and develop manpower resources.
5. Integrated perspective on role of HRM in modern business and ability to plan human resources and implement techniques of job design
6. Ability to handle employee issues and evaluate the new trends in HRM

UNIT I

HRD - Meaning, scope, importance, difference between traditional personnel management and HRD. Role Analysis and HRD-Key performance areas, Critical Attributes, Role Effectiveness, Role analysis methods.

UNIT II

Performance appraisals and performance development - objectives of performance appraisal - The past and the future; Basic considerations in performance appraisal; Development oriented appraisal system. Interpersonal Feedback and performance counseling

UNIT III

Potential Appraisal and Development. Career planning and Development.

UNIT IV

Training - conceptual framework for training; learning principles; Identification of training needs; Determination of training objectives; Training programme design; Training methods and their selection criteria.

UNIT-V

Organization Effectiveness - Organisation Culture, HRD climate; Organization Development - characteristics, HRD - OD interface. HRD experiences in India - Emerging trends and perspectives.

TEXT BOOKS

1. Rao V.S.P, (2011), Human Resource Development, I K International Publishing House Pvt. Ltd., New Delhi.

REFERENCES

1. Kandula S.R, (2004), Strategic Human Resource Development, Prentice Hall Publications, New Delhi.
2. Pareek Udai and T.V.Rao, (2011), Designing and Managing Human Resource Systems, Oxford & IBH, New Delhi.
3. ILO, (2013), An Introductory course in Teaching and Training Methods for Management Development, Sterling Publishers Private Limited, New Delhi.

15BAU691

PROJECT**Semester - VI**
15H – 5C

Instruction Hours / week L: 0 T: 1 P : 15

Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours**COURSE OBJECTIVES:**

To make the students

- To identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
- To understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
- To analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
- To apply the theoretical and practical learning of doing research into lifelong practice.
- To Communicate in oral and written form and prepare report
- To Work in team and exhibit leadership skills
- To utilize the IT application for analysis and preparation of report.

COURSE OUTCOMES:

Learners should be able to

1. Identify an issue to be analyzed and to be solved in a business setup or real time scenario using primary or secondary data collection.
2. Understand the application of Research process in the area of accounting/Finance/Marketing/HR/International business etc.
3. Analyze the data and critically evaluate the result and formulate the suggestion for the problem identified.
4. Apply the theoretical and practical learning of doing research into lifelong practice.
5. Communicate in oral and written form and prepare report
6. Work in team and exhibit leadership skills
7. Utilize the IT application for analysis and preparation of report.

The students should select a problem in Accounting, Finance, Marketing, Human Resource Management, international business or any other areas.

Report should contain

- Introduction
 - Introduction about the industry
 - Introduction about the Company
 - Review of literature – Minimum 10 papers from referred journal
 - Need for the Study
 - Objectives
- Research Methodology
 - Research Design
 - Sampling Design
 - Sources of Data Collection

- Tools used for analysis
 - Limitation
- Data analysis and interpretation
- Findings and Suggestions
- Conclusion
- Bibliography (APA format)

FACULTY OF ARTS, SCIENCE AND HUMANITIES
POST-GRADUATE PROGRAMME
MASTER OF BUSINESS ADMINISTRATION
(MBA)
(REGULAR PROGRAMME)

Curriculum & Syllabus
(2015)

CHOICE BASED CREDIT SYSTEM (CBCS)

Eachanari Post, Coimbatore – 641 021 INDIA
Phone: 0422-6453777, 6471113-5, 2980011-2980018;
Fax No: 0422 – 2980022, 2980023
Email: info@karpagam.com
Web: www.kahedu.edu.in

PG PROGRAM (CBCS) – M.B.A. CURRICULUM
(2015–2016 Batch and onwards)

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
SEMESTER – I										
15MBAP101	Management Principles and Organizational Behavior	I	a/b/g	4	0	0	4	40	60	100
15MBAP102	Managerial Economics	V	c/e/h	4	0	0	4	40	60	100
15MBAP103	Legal Environment for Business	I	a/b/g	4	0	0	4	40	60	100
15MBAP104	Accounting for Managers	I	a/b/g	4	1	0	4	40	60	100
15MBAP105	Quantitative Methods for Management	I	a/b/g	4	1	0	4	40	60	100
15MBAP106	#Foundation: Environmental Management	V	c/f	2	0	0	1	50	-	50
15MBAP107	#Management Practice I	V	c/f/h	2	0	0	1	50	-	50
15MBAP108	#Communication Practice I	V	c/f/h	2	0	0	1	50	-	50
15MBAP111	Computer Lab I: MS Office & Tally	I	a/b/g	0	0	4	2	40	60	100
15MBAP181	*Comprehensive Viva Voce – I	-	-	-	-	-	1	-	100	100
-	Seminar	V	c/f	1	0	0	-	-	-	-
-	Career Practice I	V	c/f	2	0	0	-	-	-	-
Semester Total				29	2	4	26	390	460	850
SEMESTER – II										
15MBAP201	Operations Management	I	a/b/g	4	0	0	4	40	60	100
15MBAP202	Marketing Management	II	d/f/i	4	0	0	4	40	60	100
15MBAP203	Human Resource Management	V	c/e/h	4	0	0	4	40	60	100

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
15MBAP204	Financial Management	I	a/b/g	4	1	0	4	40	60	100
15MBAP205	Operations Research	I	a/b/g	4	1	0	4	40	60	100
15MBAP206	Research Methods for Management	III	c/e/h	4	0	0	4	40	60	100
15MBAP211	Computer Lab – II: SPSS	I	a/b/g	0	0	4	2	40	60	100
15MBAP281	*Comprehensive Viva Voce II	-	-	-	-	-	1	-	100	100
-	Seminar	V	c/f	2	0	0	-	-	-	-
-	Career Practice II	V	c/f	2	0	0	-	-	-	-
Semester Total				28	3	4	27	280	520	800
SEMESTER – III										
15MBAP301	Strategic Business Management	I	a/b/g	4	0	0	4	40	60	100
15MBAP302	Entrepreneurship	IV	d/f/i	4	0	0	4	40	60	100
	+Specialization I Elective 1			4	0	0	4	40	60	100
	+Specialization I Elective 2			4	0	0	4	40	60	100
	+Specialization II Elective 1			4	0	0	4	40	60	100
	+Specialization II Elective 2			4	0	0	4	40	60	100
15MBAP304	#Management Practice II	V	c/e/h	1	1	0	1	50	-	50
15MBAP305	#Communication Practice II	V	c/e/h	1	1	0	1	50	-	50
15MBAP321	Summer Internship and Viva Voce	V	c/e/h	4	0	0	2	40	60	100
15MBAP381	*Comprehensive Viva Voce III	-	-	-	-	-	1	-	100	100

Course code	Name of the course	Objectives and outcomes		Instruction hours / week			Credit(s)	Maximum Marks		
		PEOs	POs	L	T	P		CIA	ESE	Total
								40	60	100
-	Seminar	V	c/f	2	0	0	-	-	-	-
-	Career Practice III	V	c/f	1	0	0	-	-	-	-
Semester Total				33	2	0	29	380	520	900
SEMESTER – IV										
	+Specialization I Elective 3	-	-	5	0	0	4	40	60	100
	+Specialization I Elective 4	-	-	5	0	0	4	40	60	100
	+Specialization II Elective 3	-	-	5	0	0	4	40	60	100
	+Specialization II Elective 4	-	-	5	0	0	4	40	60	100
15MBAP481	*Comprehensive Viva Voce – IV	-	-	-	-	-	1	-	100	100
15MBAP491	Major Project and Viva Voce	II/IV	d/f/i	18	0	0	5	80	120	200
-	Career Practice IV	V	c/f	1	0	0	-	-	-	-
Semester Total				35	0	0	22	240	460	700
Programme Total				-	-	-	104	1290	1960	3250

ELECTIVE LIST - SEMESTER III

Semester	List of Specializations	Course Code	Name of the Elective Course	PEO	PO
	Finance	15MBAPF303A	International Financial Management	I	a/b/g
		15MBAPF303B	Strategic Cost Management	I	a/b/g
		15MBAPF303C	Financial Service Management	I	a/b/g
		15MBAPM303A	Services Marketing	II	d/f/i

Semester	List of Specializations	Course Code	Name of the Elective Course	PEO	PO
III	Marketing Management	15MBAPM303B	Sales and Promotional Management	II	d/f/i
		15MBAPM303C	Marketing Research and Consumer behavior	II	d/f/i
	Human Resources Management	15MBAPH303A	Human Resource Development	V	c/e/h
		15MBAPH303B	Managing Interpersonal Effectiveness	V	c/e/h
		15MBAPH303C	Organizational Development	V	c/e/h
	Systems	15MBAPS303A	System Analysis & Design	V	c/e/h
		15MBAPS303B	Emerging Trends in Technology	V	c/e/h
		15MBAPS303C	Software Development	V	c/e/h
	Entrepreneurship	15MBAPE303A	Entrepreneurial Finance	IV	d/f/i
		15MBAPE303B	Entrepreneurship Development	IV	d/f/i
		15MBAPE303C	Project management	IV	d/f/i
	Banking Management	15MBAPB303A	Fundamentals of Commercial Bank Management	I	a/b/g
		15MBAPB303B	Resource Mobilization – Deposits	I	a/b/g
		15MBAPB303C	Resource Deployment – Small Loans	I	a/b/g
	Retail Management	15MBAPR303A	Retail Environment	II	d/f/i
		15MBAPR303B	Retail Operations, Systems and Inventory	II	d/f/i
		15MBAPR303C	Merchandising Management	II	d/f/i
	International Business	15MBAPI303A	International Marketing Management	IV	d/f/i
		15MBAPI303B	International Logistics and Documentation	IV	d/f/i
		15MBAPI303C	International Business Negotiations	IV	d/f/i
	Production Management	15MBAPP303A	Business Process Reengineering	I	a/b/g
		15MBAPP303B	Advanced Maintenance Management	I	a/b/g
		15MBAPP303C	Lean Management	I	a/b/g

ELECTIVE LIST - SEMESTER IV

Semester	List of Specializations	Course Code	Name of the Elective Course	PEO	PO
	Finance	15MBAPF401A	Working Capital Management	I	a/b/g
		15MBAPF401B	Security Analysis & Portfolio Management	I	a/b/g
		15MBAPF401C	Bonds, Derivatives & Commodity Market Management	I	a/b/g
	Marketing Management	15MBAPM401A	Brands and Business	II	d/f/i
		15MBAPM401B	Retail Marketing	II	d/f/i
		15MBAPM401C	Customer Relationship Management	II	d/f/i
	Human Resources Management	15MBAPH401A	Industrial Relations	V	c/e/h
		15MBAPH401B	Training and Development	V	c/e/h
		15MBAPH401C	Compensation Management	V	c/e/h
	Systems	15MBAPS401A	E-Commerce Technology & Management	V	c/e/h
		15MBAPS401B	Software Project Management	V	c/e/h
		15MBAPS401C	Enterprise Resource Planning	V	c/e/h

Semester	List of Specializations	Course Code	Name of the Elective Course	PEO	PO
IV	Entrepreneurship	15MBAPE401A	Technology Innovation & Sustainable Enterprise for Management	IV	d/f/i
		15MBAPE401B	Business Plan & Ethics	IV	d/f/i
		15MBAPE401C	Managing Diversity	IV	d/f/i
	Banking Management	15MBAPB401A	Export and Import Financing	I	a/b/g
		15MBAPB401B	Management of Non-Performing Assets	I	a/b/g
		15MBAPB401C	Risk Management in Banks	I	a/b/g
	Retail Management	15MBAPR401A	International Retailing	II	d/f/i
		15MBAPR401B	Retail Planning	II	d/f/i
		15MBAPR401C	Retail Communication	II	d/f/i
	International Business	15MBAPI401A	Multilateral Trade Agreements and Regulations	IV	d/f/i
		15MBAPI401B	International Economics	IV	d/f/i
		15MBAPI401C	International Logistics Management	IV	d/f/i
	Production Management	15MBAPP401A	Purchasing and Materials Management	I	a/b/g
		15MBAPP401B	Supply Chain and Logistics Management	I	a/b/g
		15MBAPP401C	Total Quality Management	I	a/b/g

* A panel of external and internal members shall evaluate the **Comprehensive Viva Voce** for 100 marks respectively. The aggregate of the marks shall be averaged for final ESE marks.

#The internal evaluation for **Foundation Course, Management Practice and Communication Practice** shall be as follows:

- Attendance = 5 marks
- Activity/Seminar = 45 marks (15 marks for Unit I, 15 Marks for Unit II and 15 Marks for Unit III. Activity/seminar will be conducted at end of each Unit)
- **Open Elective** (Self Study): Students can opt for an open elective course provided by any other PG department of the University. The Course offered is **Human Resource Management** (Code:15OEP201L), Credit: 4

The internal evaluation of **Major Project & Viva voce** shall be as follows:

- Review 1 (PPT Presentation) = 15 marks
- Review 2 (PPT Presentation) = 15 marks
- Model Viva-voce = 20 marks
- Project Record = 10 marks
- Viva voce Examination (internal examiner) = 20 marks

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established under section 3 of UGC Act, 1956)

Programme Outcomes (POs)

Graduates of the MBA programme will be able to:

- Understanding the management and domain concepts and apply them to achieve business environmental solutions.

- b. Demonstrate the ability to apply multiple theoretical perspectives to address complex managerial issues required for effective problem solving and decision making in contemporary organizational environment.
- c. Possess the skills required to work individually and lead effectively in a team-based environment.
- d. Recognize the values and ways to identify and resolve ethical issues and apply them in organizational settings
- e. Evaluate the implications of changing environmental factors on organizational choices within a global environment
- f. Ability to effectively communicate, persuade and strategically engage diverse stakeholders within a business environment.

PROGRAMME SPECIFIC OUTCOMES (PSO)

- g. Postgraduates will develop critical thinking and conceptualization of functional knowledge of management
- h. Able to accept various responsibilities and exhibit high level of commitment to complete on time.
- i. Ability to organize events individually / team and can show creativity and unique ideas in every business solutions

Programme Educational Objectives (PEOs)

- I. To develop professional skills for life-long learning in areas of management and related fields.
- II. To enable students to acquire proficiency, a sense of professionalism, integrity and team spirit to work in diverse environments.
- III. To develop capabilities in students to independently conduct theoretical as well as applied research.
- IV. To develop sound knowledge and skill to become an intrapreneur/entrepreneur and to inculcate creativity and innovation among students
- V. To adapt to a rapidly changing environment with learned and applied new skills and become socially responsible and value driven citizens committed to sustainable development.

Program Educational Objectives	Program Outcomes								
	a	b	c	d	e	f	g	H	I
To develop professional skills for life-long learning in areas of management and related fields.	√	√					√		
To enable students to acquire proficiency, a sense of professionalism, integrity and team spirit to work in diverse environments.		√	√	√	√				√
To develop capabilities in students to independently conduct theoretical as well as applied research.			√		√	√		√	
To develop sound knowledge and skill to become an intrapreneur / entrepreneur and to inculcate creativity and innovation among students	√			√					√
To adapt to a rapidly changing environment with learned and applied new skills and become socially responsible and value driven citizens committed to sustainable development.			√			√		√	

Course Objectives:

To make the students

- Familiar with basic concepts of management in an organizational context and application of these concepts to managerial problems
- Understand the manpower planning and motivation techniques used in organizations.
- To study the system and process of effective controlling in the organization.
- The focus of this course is to make students recognizes human behavior in an organizational context.
- To have critical understanding of organisational behaviour theories.
- It will provide an understanding of the concepts of organizational functioning and human behavior with an emphasis on the application of these concepts to managerial problems.

Course Outcomes (Cos):

Learners should be able to

1. Gain the knowledge and apply the skills of organizing, allocating, monitoring and controlling in the organization.
2. Determine the most effective action to take in specific situations.
3. Evaluate approaches to addressing issues of diversity.
4. The students will understand to communicate effectively in oral and written forms about organizational behavior theories.
5. To understand how to perform in group and team and how to manage the power, politics and conflict.
6. To analysis functional issues and formulate best solutions

Unit I

Management Overview: – Evolution of management - Functions - Characteristics and importance of management - Management Vs Administration - Role of manager - Planning: Meaning - Steps in planning - objectives - Management by Objectives.

Unit II

Decision making: Meaning, process. Organization – Departmentalization - Manpower planning - Process of recruitment and selection, Placement and Orientation - Directing – Motivation – Communication. Control – Need, process, steps in control.

Unit III

Organization Behavior: Meaning and definition - Fundamental concepts of OB - Contributing disciplines to the OB field - Learning – Theories of Learning - Personality – Determinants of personality - Theories of Personality - psycho-analytical, social learning, job-fit, and trait theories.

Unit IV

Perception – factors influencing perception – Attribution Theory – Frequently Used Shortcuts in Judging Others - Perceptual Process - Organization Errors of perception - Attitudes – Types of attitudes - Functions of Attitudes. Values – Types of Values- Value across cultures – Groups - Stages of Group Development - Group Norms - Group Cohesiveness.

Unit V

Conflict – Meaning – Functional vs. Dysfunctional Conflict - Levels of Conflict – Conflict management. Stress – Causes of stress – Effects of Occupational Stress - Coping Strategies for Stress. Organizational change - Forces for change - Resistance to change- Overcoming resistance to change.

Note: Emphasis will be given to case discussion and article reviews

Text Books:

1. Koontz and Weirich, “Essentials of Management”, Tata McGraw Hill, New Delhi, 2010.
2. Stephen Robbins, “Organizational Behaviour”, Prentice Hall of India, 2012

References:

1. VSP Rao, V.Hari Krishna, “Management: Text and Cases, Excel Books”, New Delhi 2009.
2. L.M.Prasad, “Principles and Practice of Management”, Sultan Chand & Sons, 2013.
3. Robbins.S.P, “Fundamentals of Management”, Pearson Publications, New Delhi, 2006.
4. Gilbert, “Management Today Principles and Practice”, Tata McGraw Hill, 2008
5. Fred Luthans, “Organizational Behaviour”, 7th Edition, Tata McGraw Hill, 1995.

6. Steven. Lmc Shane and Mary Ann von Glinow, “Organizational Behaviour”, 2nd edition, Tata McGraw Hill, 2001.
7. Stephen P Robbins and Timothy A Judge, “Organizational Behaviour”. Prentice Hall of India, 2007.
8. L .M. Prasad, “Organizational Behaviour”, 3rd Edition, Sultan Chand and Sons, 2001.

Journals/ Additional Readings:

1. Effective Executive – Magazine
2. All Management Journals
3. Vikalpa The Journal for Decision Makers
4. Harvard Business Review
5. Human Resource Management Review
6. Training and Development Journal
7. Personnel today
8. Academy of Management Journal
9. Academy of Management Review
10. The IUP journal of Organization Behavior

Course Objectives:

To make students

- To illustrate the application of economic theory and methodology as an alternative in managerial decisions.
- To understand the demand behavior and estimate demand
- To gain knowledge on the production functions, economies of scale and cost functions
- To gain a rigorous understanding of competitive markets as well as alternative market structures.
- To understand the forces determining macroeconomic variables such as inflation, unemployment, interest rates, and the exchange rate.
- To obtain familiarity on the macro level business components like money, banking, monetary policy, fiscal policy, trade, business cycles and balance of payments.

Course Outcomes (Cos):

Learners should be able to

1. Apply the economic way of thinking to individual decisions and business decisions
2. Measure the responsiveness of consumers' demand to changes in the price of a goods or service, and understand how prices get determined in markets,
3. Evaluate the different costs of production and how they affect short and long run decisions and derive the equilibrium conditions for cost minimization and profit maximization
4. Design competition strategies, including cost, pricing, and market environment according to the structure of the markets.
5. Critically evaluate the consequences of basic macroeconomic policy options under differing economic conditions within a business cycle.
6. Demonstrate an understanding of monetary and fiscal policy options as they relate to economic stabilization in the short run and in the long run.

Unit I

Managerial Economics - meaning, nature and scope - Managerial Economics and business decision making – Role and responsibilities of Managerial Economist - Fundamental concepts in

Managerial Economics. Objectives of Business Firms - Determinants and types of demand - Elasticity of demand - Demand Forecasting - Applications.

Unit II

Production and Costs - Meaning of Production Function –Law of Diminishing returns- Law of variable proportions - Isoquants, Cobb-Douglas function - Law of Supply and Elasticity of Supply, Economies and diseconomies of scale – Cost – types – Determinants- Short and Long run cost curves.

Unit III

Product markets - Market Structure - Pricing under different markets- perfect competition, monopoly, monopolistic competition, oligopoly - Pricing Methods - Pricing in Public Sector Undertakings.

Unit IV

Theories of profit, wages, rent - Keynes Liquidity Preference Theory of interest - Cost Benefit Analysis- Steps - Break Even Analysis- Profit - Meaning and nature - Profit policies.

Unit V

Government and Business - Need for Government intervention in the market – Monetary and Fiscal policy- Prevention and control of monopoly - National Income - methods- Trade Cycles- Economic Liberalization and Business Trends

Note: Emphasis will be given to case discussion and article reviews

Text Books:

1. Varshney and Maheshwari, “Managerial Economics”, Sultan and Sons, New Delhi. 2014.
2. P.L.Mehta, “Managerial Economics”, Sultan Chand and sons, New Delhi, 2014.

References:

1. Joel Dean, “Managerial economics”, PHI India Pvt Ltd, New Delhi, 2006.
2. Rangarajan, “Principles of Macro Economics”, Tata Mc.Graw Hill, New Delhi, 2007.
3. Mote, Paul and Gupta, “Managerial Economics”, Tata McGraw Hill, New Delhi, 2009.

4. M.L.Jhingan, “Managerial Economics”, Vrinda Publications Pvt Ltd., New Delhi, 2009.
5. Ruddar Dutt and K.P.M Sundaram, “Managerial Economics” 5th Edition, Sultan & Chand private limited, New Delhi, 2005.

Journals:

1. The IUP Journal of Managerial Economics
2. Economic Challenger
3. Economic and political weekly
4. Business policy and Economics (International Journal)
5. International Journal of Economic Research

Course Objectives:

To make the students

- To make the students understand the basics of legal concept and environment in which the present day business is carried.
- To provide an overview of important laws that have a bearing on the conduct of business in India
- To acquaint students with the functioning of negotiable instruments
- Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as an employer.
- To acquire knowledge of income tax act and sales tax act and its applications in business
- To understand the existing law and practice relating to consumer protection and cyber crimes

Course Outcomes (Cos):

Learners should be able to

1. Analyze the nature of contract law, Company law and cyber laws and its application in business.
2. Appreciate the overall legal framework within which business activities are carried out.
3. Assess the legal forms of business organization and its modus operandi.
4. Recognize the application of factories act and wages act in business scenario.
5. Understand and apply the concept and laws pertaining to income tax and sales tax, intellectual property rights and cyber laws and evaluate its impact on business and social environment.
6. To illustrate the consumer legislations towards consumer protection and cyber crimes

Unit I

Mercantile Law - Contracts: Nature and Classification of Contracts. The Agreement of Offer and Acceptance. Consideration and capacity – Free consent – Contingent and Quasi contracts – Discharge of contracts – Breach of contract- Essentials of Contract of Agency – Creation of Agency – kinds of Agents – Rights and duties of Principal and Agent-Termination of Agency-

Sales contract, Transfer of title and risk of Loss, Warranties in sales Contract. Performance of Sales contract, conditional sales.

Unit II

Negotiable Instruments-Nature and requisites of Negotiable Instruments, Transfer of Negotiable Instruments and liability of parties, Enforcement's of secondary Liability, Holders in due course, special rules for cheques and banks Discharge of Negotiable instruments.

Unit III

Company Law - Major principles – types of companies, memorandum and articles of association, Promotion and Formation of a Company - prospects, powers, duties and liabilities of directors – Corporate Governance.

Unit IV

Income Tax Department & Sales Tax Act - Corporate tax planning, overview of sales tax act, including value added tax.

Unit V

The Consumer Protection Act 1986: Object of the Consumer Protection Act – Rights of Consumers – Definitions of Important Terms. – Cyber law in India – Information Technology Act – 2000.

Note: Emphasis will be given for legal case discussion and review of legal articles related to business.

Text Books:

1. N.D.Kapoor, "Elements of Mercantile Law", Sultan Chand & Sons, 2014.
2. V.Kubendran, "Legal Aspects of Business", SciTech Publications, Bangalore, 2014.

References:

1. N.D.Kapoor, "Elements of Mercantile Law", S. Chand and Sons Limited, New Delhi, 2008.
2. Sen and Mitra, "Commercial and Industrial Law", Taxman Publication, New Delhi, 2009.
3. M.C. Shukla, "Mercantile Law", S. Chand and Company, New Delhi, 2007.
4. S.S. Gulshan, "Business Law", Excel Books New Delhi, 2007.

Journals & additional readings:

1. Legal news & views
2. Labour law reporter
3. The practical lawyer-supreme court cases
4. Chennai law times

Course Objectives:

To make the students

- To understand the financial accounting standards, conventions and principles in preparation of financial reports
- To understand the tools and techniques used for analyzing the financial statements.
- To recognize the cost concepts and prepare cost sheets.
- Calculate and analyse the cash flow operations with available inputs.
- To know various tools from accounting this would facilitate the decision making
- To develop analytical abilities to face the business situations

Course Outcomes (Cos):

Learners should be able to

1. Illustrate the financial statements for the organization.
2. Ability to prepare and analyse financial statements to assess the financial performance and position of a company;
3. Evaluate the cost concepts to analyse business management decisions related to pricing and outsourcing
4. Demonstrate capabilities of problem-solving and critical thinking
5. Develop an awareness on ethical, social issues in addition to financial information, in the management decision making process
6. Develop group work and communication skills

Unit I

Financial Accounting – Definition – Accounting Principles – Concepts and conventions – Journal – Ledger - Trial Balance

Unit II

Final Accounts – Financial accounting Vs Management accounting - Objectives and functions of management accounting - Financial Statement Analysis – Objectives – Comparative Statements, Common-Size statement, Trend Percentages

Unit III

Costing – Basic concepts – Element costing – Preparation of Cost Sheet. Ratio Analysis, Meaning, Nature, Uses, Limitations, Classification of Ratios, Interpretation of Ratios.

Unit IV

Funds Flow Statement, Meaning and Concept of Funds, Flow of Funds, Uses and Significance of Funds Flow Statement, Limitations of Funds Flow Statement, Statement of Schedule of Changes in Working Capital, Funds From Operation.

Unit V

Cash Flow Statement, Classification of Cash Flows, Comparison between Funds Flow Statement and Cash Flow Statement, Uses and significance of Cash Flow Statement, Computation of Cash Flow Statement and Cash from Operations.

Note: Problems 60 Marks and Theory 40 Marks.

Text Books:

1. R.K. Sharma & Shashi K Gupta, “Management Accounting”, Kalyani Publishers, Ludhiana, 2014.
2. Jelsy J. Kuppapally, 1st Edition, “Accounting for Managers”, PHI, New Delhi, 2009.

References:

1. Jain & Narang, “Financial Accounting”, Kalyani Publishers, Ludhiana, 2014.
2. Jan Williams, Financial and Managerial Accounting – The basis for business Decisions, 15th edition, Tata McGraw Hill Publishers, 2011.
3. Stice & Stice, Financial Accounting Reporting and Analysis, 8th edition, Cengage Learning, 2010.
4. Singhvi Bodhanwala, Management Accounting -Text and cases, PHI Learning, 2009.
5. Ashish K. Battacharya, Introduction to Financial Statement Analysis, Elsevier, 2009

Journals & Magazines:

1. Finance India
2. Journal of Accounting and Finance

3. Indian Journal of Finance
4. Accounting Research and Audit Practice
5. Indian Journal of Accounting
6. The Management Accountant
7. The Chartered Accountant

Course Objectives:

To make the students

- To understand the classification and analysis of the data with statistical tools and techniques.
- To know the descriptive and inferential statistics, and apply them to examine business and economic data.
- To know the use of tools and techniques of correlation and regression
- To understand the concept of measurement of central tendency
- To realize the applications of probability and distributions in the analytical decision making.
- To understand the index number concepts and its applications.

Course Outcomes (Cos):

Learners should be able to

1. Identify the basic statistical tools and techniques and its application in business decision making.
2. Categorize and estimate the measures of central tendency
3. Develop an ability to analyse and interpret the collected data to provide meaningful information in making management decisions
4. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to the discipline of statistics.
5. Classify and evaluate the hypothesis to obtain reliable results.
6. Develop skills to design business model and Analytics projects

Unit I

Role of mathematics and statistics in business decisions - Statistics – meaning – Scope - Functions, limitations, uses and Misuses of statistics. Collection of data - Classification and Tabulation of data, Diagrammatic and graphic representation of data

Unit II

Measures of Central tendency - Mean, Median and Mode. Combined mean and corrected mean
Measures of Dispersion-Range, Quartile deviation, standard deviation and Coefficient of Variation.

Unit III

Correlation: Types of Correlation-methods of correlation-scatter diagram-Karl Pearson's co-efficient of correlation-Spearman's Rank correlation-Regression two regression lines-regression co-efficient-methods of forming the Regression equations.

Unit IV

Probability: Basic definitions-addition and multiplication rules (only statements)-simple business problems. Probability distributions: binomial distribution-Poisson distribution and normal distribution- simple business problems.

Unit V

Hypothesis testing – Errors in Hypothesis testing - large sample test (Z – test) single and two mean test, Small sample test (t – test)-Single mean-Two mean- Chi-square test –Goodness of fit, ANOVA – one way-f-test.

Note: Problems 60 Marks and Theory 40 Marks.

Text Books:

1. S.P. Gupta, "Statistical Methods", Sultan Chand & Sons, New Delhi, 2009
2. N.Elhance, Veena Elhance, B.M. Agarwal, "Fundamentals of Statistics", Kitab Mahal, Allahabad, 2008.

References:

1. PA. Navnitham, "Business Mathematics and Statistics", Jai Publishers, Trichy, 2004.
2. R.S.N.Pillai, Bagavathy, "Statistics", S. Chand & Company Ltd, New Delhi, 2002.

Course Objectives:

To make the students

- Understand Global and Indian Environmental Policies and laws.
- To enhance their synthesis skills to evolve strategic corporate responses to integrate social/environmental issues into business management
- To understand the International and Indian efforts for environmental Protection
- To emphasize importance of understanding external environment in marketing decision making
- Familiarize with the concepts of green marketing strategies
- Recognize the impact of Industrial and Business activities on the Environment

Course Outcomes (Cos):

Learners should be able to

1. Categorize the various environmental issues and remedies
2. Create awareness on the issues related to environment and enforcing agencies.
3. Describe organizations as systems and their role in environmental management
4. Capacity to critically assess theoretical and conceptual issues relating to environmental management
5. To present synthesised and critically evaluated information in oral and written forms.
6. To work effectively to create environmental management analysis outputs of professional quality, both independently and within team environments.

Unit I

Environmental awareness - Sustainable Development; Global Environmental - Problems- Global Warming and Climate change, Concept of Carbon Credit; Pollution – Air, Water resources and Land

Unit II

International and Indian efforts for environmental Protection, United Nations Framework Convention on Climate Change, Earth Summit

Unit III

Business and environment- Impact of Industrial and Business activities on the Environment, business implications and opportunities arising from social and environmental issues; Eco-friendly manufacturing, Packaging, Green Marketing

References:

1. Uberoi, N.K. (2010). Environmental Management, 2nd edition, New Delhi: Excel Books
2. Krishnamurthy, B. (2009). Environmental Management: Text and Cases, 2nd edition, New Delhi: PHI
3. Arindita Basak. (2009). Environmental Studies, Pearson Education
4. Rajagopalan, R. (2011). Environment, Oxford University Press

Course Objectives:

- To train graduates to become as managers of varying departments through activity based learning.
- This course provides training on decision making skills
- To determine the role to be played during conflict and empowerment skills.
- To help the students to acquire some of the necessary skills to handle day-to-day managerial responsibilities
- To gain a solid understanding of human behavior in the workplace from an individual, group and organizational perspective
- To obtain frameworks and tools to effectively analyze and approach various organizational situations

Course Outcomes (cos):

1. Gain the knowledge and skills necessary to manage various components of a practice that include organization, administration, communication, and managerial aspects.
2. To focus on decision making aspects and implementation of decisions
3. Students should be able to demonstrate the Interpersonal Skills and Practice-Based Learning
4. Demonstrate the roles of the manager and become an effective planner and decision maker
5. Systematically identify relevant theory and concepts and relate to appropriate methodologies and draw conclusions
6. Evaluate, classify, imagine and plan the successful management practices.

UNIT I**Interpersonal Skills**

Decision Skills: Group decision making (strengths and weaknesses), Developing characteristics of charismatic and transformational leadership. Emotional intelligence and leadership effectiveness - self awareness, self management, self motivation, empathy and social skills

Negotiation skills- preparation and planning, definition of ground rules, clarification and justification, bargaining and problem solving, closure and implementation

UNIT II

Conflict Management skills:

Types of conflict (intrapersonal, Intra group and inter group conflicts), Basic concepts, cues, signals, symbols and secrets of body language, Significance of body language in communication and assertiveness training, Conflict stimulation and conflict resolution techniques for effective management.

UNIT III

Empowerment Skills:

Stimulating innovation and change- coping with “temporariness”, Network culture, Power tactics and power in groups (coalitions), Managerial empowerment and entrepreneurship, Prevention of moral dwarfism especially terrorism, Altruism (pro-social behaviour/helping behaviour), Spirituality - strong sense of purpose- trust and respect- humanistic practices- toleration of fellow human beings expressions.

References:

1. Swaminathan. V.D & Kaliappan. K.V. (2001). Psychology for Effective Living. Chennai. The Madras Psychology Society.
2. Robbins, S.B. (2005). Organizational Behaviour. New Delhi: Prentice Hall of India.
3. Hurlock, E.B. (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.

Course Objectives:

- To impart students and enrich communication and non-verbal activity such that students will be good on their communication.
- To understand norms of business letters and prepare prompt business letters
- Make students to understand the value of face to face communication
- To learn the importance of postures and gestures
- The students acquire skills on conducting meetings, seminar and conferences.
- To gain practical knowledge on designing and developing clean and lucid writing skills.

Course Outcomes (Cos):

1. The student will able to get practice with Verbal communication and Non- Verbal communication.
2. Demonstrate the understanding of face to face Communication and appropriate ways to communicate to an audience
3. The students shall be familiar with conducting meetings, seminar and conferences.
4. Students attain competence in functional use of communication during both academic and non-academic life situations.
5. To draft effective business correspondence with brevity and clarity.
6. To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

Unit I

Communication - Meaning and significance for management- Types of communication- media –
 Barriers to communication - Norms for Business letters - Letter for different kinds of situations.
 Report writing - formal & informal reports - writing research reports & technical reports-
 Principles of effective communication. Listening and answering the questions

Unit II

Communication: Face to face communication – telephonic conversation. Structuring the resume / report – Letter writing / E-mail communication – Samples. Conducting Meetings: Procedure – preparing Agenda, minutes and resolution

Unit III

Non-verbal communication - personal appearance - posture - body language - visual & audio visual aids for communication - face to face communication - Conducting Meetings - Procedure - preparing Agenda, minutes and resolutions - conducting seminars and conferences

References:

1. Leena Sen, “Communication Skills”, 8th edition, PHI Learning Pvt Ltd, New Delhi, 2007.
2. Raymond. V. Lesikar’s, “Basic Business Communication”, 7th Edition, Tata McGraw Hill Education Pvt Ltd, 2008.
3. Kitty. O. Locker and Stephen Kyo Kaczmarek, “Business communication Building Critical Skills”, 3rd edition, TMH, 2007.
4. Rajendra Pal and Korlahali, “Business Communication”, 7th edition, Nisha Publishers, New Delhi, 2007.

Course Objectives:

To make the students

- To provide insight on importance of technology for communication and decision making.
- To familiarize Students with basic to intermediate skills for using tally in the classroom vis-à-vis Business Applications
- To provide hands-on usage of MS-office to creating new word documents including features like tables, charts and references.
- To enable students to explore MS office
- To provide students hands on experience on tally Utilities
- To gain proficiency in creating solutions for Data Management and Reporting

Course Outcomes (Cos):

1. Develop the student to work efficiently in MS Office and Tally
2. Get familiarize with the shortcuts used in office tools.
3. Recognize effective use of charts, diagrams, and other graphics in business messages and identify potential sources for these visual aids
4. Evaluate and practice various techniques of analysis in excel tools
5. To design presentation using animation, special effects and graphics.
6. To facilitate the understanding of accounting package and its application

Unit I

Components of Computer – Introduction to MS Office- Word – Creating a new documents with templates and wizards- Using Key Board Short cuts – Symbols and Pictures – Text Management.

Unit II

Introduction to Excel – Working with work sheets – Calculation using formulas work sheet formatting – Types of Charts – Formatting and printing – Chart elements

Unit III

Introduction to Power Point – Creating New Presentations - Presentation using Graphics – Slide Transition and Adding Sounds Using action Buttons.

Unit IV

Internet and World Wide Web: Introduction to Internet – Internet access – Internet Addressing – Introduction and use of E-mail working of E-mail – E-mail names and address- Working in Blogs.

Unit V

Accounting Package Tally: Introduction to tally – create a company – creating groups & ledger accounts – Account Voucher creation – Statement of accounts – Inventory reports display

Text book:

V. Rajaraman, 2009, “Fundamentals of Computer”, 4th Edition, Prentice Hall of India Pvt Ltd, New Delhi.

Reference:

P.K. Sinha, 2008, “Fundamentals of Computer”, 6th Edition, BPB publication

Course Objectives:

To make the students

- To assess the overall knowledge of the student in the relevant field of Management
- Realize the knowledge and skills required to excel in their career
- To test their learning and understanding of various concepts of the syllabus during the course of their programme
- To acquaint the students with fundamentals of communication and help them to transform their communication abilities
- To obtain frameworks and tools to effectively analyze and approach various Organizational situations.
- To prepare the students to face interview both in the academic and the industrial sector

Course Outcomes (Cos):

Learners should be able to

1. To equip students with skills and knowledge to excel in their future careers
2. To develop an in-depth knowledge on the management concepts, theories and principles
3. Develop an ability to analyse and interpret contents and concepts to provide meaningful information in making management decisions
4. Recognize the application of various techniques to achieve the objective of the task
5. Determine opportunities and emerging challenges in the upcoming business trends
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to various courses.

A Comprehensive Viva Voce will be conducted at the end of the Semester. The panel shall consist of an external expert and faculty members who handled the courses. The viva is aimed to evaluate the student's knowledge in all the core and elective courses in the particular semester

Course Objectives:

- Help the Students in developing their communication skills, especially presentation before the group.
- Develop and improve discussion skills
- The students will be able to analyze any given issue and to present before an identified group.
- Identify and comprehend main ideas and supporting idea in detailed manner
- Manage timings on discussion
- Develop and present options based on selected materials

Course Outcomes (Cos):

1. Develop multiple thinking strategies to examine real-world issues and explore creative avenues of expression
2. Analyze the impact of word choice and tone that can have on presentation
3. Identify ways to make information more accessible to audience
4. Students will demonstrate the ability to construct a paper consistent with expectations of the discipline, including an appropriate style
5. Evaluate an enthusiastic and well-practiced method of presentation
6. Critically evaluate individual and peer effort and performance

Each Student is expected to present a topic approved by the Teacher. In the First Semester, the Student being fresh to the environment and coming from different academic background, the topic of the Seminar shall be on general subjects of their choice.

Course Objectives:

- The students understand proper usage of English in their profession and focus on report writing.
- To develop new ability to practice new problem solving skills in group and use these skills in personal life
- To develop employability and enterprise skills, such as teamwork and communication.
- To develop positive attitudes in the pupils towards study and work.
- To provide students with impartial advice about options that is available to them.
- To provide equal opportunity of access to careers inspiration and guidance.

Course Outcomes (Cos):

1. The ability to speak clearly, persuasively, and forcefully
2. Exhibit important life skills including Decision making, Problem solving and creative thinking.
3. Anticipate what they gain from educational experience
4. Track their progress and set bench mark
5. Identify the methods of assessment of knowledge and skills
6. Plan appropriate strategies to enrich the need based learning techniques

Verbal Ability: Parts of Speech , Tense - Subject Verb and Agreement - Active and Passive Voice - Clause - Degrees of Comparison - Reading Comprehension - Sentence Correction - Sentence Completion - Spotting the Errors - Jumbled Sentence - Articles and Prepositions - Synonyms & Antonyms - Verbal Analog

Course Objectives:

To make the students

- To understand the operations management concepts that yields a competitive advantage through operational excellence.
- Aware of various business combinations, location, layout, total quality management
- Learn about design, planning and control of an organization's processes.
- To know the Maximum utilisation of all kinds of resources needed.
- To understand Master Production Schedule, Material Requirement Planning and Total Quality Management
- To get acquainted with ISO Quality Certifications

Course Outcomes (Cos):

Learners should be able to

1. Classify and understand the core features of the operations and production management function
2. Evaluate and prepare the best plant and factory location and layout.
3. Obtain the knowledge of identifying and applying a quality management tools to improve organizational effectiveness.
4. Compare and combine various business locations, layouts, total quality management.
5. Define and list operations management concepts that yield a competitive advantage through operational excellence.
6. Discover, estimate and classify products & services to customers by improving process & supply chain performance.

Unit I

Operations Management – Meaning – Importance – historical contributions – Functions of OM – Differences between Production and Operations Management – Recent trends in Production and Operations - Types of Production Systems, Product Design and Process selection

Unit II

Facility Location – Facility Layout – Facility Layout planning and Designing, Types of layout – Cellular, Lean and Agile manufacturing systems – Computer Integrated Manufacturing Systems

-Assembly line balancing, Introduction to product layout and process layout-Comparison of Product Layout and Process Layout.

Unit III

Capacity Planning and Control — functions - Determinants of Effective Capacity planning – Forecasting Demand for Capacity Planning- Capacity Control– Aggregate planning – Master Production Schedule (MPS) – Material Requirement Planning (MRP) – BOM – Capacity Requirement Planning (CRP) –An Introduction to MRP II and ERP.

Unit IV

Materials Management – functions – material planning and budgeting – Value Analysis - purchase functions and procedure - inventory control – types of inventory – safety stock – order point –inventory control systems – perpetual – periodic – JIT – KANBAN.

Unit V

Total Quality Management Concept - Statistical Quality Control for Acceptance Sampling and Process Control –Quality movement – Quality circles — ISO Quality Certifications and types – Quality assurance – Six Sigma concept.

Note: Problems 20 Marks and Theory 80 Marks

Text Books:

1. Pannerselvam, “Production and Operations Management”, 2nd edition, PHI, 2012.
2. M. Senthil, “Production and Operations Management”, 2nd edition, 2009.

References:

1. Everest E Adam & Ebert, “Production and Operations Management”, fifth edition, PHI publication, 2009.
2. Joseph G Monks, “Operations Management (Theory and Problems)”, second edition, McGraw Hill Intl, 2004.
3. S N Chary, “Production and Operations Management”, 3rd edition, TMH Publications, 2009.
4. Lee J. Krajewski and Larry P. Ritzman, “Operations Management: Process and value Chains”, seventh Edition, PHI, 2007.
5. E.S Buffa, “Modern Production and Operations Management”, 8th edition, Wiley India, 2009.

6. Lee J. Krajewski and Larry P. Ritzman, “Operations Management: Strategy and Analysis”, 7th edition, Addison Wesley, 2007.
7. Chase, Aquilano & Jacobs, “Production and Operations Management”, 13th edition, Tata McGraw Hill, 2009.

Journals:

1. Journal of Operations Management, Published by Elsevier in collaboration with APICS, Educational & Research Foundation.
2. International Journal of Operations Management, Published by Emerald Journals.
3. POM Journal, published by POM Society.
4. International Journal of Advanced Operations Management, published by Inderscience.

Course objectives:

To make the students

- To understand the marketing environment and marketing functions
- Learn the importance of consumer buying motives and consumer behavior.
- To get familiarize in marketing mix
- To get an in-depth view on advertising and sales promotional tools
- To make aware of direct marketing and customer relation marketing
- To aware of the competitive strategy for leader, follower & nichers.

Course outcomes (Cos):

Learners should be able to

1. Apply the core concepts of marketing and the role of marketing in business and society.
2. Perform market analysis by formulating and identifying the best marketing mix.
3. Evaluate and support the latest trends in marketing and apply the ethical norms in marketing domain.
4. Effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to the team members.
5. Evaluate and relate the techniques involved in promoting and branding products
6. Analyze the importance of consumer buying motives & consumer behavior, Designing competitive strategies for Leaders.

Unit I

Marketing-definition – market - conceptual framework - Marketing Environment: Internal and External – Marketing Functions – E-Marketing, Green Marketing.

Unit II

Buyer behavior - process, Market segmentation – levels - bases, targeting – patterns, positioning and differentiation, Tools of product differentiation.

Unit III

Marketing mix - Product mix - New product development - product line – brand - Product life cycle, Packing, Price mix - methods and strategies.

Unit IV

Place Mix - Channel System – Flows - Channel Design - Promotion Mix – Advertising – types – Media, Sales promotion – Tools, Public Relations - Tools - Direct Marketing.

Unit V

Customer relation marketing - Customer database, identifying and analyzing competitors - Designing competitive strategies for leaders, Challengers, followers and nichers:–Attracting and retaining customers.

Note: Emphasis will be given to case discussion and article reviews

Text books:

1. Kotler Philip and Keller, “Marketing Management”, PHI, New Delhi, 2014.
2. R.S.N Pillai Bagavathi, “Marketing Management”, S.Chand & Company Ltd, 2013

References:

1. Rajan Saxena, “Marketing Management”, 2nd edition, Tata Mc Graw Hill. 2008
2. Ramasamy and Namakumari, “Marketing Management”, McMillan, India Ltd., 2007
3. Sherlekar, “Marketing Management”, 14th edition, Himalaya Publication House, 2008
4. K.S Chandrasekar, “Marketing Management”, Tata Mc Graw Hill, 2010.

Journals:

1. Indian journal of marketing
2. Business & marketing
3. Advertising Express

Course objectives:

To make the students

- To understand the human resource management and human resource information system
- To increase knowledge of HR planning, Selection, Recruitment, job analysis and its interrelations.
- To gain information on feedback systems
- To know about compensation and reward management and its practice in industry.
- To understand the concept of competency mapping and components of quality work life
- To get an in-depth knowledge of employee welfare measures and global HR practices

Course outcomes (Cos):

Learners should be able to

1. Analyze and assess the job analysis for a profile and understand its linkage with HR planning
2. Identify and evaluate the training needs and prepare a training programme.
3. Examine and outline the compensation and reward system applicable to the industry based and understand its linkage with performance management
4. Apply the appropriate employee relations measures and Recruitment process, Learning organization Auditing HR functions
5. Draft the HR functions and latest developments in the field of HR and effectively communicate ideas, explain procedures and interpret results and solutions in written and oral forms to different audiences.
6. To make any manager to identify various activities related to Human Resources, Job involved in HR, Training, and Compensation and Labour welfare practices

Unit I

Human resource management - Importance of HRM; Objectives of HRM; HR Planning –factors affecting HR Planning – Human resource information system(HRIS) - Functions of HRM-

Changing environments of HRM - Using HRM to attain competitive advantage- Trends in HRM- Qualities and role of HR managers.

Unit II

Job analysis and Design – Process of job Analysis-Job description, Job specification, Job rotation, Job enrichment- Job evaluation- Recruitment and selection: Sources of recruitment, Recruitment process – Process of selection - Induction and Placement.

Unit III

Orientation & Training: Orienting the employees, Training – Training process - Performance appraisal- Traditional and modern techniques of performance appraisal- Performance appraisal process - 360° - 720° feedback.

Unit IV

Basics of compensation- factors determining pay rate- Current trends in compensation – Pay for performance and financial incentives, issues in compensation management – Competency mapping – Quality work life.

Unit V

Labor Welfare – Statutory and Voluntary Welfare measures. Knowledge management – Learning organization Auditing HR functions - Future of HRM function, International HRM – Global differences and similarities in HR Practices – Application of IT in various HRM functions

Note: Emphasis will be given to case discussion and article reviews

Text Book:

1. V.S.P.Rao, “Human Resource Management- Texts and Cases”, 2nd Edition, Excel Books, New Delhi, 2014.

References:

1. Gary Dessler, “Human Resource Management”, 11th Edition, Prentice Hall of India Pvt, Ltd, 2011.
 2. K. Aswathappa, “Human Resource Management”, 6th Edition, Tata McGraw Hill, 2013.
- Master of Business Administration (2015 Batch) Karpagam Academy of Higher Education

3. Scott, Snell ,George ,Bohlander , “Human Resource Management - A South Asian Perspective”, Cengage Learning, 2010.
4. Klerman, “Human Resource Management”, Biztantra, 2008.

Journals/ additional readings and other materials:

1. HRD Times
2. Personnel today
3. Human capital
4. Vision
5. Management and labour studies
6. IIMB management review
7. HR effective
8. Vikalpa
9. www.hrd.com

Course objectives:

To make the students

- To understand the financial management concept and its importance and its applications in business
- To gain knowledge on the sources of finance and the role and functions of chief financial officer.
- To know the concept of time value of money and the rationale for using the time value of money concept in capital budgeting techniques for evaluations of business proposals.
- To recognize the availability of different source of capital and computation of cost of capital.
- To recognize the importance of working capital its application in business.
- To comprehend on the importance of capital structure, the factors which influence the dividend policy.

Course outcomes (Cos):

Learners should be able to

1. Evaluate the various sources of capital and its impact on business
2. Demonstrate knowledge and compute value of money to evaluate the business proposal applying capital budgeting techniques
3. Compute the cost of capital to estimate the optimal capital structure.
4. Comprehend the knowledge of assessing the working of organization to assess the liquidity position of the firm.
5. Discover the knowledge on capital structure, and the determination of dividend policy
6. Develop analytical skills which facilitate the financial decision making in business situations

Unit I

Financial Management, Objectives, Functions, Role of Financial Management, Risk - Return Relationship, Sources of Long Term Finance, Capital Market in India.

Unit II

Capital Budgeting , Time Value of Money, Methods of Appraisal, Pay Back Method, Rate of Return, NPV, IRR, Profitability Index.

Unit III

Cost of Capital, Determining component cost of capital, Specific cost of Capital, Overall Cost of Capital, Cost of Equity Capital, Cost of Preference Capital, Cost of Debt, and Weighted Average Cost of Capital.

Unit IV

Working Capital Management, Current asset and liability decision, Factors affecting working capital requirements, forecasting working capital requirements.

Unit V

Capital Structure, Optimum Capital Structure, EBIT - EPS Analysis - Leverages - Dividend Policy, Factors determining Dividend Policy.

Note: Emphasis should be given to case discussions and review of articles. Mark distribution - Problems 40 marks and Theory 60 marks.

Text Books:

1. Pandey.I.M, “Financial Management”, 9th Edition, Vikas Publishing House, New Delhi, 2013.
2. Prasanna Chandra, “Financial Management”, 7th Edition, Tata McGraw Hill, New Delhi, 2012.

References:

1. Khan & Jain, “Financial Management”, Tata McGraw Hill, New Delhi.
2. James C Vanhorne, John M Wachowicz Jr, “Fundamentals of Financial Management”, Pearson Education Limited, 2001.
3. Lawrence J Gitman, “Principles of Managerial Finance” Pearson Education limited.
4. Periasamy P, “Financial Management”, Vijay Nichole Imprints, Chennai.

Journals / Additional Readings:

1. Finance India, Indian Journal of Finance
2. Journal of Financial Services and Management
3. Asia Pacific Business Review
4. Corporate India

Course objectives:

To make the students

- To understand the basic framework of operation research and its applications in business decision.
- To develop an understanding of Transportation model for Mathematical formulation of the Transportation problem.
- To identify strategies for to minimize the cost of service through Queuing theory.
- To have a thorough understanding on game theory
- Understand the mathematical tools and professionally allocate scarce resources to optimize and maximise profit.
- To inculcate the knowledge of geometric programming to solve the non linear programs

Course outcomes (Cos):

Learners should be able to

1. Assess the operation research and its applications in business decision.
2. Discover suitable transportation model and apply mathematical formulation of the transportation problem.
3. Apply suitable strategies to minimize the cost of service
4. Analyze the non-linear programming techniques to solve the problems in functional areas
5. Demonstrate separable programming function to design a suitable Programming based on the ethical norms of research.
6. Identify the mathematical software to solve the proposed models

Unit I

Introduction to Operations Research – Meaning – Scope – Models – Limitation and applications in management decision making. Linear Programming – Formulation– Graphical method – Simplex method (Problems using slack variables only)

Unit II

Transportation model- Mathematical formulation of the Transportation problem-Initial Basic Feasible solution - Optimum solution for non degeneracy and degeneracy models - Unbalanced Transportation problems and Maximization case in Transportation problem The Assignment problem - Mathematical formulation of the problem – Hungarian method –Unbalanced Assignment problem-Maximization case in Assignment problem.

Unit III

Queuing theory: Introduction – Characteristics of queuing system –Single server finite and infinite capacity models. Game Theory: Two Person-Zero-Sum Game- Saddle Point- Value of Game- Dominating Strategy- Mixed Strategy.

Unit IV

Nonlinear Programming: Introduction – Formulating lagrangian function – Formulation of NLP – General Nonlinear Programming problem – Methods of NLP – Graphical solution methods – Quadratic Programming – General mathematical model – kuhn tucker conditions – applications of quadratic programming

Unit V

Separable Programming – separable functions – reduction to separable form – piece-wise linear approximation of nonlinear functions – mixed linear approximation of separable NLP. Geometric programming – general form of geometric programming – necessary condition for optimality – primal GP with equality conditions. Stochastic programming – sequential stochastic programming – Non-sequential stochastic programming

Note: Problems 60 Marks and Theory 40 Marks

Text Books:

1. Franks S.Buknick Mcleavey, Richard Mojena, “Principles of Operations Research for Management”, AITBS publishers, 2002. (Unit I – III)
2. J.K Sharma, “Operations Research- Theory and Applications”, MacMillan Publishers India Pvt Ltd, 2013. (Unit IV – V)

References:

1. Kanthi Swarup, P.K. Gupta, Man Mohan. "Operations Research", Sultan Chand & Sons, New Delhi, 2010.
2. Anand Sharma, "Operations Research", Himalaya Publishing House, 2004.
3. Dr.S.D.Sharma, "Operations Research", Kedar Nath Ram Nath & Co, 2002.
4. V.K.Kapoor, "Operation Research Techniques for Management", Sultan Chand & Sons, 2001.

Course objectives:

To make the students

- To understand the basic framework of research and research process and its important in business decision.
- To learn the research situations from the management perspective
- To develop an understanding of various research designs and sampling techniques and its application.
- To identify appropriate sources of information and methods of data collection for solving a business issue.
- To understand the selection of appropriate tools to analyse the quantitative and qualitative data.
- Disseminate the knowledge of research report and be familiar with the content to be included in the report.

Course outcomes (Cos):

Learners should be able to

1. Assess the best suitable research type and formulate the research objective for the business problem.
2. Identify and design a research process to solve the real time issues in the organizations
3. Formulate the suitable research designs and select appropriate sampling techniques for the research.
4. Practice the appropriate data collection method for solving the business issue and decide the appropriate measurement scale for designing the instrument for data collection.
5. Evaluate the appropriate analytical tools for the data collected and formulate a suitable suggestion for the business problem.
6. Demonstrate capabilities of designing a suitable research report based on the principles of research.

Unit I

Research Scope and Significance- Types of research- research process- Characteristics of good research-criteria for good research- objectivity in research - Problems encountered by Researchers in India.

Unit II

Research Design- meaning- classification- features – importance - selection of research problem - steps in research design - Sample design - meaning- concepts - steps in sampling - criteria for good sample design – sampling types.

Unit III

Data collection:- Types of data - sources - Tools for data collection methods of data collection - constructing questionnaire - Pilot study - case study - Data processing:- coding - editing - and tabulation of data - Measurement - meaning – need- Errors in measurement - scaling Techniques - meaning - Types of scales - scale construction techniques.

Unit IV

Data Analysis: Hypothesis – Meaning – Types - Test of Significance - Assumptions about parametric and non-parametric tests. Non-Parametric Test: One Sample Test - Sign Test, Chi-Square Test, ANOVA, Run test for randomness - Factor analysis.

Unit V

Interpretation- Meaning – Techniques - Charts and Diagrams - Report Writing- Significance, STEPS- Layout- Types Of Reports - Oral Presentation- Executive Summary - Precautions For Writing Report- Norms For Using Tables, Charts And Diagrams. APPENDIX: Norms for using index and bibliography- conventions relating to preparation of research reports.

Note: Problems 20 Marks and Theory 80 Marks

Text Books:

1. R.Paneerselvam, “Research Methodology”, Prentice Hall of India Pvt Ltd, 2007.
2. C.R.Kothari, “Research Methodology: Methods and Techniques”, New Age International Pvt Ltd, 2008.

References:

1. Dr. Deepak Chawala and Dr. Neena Sondhi, “Research Methodology concepts and cases”, Vikas Publishing House Pvt Ltd, 2011
2. Bill Taylor, “Research Methodology: A Guide for Researchers in Management and Social Sciences”, Prentice Hall of India pvt ltd, 2007.
3. William Zikmund, “Business Research Methods”, South Western Publishers, 2003.

Journals:

1. IUP Management Research
2. International Journal of Economic Research.
3. International Journal of Economics Research
4. Journal of Marketing Research
5. HRM Review

Course Objectives:

- The course has been introduced in order to make them use statistical package for their research
- Make the students to prepare data sheet and manipulate the data.
- Learn an organization's information systems and technology decision making processes.
- To gain in-depth knowledge on research situations from management perspectives
- To train them to access different statistical tools and interpret the results
- To gain data analytics skills to solve the business/Research problem.

Course Outcomes (Cos):

1. Effectively to apply the statistical package to analyze the research problem under study
2. Evaluate the usage of graphical presentation of data for dissemination of information to audience
3. To analyze the real time data by use of appropriate tools at any given situation in order to come with conclusion
4. Experts in handling data files and carry out basics statistical analysis
5. Get acquainted with advanced statistical tools and bring out appropriate solutions to business problems
6. Develop data analytics skills and meaningful interpretation to the data sets so as to solve the business/Research problem.

Unit I

SPSS – Meaning – scope- Limitation- Data view- Variable view- Data entry procedures

Unit II

Data editing- Missing-Recoding Using Transform - table scores- Frequencies Distribution – Diagram –Graphs.

Unit III

Descriptive statistics – Mean, Median, Mode Squeezes – kurtosis – Standard Deviation

Unit IV

T- Test for Independent sample and X test – ANOVA

Unit V

Correlation – Rank correlation – Regression – charts

Text Book:

1. Darren George, “SPSS for Windows step by step”, 7th Edition

Course Objectives:

- To assess the overall knowledge of the student in the relevant field of Management
- Realize the knowledge and skills required to excel in their career
- To test their learning and understanding of various concepts of the syllabus during the course of their programme
- To acquaint the students with fundamentals of communication and help them to transform their communication abilities
- To understand the frameworks and tools to effectively analyze and approach various Organizational situations.
- To prepare the students to face interview both in the academic and the industrial sector

Course Outcomes (Cos):

1. Students get equipped with skills and knowledge to excel in their future careers
2. To develop an in-depth knowledge on the management concepts, theories and principles
3. Develop an ability to analyse and interpret contents and concepts to provide meaningful information in making management decisions
4. Recognize the application of various techniques to achieve the objective of the task
5. Determine opportunities and emerging challenges in the upcoming business trends
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to various courses.

A Comprehensive Viva Voce will be conducted at the end of the Semester. The panel shall consist of an external expert and faculty members who handled the courses. The viva is aimed to evaluate the student's knowledge in all the core and elective courses in the particular semester.

Course Objectives:

- Help the Students in developing their communication skills, especially presentation before the group.
- Develop and improve discussion skills
- The students will be able to analyze any given issue and to present before an identified group.
- Identify and comprehend main ideas and supporting idea in detailed manner
- Manage timings on discussion
- Develop and present options based on selected materials

Course Outcomes (Cos) :

1. Manipulate the functions and operations related to management
2. Demonstrate capabilities of problem-solving, critical thinking, and communication skills.
3. Organize and participate in business meetings and presentations
4. Identify ways to make information more accessible to audience
5. Students will demonstrate the ability to construct a paper consistent with expectations of the discipline, including an appropriate style
6. Evaluate an enthusiastic and well-practiced method of presentation

In second Semester the seminar shall be on the topics related to Trade, Industry, Commerce, Corporate world and Corporate Affairs.

Course Objectives:

- To train the students on analytical aptitude and reasoning
- To provide enhanced recruitment and better training activities.
- To develop employability and enterprise skills, such as teamwork and communication.
- To develop positive attitudes in the pupils towards study and work.
- To provide students with impartial advice about options that is available to them
- To provide equal opportunity of access to careers inspiration and guidance.

Course Outcomes (Cos):

1. Practice the quantitative and reasoning ability to analyze the business issues
2. Demonstrate the critical thinking and problem-solving techniques
3. Disseminate the knowledge of data arrangement and presentation
4. Develop competent management professional skills
5. Develop proactive thinking so as to perform effectively in the dynamic socio-economic and business ecosystem.
6. Ability to communicate effectively.

Quantitative & Reasoning Ability: - Number Theory - Number series - Blood Relation - Averages - Ratios and Proportions - Venn diagram, Syllogism – Percentage- - Profit and Loss - Problems on Interests - Data Interpretation - Image Analysis - Time speed and Distance - Coding and De-coding - Problems on Trains and Boats - Problems on Ages - Data Arrangement - Time and Work - Pipes and Cisterns - Directions

15 OEP201L HUMAN RESOURCE MANAGEMENT (OPEN ELECTIVE)

Course Objectives:

- To make students aware on Human Resources and their scope in organization
- To provide knowledge on Job involved in HR, Training, Compensation and Labour welfare practices.
- To train the students in recruitment and selection process
- To disseminate the knowledge of labour welfare measures practiced in organizations
- To get insight the concept of collective bargaining and worker's participation in management
- To understand the current issues, trends, practices, and processes in HRM

Course Outcomes (Cos):

1. Helps in effective management of human resources and to plan key human resource functions within organization.
2. Enhanced recruitment skills and career development
3. Utilize the knowledge to gain the competitive advantage through people
4. Acquire the skill to conduct organizational Training and performance appraisal.
5. To develop human relations and facilitate collective bargaining
6. To examine the current issues, trends, practices, and processes in HRM

UNIT I

Human Resource Management - Definition - Objectives - Functions - Scope -Importance - HRM in India - Evolution of HRM - Quality of a good Human Resource Managers- Human Resource Planning - Job Analysis, Job description and Job Specification.

UNIT II

Recruitment and Selection - Sources of Recruitment - Selection Process – Test Types - Interview Types - Career Planning - VS Man Power Planning and succession Planning - Career Planning - Process - Career Development -Placement and Induction.

UNIT III

Training - Methods of Training - Executive Development – Performance Appraisal - Methods of Performance Appraisal - Transfers – Promotion

UNIT IV

Industrial Relations - Meaning & Characteristics Industrial Relations - Parties to Industrial relations - Nature of Trade Unions - Problems of Trade Union -Measures to Strengthen Trade Union Movement in India - Causes for Industrial Disputes - Settlement of Industrial Disputes.

UNIT V

Collective - Bargaining - Features - Pre-requisite of Collective Bargaining -Agreement at different levels - Workers Participation in Management-Objectives for Successful Participation.

Text Books

1. Human Resource Management - Dr. C.B. Gupta - Sultan and Sons.
2. Personnel & Human Resource Management - P. Subba Rao – Himalaya Publishing House.

References

1. Human Resource and Personnel Management - K. Aswathappa - Tata Mc Graw Hill Publishing Co. Ltd.
2. Personnel Management & Human Resources - C.S. Venkata Rathnam & B.K. Srivastava. TMPL.
3. Dynamics of Industrial Relations - Dr. C.B. Memoria, Dr. Satish Memoria &S.V. Gankar - Himalaya Publishing House.
4. Performance Appraisal, Theory and Practice - AIMA - Vikas Management Series, New Delhi - 1986.
5. Human Resource Management: Pattanayak, PHI - 2002

Course Objectives:

- To expose participants to various perspectives and concepts in the field of Strategic Management
- To get the knowledge on setting mission and vision for organization growth
- To help participants develop skills for analyzing business environment to the solution of business problems
- To carry out effective SWOT analysis and learn core competence of business
- To acquaint students with strategy formulation and implementation techniques
- To help students master the analytical tools of strategic management

Course Outcomes (Cos) :

1. Set the mission and vision in personal and organizational level
2. To analyze the environment in strategic planning and ability to take Strategic decisions
3. To be able to apply the basic concepts, principles and practices associated with strategy formulation and implementation.
4. To be able to analyze industry factors, and identify their impact on profitability and strategic positioning
5. To be able to assess the resources and constraints for strategy making in a business organization
6. Communicate effectively strategic evaluation and control techniques

Unit I

Corporate Strategy : Define strategy, levels at which strategy operates; – Mission – Vision of the firm – Development, maintenance and the role of Strategic leader – Strategy planning – Strategic planning process, Strategic management Practice in India. Competitive advantage of Nations and its implication on Indian Business

Unit II

Environment Analysis & Internal Analysis of Firm : General environment scanning, competitive & environment analysis – to identify opportunities & threat – Assessing internal environment through functional approach and value chain – identifying critical success factors – to identify the strength & weakness – SWOT audit – core competence – industry analysis.

Unit III

Strategy Formulation: Generic Strategies – Grand Strategies – Strategies of leading Indian companies – the role of diversification – limits – means and forms. Strategic management for small organizations, non-profit organizations and large multi product and multiple market organizations

UNIT IV

Strategy planning & Implementation: Competitive cost dynamics – experience curve – BCG approach – cash flow implication – IA-BS Matrix – A.D. Little Life cycle approach to strategic planning – Business portfolio balancing – Assessment of economic contribution of strategy – strategic funds programming

Unit V

Strategy Evaluation & Control: Various approach to implementation of strategy – Matching organization structure with strategy – 7S model – Strategic control process – Du Pont's control model and other Quantitative and Qualitative tools – Balanced score Card – M Porter's approach for Globalization – Future of Strategic Management.

Note: Emphasis will be given to case studies, article reviews and business practices by reading the business magazines and management journals

Text Book:

Azhar Kazmi, "Strategic Management and Business Policy", 3rd Edition, Tata Mc Graw Hill, New Delhi, 2010

References:

1. Bhattachary, S.K and N.Venkataramin, "Managing Business Enterprise: Strategies, Structure and systems", Vikas Publishing House 2006
2. V.S.P Rao, "Strategic Management – Text & Cases", Excel Books Publishers 2004
3. Francis Cherunilam,"Strategic Management", Himalaya Publishing House, 2010
4. Fred R. David, "Strategic Management: Concepts and Cases", 13th edition. Prentice Hall India 2009

5. Gerry Johnson, Kevan Scholes, Richard Whittington, “Exploring Corporate Strategy: Text & Cases”, 7th Edition, Prentice Hall India 2007
6. Budhiraja, s.B and M.B Athreya, “Cases in Strategic Management”, Tata Mc Graw Hill 2008

Journals:

1. Harvard Business Review
2. IUP Journal Of Business Strategy
3. “Vikalpa” – The Journal for Decision Makers
4. IIBM Management Review

Course Objectives:

- To provide theoretical foundations of entrepreneurship
- To acquaint students with the special challenges of starting new ventures and introducing new product and services ideas
- To train the students on entrepreneurial ethics and project management
- Knowledge on various sources of institutional finance
- Knowledge on setting up of small business and entrepreneurial performance
- To make understand the rural entrepreneurship and women entrepreneurship in all round industrialization

Course Outcomes (Cos):

1. To inculcate entrepreneurial skills
2. Categorize the promotional measures and forms of business for entrepreneurs
3. Design and development the project and undergo feasibility analysis
4. Evaluate the best sources of finance suitable for financing projects
5. Analyze the reasons of business sickness and develop self preventive techniques
6. Communicate effectively the promotion of women entrepreneurship

Unit I

Entrepreneur – Meaning - Nature – Importance – Characteristics and Types- Qualities- Entrepreneur Vs Intrapreneur - Role of Entrepreneurship in the Indian Economy – Entrepreneurial Environment – Entrepreneurship and economic development.

Unit II

Evolution of Entrepreneurs – Entrepreneurial promotion: Training and development of entrepreneurs - Entrepreneurial Motivation – mobility of Entrepreneurs – Entrepreneurial change – occupational mobility – factors in mobility – Role of consultancy organizations in promoting Entrepreneurs – Forms of business for Entrepreneurs.

Unit III

Entrepreneurial Careers, education and Training – Entrepreneurial Ethics. Project management: Sources of business idea – project classifications – identifications – formulation and design – feasibility analysis – Preparation of project report and presentation.

Unit IV

Project finance: Sources of finance – Institutional finance – Role of IFC, IDBI, ICICI, LIC, SFC, SIPCOT, and Commercial Bank – Appraisal for bank loans. Institutional aids for Entrepreneurship development – Role of DICS, SIDCO, NSICS, IRCI, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureau – Approaching institutions for assistance.

Unit V

Steps in setting SSI unit – Selection of location of enterprise- problems of Entrepreneurs – sickness in small scale industries – reasons and remedies – incentives and subsidies – Evaluating Entrepreneurial performance – Rural Entrepreneurship – Women Entrepreneurship – International Entrepreneurship - The future of Entrepreneurship.

Note: Emphasis will be given to case discussion and article reviews

Text Books:

1. Vasant Desai., “Dynamics of Entrepreneurship Sultan Chand and Sons” New Delhi, 2009.
2. N.P.Srinivasan and C.B.Gupta, “Entrepreneurial Development”, Tata Mc Graw Hill, New Delhi 2008

References:

1. Vasanth Desai, “Dynamics of Entrepreneurial Development and Management”, Himalaya Publications House, Mumbai, 2009
2. Srinivasan and G.P.Gupta. “Entrepreneurial Development”, Sultan Chand and Sons, New Delhi, 2006
3. P.Saravanelu. “Entrepreneurial Development”, Ess pee kay publications House, Madras.2007
4. S.S. Khanka, “Entrepreneurial Development”, PHI, India, New Delhi 2007
5. Bishwanath Ghosh, “Entrepreneurship Development in India”, National Publishing House, New Delhi 2009

Journals:

1. The Journal of Entrepreneurship
2. Business Today
3. Small Enterprise development, Management and Extension Journal
4. Business India- Articles about Entrepreneurs

Course Objectives:

- To make one to understand the global concepts used in financial management.
- To know the functions and its application in financial decision making.
- To get insights in the foreign exchange markets
- To gain knowledge on international financial decisions of various international financial institutions
- To get insights into the competencies required to become an effective financial manager
- To practice the students with the intricacies of international business in terms of investment with monetary systems.

Course Outcomes (Cos):

1. Identify the basis global trade and trade transaction mechanism
2. Analyze the foreign exchange rate and factors influencing fluctuations
3. Estimate the flow of Foreign Direct Investment and its impact on Indian economy
4. Ability to evaluate the functioning of international financial institutions
5. Assess the resources of Financing of foreign trade
6. To discover facts on foreign trade.

Unit I

International Trade – Meaning and Benefits –Basis of International Trade – Foreign Trade and Economic Growth – Balance of Trade –Balance of payment – Current Trends in India –Barriers to International Trade- World Trade Organisation, Trends in world trade, International trade finance.

Unit II

Foreign Exchange Markets- Market Participants – Types of Transactions - Spot Prices and Forward Prices – Factors influencing Exchange rates – Determination of Foreign Exchange rate and Forecasting – Foreign Exchange Exposure - Measurement and Management.

Unit III

International investment decisions – **Political risk** - Foreign Direct Investment – **Foreign Institutional Investors** – International capital budgeting – International portfolio investment.

Unit IV

International financial decisions – Multilateral Development Banks – World Bank – International Finance Corporation – International banking – International financial market instruments.

Unit V

Financing of foreign trade – Documentation- Mode of payment – Methods of trade financing – EXIM Bank, ECGC and its schemes - International taxation.

Note: Emphasis will be given to case discussion and article reviews

Text Books:

1. Vyuptakesh Sharan, “International Financial Management”, Prentice Hall of India Pvt Ltd., 2009.
2. Thummuluri siddaiah, “International Financial Management”, Pearson publication.

References:

1. V.Sharan , “International Financial Management”, 4th edition, Prentice hall of India 2009
2. Apte P.G, “International Financial Management”, Tata McGraw Hill 2008
3. Eun, “International Financial Management”, Tata McGraw Hill
4. Larceny & Bhattacharya, “International Marketing”, Sultan Chand & Sons, 2010

Journals / Additional Readings and other Materials:

1. <http://www.indianjournaloffinance.co.in/>
2. <http://fisher.osu.edu/fin/journal/jofsites.htm>
3. <http://www.afajof.org/>
4. <http://www.wiley.com/bw/journal.asp?ref=1367-0271>
5. <http://finance.mapsofworld.com/finance>
6. Reserve Bank of India Annual Report (2010-2011)
7. Readers self: International Business- B.V.H.Kameswara sastry

Course Objectives:

- To understand the concept of costing and cost reduction methods.
- To make students to learn to manage total cost and production costing.
- To provide knowledge on the process of various costing methods and management.
- To understand the concept involved costing related to business decisions.
- Provide insight in strategic cost management
- To learn the techniques of cost management that are effective and ethical

Course Outcomes (Cos) :

1. Illustrate the cost sheet and cost reduction methods to improve organizational productivity.
2. Estimate the total cost and production cost to source competitive advantage
3. Evaluate cost control systems and various costing methods and management
4. To analyze the cost function in mathematical methods.
5. Analyze productive results on cost management and reduction
6. Interpret knowledge in Market Based and Cost Based Transfer Prices and Multinational Transfer Pricing.

Unit I

Costing- Purpose- Utility, objectives-Elements of Cost- Cost Sheet –methods of costing – Problems - Cost reduction and productivity: Cost reduction value analysis- productivity- Value added concepts- Learning curves- quality circles.

Unit II

Total cost management- Managing process cost- Managing production costs- Managing delivery costs- Managing structural cost. Target costing - cost as a source of competitive advantage - Life cycle costing

Unit III

Activity based costing - Drawbacks of conventional costing- Methodology of ABC - Merits, demerits suitability of ABC - implementation of ABC. Management control systems - evaluating management control systems - responsibility centers- Evaluation of the performance of different responsibility centers- Problems.

Unit IV

Linear programming and regression analysis- Implications of Linear Programming for cost accountants - Guidelines for regression analysis- Applications of regression analysis in cost functions.

Unit V

Strategic control systems - Decentralization and Transfer pricing - Choices about responsibility centers-Market based and cost based transfer prices- Multinational transfer pricing.

Note: Emphasis will be given for case discussion and review of articles

Text Books:

1. Horngren, "Cost Accounting", AITBS Publications, 4th Edition, New Delhi, 2008
2. Vijay Govindraj, "Strategic Cost Management". 3rd Edition, Wishwa Prakasham. New Delhi, 2000
3. Jokhotiya G.P," Strategic Financial Management", Vikas Publication Ltd.

References:

- 1 Antony, "Management Accounting", 3rd Edition, Tata Mc Graw Hill, New Delhi, 2010.
- 2 J Batty, "Management Accounting", 1st Edition, Vikas Publishing House, New Delhi 2007.
- 3 Atkinson and Robert Haplan, "Advanced Management Accounting", Prentice Hall of India.
- 4 Ajit Prasad, "Strategic Financial Management", Vikas Publication Ltd, 2009.

Journals:

1. Journal of Accounting and Finance
2. IFCAI Accounting World
3. Indian Journal of Finance
4. IFCAI Applied Finance

Course Objectives:

- Understand the various ways of generating funds in to an organization and ways and means of investing surplus.
- To understand the regulation of merchant banking
- To know about mutual funds and the concept of factoring
- To learn the concepts of leasing and effective management of financial resources
- To provide knowledge on hire purchase and investment
- To understand the importance of various credit rating techniques

Course Outcomes (Cos):

Learners should be able to

1. To assess the regulation of merchant banking.
2. To estimate the benefits of mutual funds and the concept of factoring.
3. Classify the different factoring that helps in investment decision making
4. Develop skill to explore new avenues in business operations
5. Developing capabilities of evaluating leasing techniques
6. To manage hire purchase and investment.

Unit I

Nature and scope of merchant banking – Regulation of merchant banking – overview of current Indian merchant banking scenario – procedural aspects of primary issue – pre-issues decision making – post issue management.

Unit II

Mutual funds – operation – performance – SEBI guidance for mutual funds securitization – concept, securitization as a funding mechanism, securitization of residential real estate – mortgages & mortgage investments.

Unit III

Concept of factoring – forms of factoring Vs Bill discounting – Factoring Vs credit financing – factoring Vs forfeiting – Evaluation of a factor – legal aspects of factoring – Factoring services in India – Bill of exchange – Definition – Features.

Unit IV

Leasing – History & Development – Concept & classification – types – Advantages – Disadvantages- legislative framework – supplier, lessor, lessee relationship – sub lease – Default & remedies – lease evaluation in lessee's and lessor's point of view.

Unit V

Hire purchase – concept & Characteristics – rate of interest – legal aspects – tax implication frame work for financial evaluation – credit rating – concept – types – advantages & disadvantages – credit rating process – credit rating agencies.

Note: Emphasis will be given for case discussion and review of articles

Text Books:

1. M.Y. Khan, “Financial Services”, 4th Edition, McGraw Hill Prentice Hall, New Delhi, 2009.
2. G. Rameshbabu, “Indian Financial System”, Himalaya Publishing House, New Delhi, 2009.

References:

1. Shanmugam R, “Financial Services”, Wiley India Pvt Ltd, New Delhi, 2010
2. S.Gurusamy, “Merchant Banking and Financial Services”, Tata Mc Graw Hill Education Pvt Ltd., 3rd Edition, 2009.
3. Gordon E, “Financial Markets & Services”, Himalaya Publications.

Journals / Additional Readings:

1. Journal of Financial Services and Management
2. Indian Journal of Finance
3. IFCAI Applied Finance

Course Objectives:

- Provide a theoretical and practical basis for assessing services in a simple and understanding level.
- To understand the positioning and differentiation strategies and quality of services
- To make awareness and get insight in Pricing and distribution of service industry
- To get exposure to marketing of hospitality and financial services
- To clarify the marketing of Non-Profit Organizations
- To provide insights to the challenges and opportunities in services marketing

Course Outcomes (Cos):

Learners should be able to

1. Infer knowledge on services marketing to serve better in new services avenues
2. Create avenues for relationship marketing
3. Analyze several facets in the area of services marketing essential for the success of a service sector firm.
4. Understanding and determine segmentation of Services marketing
5. Acquire thorough knowledge in different services areas
6. Effectively provide knowledge to develop skills in financial services

Unit I

Services Marketing – meaning – features of services – Types and importance – Relationship marketing – mission, strategy, elements of design, marketing plan, service encounter, Globalization of services, moment of truth-interactive marketing.

Unit II

Marketing Mix decisions: Unique services – Pricing - Promoting and distributing services – segmenting - bases of segmentation -Positioning and differentiation strategies - Quality of service industries – customer support service

Unit III

Marketing of hospitality: Perspectives of Tourism, Hotel and Travel services – Airlines, Railway–Information Technology- Real estate services-courier services

Unit IV

Marketing of Financial services: Concept – features of Banking, Insurance, Lease, Mutual Fund, Factoring, Portfolio and financial intermediary services - Negotiation & parties involved in negotiation

Unit V

Marketing of Non-Profit Organizations: NGOs – Services Offered by Trust/Societies – Educational service – Miscellaneous services – Power and Telecommunication - Hospital services.

Note: Emphasis will be given for case discussion and review of articles

Text book:

1. Christopher, Lovelock. Jochen wirtz, “Services Marketing-People, Technology, Strategy” 7th edition, Pearson Education, New Delhi, 2009

References:

1. K.Rammohan rao, “ Service Marketing”, Pearson education, 2009
2. Roland & Anthony, “Service Marketing Text & Reading”. 2009
3. S.M Sha, “Service Marketing”, New Delhi: Himalaya Publishing House, 2010.

Journals:

1. Business & Marketing
2. Reader shelf International Business
3. Indian Journal of Marketing
4. Journal of Marketing

Course Objectives:

- To give a broad understanding of Sales Management and its implications.
- Help students understand the Sales & Distribution functions as integral part of marketing functions in a business firm
- To make understand the key terms and concepts in sales force management.
- To learn the role of advertising and media management in business.
- To provide information on Sales Promotion and Public Relations
- To sharpen decision making skills of future sales and distribution managers

Course Outcomes (Cos) :

Learners should be able to

1. Provide an understanding of the concepts, attitudes, techniques and approaches required for effective decision making in the areas of Sales and Distribution.
2. Analyze and pay special emphasizes on the problems and dilemmas in sales force management.
3. Identify distinguished Knowledge on advertisement management that helps to develop business.
4. Develop critical skills for generating, evaluating and selecting sales, advertisement media and distribution strategies.
5. Develop critical skills for generating, evaluating and selecting sales and distribution strategies.
6. Classify the Trade promotional tools and sales person promotional tools

Unit I

Nature and process of personal selling - Sales Management – Importance – Role of Sales Manager – Setting Sales Objectives – Sales Forecasting – Methods of Sales Forecasting-Sales Quotas & Territory – Sales budgeting – Types of Budgets – Budgeting Procedure

Unit II

Sales Force Management – Types of Sales Organizations - Sales Force Recruitment –Sources – Training – needs – designing a training programme – Motivating Sales Force – Sales incentives, contests and compensation – Evaluating Sales Performance.

Unit III

Advertising Management – Meaning – Objectives – Importance – Classification of Advertisement – Economic and Social Effects of Advertisement – Organization of advertising Department– Campaign Planning and Advertising Budget.

Unit IV

Advertising media management – Types – Print, TV, Outdoor and Other forms – Advantages, Limitations, Media Rates, Media Planning and Scheduling. Advertising Creativity – Advertising Copywriting for Print and Broadcast Media

Unit V

Sales Promotion and Public Relations – Sales Promotion - Objectives, Tools, Planning Implementation and Control. Public Relations – Objectives -Tools and importance.

Note: Emphasis will be given for case discussion and review of articles

Text Books:

1. S.L. Gupta, “Sales and Distribution Management”, Himalayas Publishing House, New Delhi, 2009
2. A. Chunawalla, Advertising, Sales & Promotion Management, Himalaya Publishing House, New Delhi, 2007

References:

1. Richard R Still, Edward Cundiff & Norman A P Gowani , “Sales Management”, Prentice Hall India Publishers, New Delhi 2009.
2. Rajeev Batra, John G. Myers, David A. Aaker, “Advertising Management”, Prentice Hall India Publishers, New Delhi, 2010
3. Richard R. Still, Edward W. Cundiff, Norman A.P. Govoni, “Sales Management: Decisions, Strategies And Cases” , Prentice hall of India, 2008

Journals:

1. Marketing Mastermind
2. Advertising Express
3. Indian Journal of Marketing
4. Marketing Management – AMA
5. Journal of Marketing Research

15 MBAPM303 C MARKETING RESEARCH & CONSUMER BEHAVIOR 4 0 0 4

Course Objectives:

- To give the students an understanding of marketing research from both user's (management) and doer's (the researchers) perspective.
- To design and produce, evaluate a research proposal & understand the quality of research studies.
- To acquaint with the factors influencing the consumer behavior and concepts to marketing decisions
- To provide the relevance of consumer behaviour models
- To learn the basic skills to conduct professional marketing research.
- To understand the applications of business research tools in Marketing decision making

Course Outcomes Cos) :

Learners should be able to

1. To be able to appreciate the different perspectives of marketing research from both user's and doer's perspective.
2. To be able to formulate research proposal and evaluate it.
3. To be able to conduct professional marketing research.
4. Apply business research tools in marketing decision making.
5. To generate new models of consumer behavior to To generate new models of consumer behavior
6. Evaluate the effectiveness of marketing programmes on consumption decisions

Unit I

Marketing Research and Scope of Marketing Research – Types & uses of marketing research- Marketing Research & decision making – Marketing Research Design – The Marketing Research process – Exploratory, descriptive and conclusive Research. Primary and Secondary methods of data collection – Construction of questionnaire

Unit II

Research Categories- Applications of Marketing Research – Product Research – Advertising Research – Market and Sales Analysis Research – Export Marketing Research - Motivation Research - Application of marketing research.

Unit III

Consumer Behaviour - Need to study Consumer Behavior – Applications of consumer behaviour principles to strategic marketing- Models of Consumer Behaviour – Market segmentation and Consumer Behaviour-Factors influencing Consumer Behaviour – social, economic, psychographic, group influences.

Unit IV

Consumer behaviour - Elements of consumer behaviour - Product perception – learning, attitude, personality - New product purchase, repeat purchase, consumer spatial behaviour – consumption analysis – product usage rates – expenditure pattern – Howard-Seth Model of Buyer behaviour – Organizational Behaviour of buyer.

Unit V

Consumer decision processes –Buying pattern -Problem recognition – search and evaluation – purchasing processes– post-purchase behaviour – Consumerism-impact of consumerism on marketing practices – Industrial and Domestic consumer characteristics.

Note: Emphasis will be given for case discussion and review of articles

Text book:

1. S.Sumathi, P.Saravanel, “Marketing Research & Consumer Behaviour”, Vikas publication house, 2003

References:

1. M.S. Raju & Dominique Xardel, “Consumer Behaviour Concepts, Application & Cases”, Vikas publishing house, 2009.
2. Arun Kumar & N. Meenakshi, “Marketing Management”, Vikas publishing house, 2006

Journals:

1. Marketing Mastermind
2. Business & marketing
3. Reader Shelf International Business
4. Indian journal of Marketing
5. Journal of Marketing

Course Objectives:

- Helps to recognize the dynamic relationship between strategy, people, technology, and the processes that drive organizations.
- To develop knowledge on analyzing individual and group behavior
- It helps students to understand the key HRD concepts and techniques that can be applied in everyday managerial decision-making.
- To make them understand the techniques of managing conflict and create better environment
- To gain insight in the HRD-OD approach to industrial relations
- To learn about cross cultural dimensions and its impact

Course Outcomes (Cos):

Learners should be able to

1. Recognize the dynamic relationship between strategy, people, technology, and the processes that drive organizations.
2. Acquire skills in analyzing individual behaviour and group behavior
3. Talent in managing conflict in personal and organizational level
4. Learn to evaluate work-life balance
5. Gain knowledge of culture which helps to integrate people
6. Analyze the cultural dimensions that helps to manage people in an individual, organization and society life

Unit I

Introduction to HRD – Meaning – Scope – Importance – Need for HRD – HRD and HRM – Role of HRD professionals – Key Performance Areas – Role Analysis Methods- Designing effective HRD programs- Framework of HRD process.

Unit II

Individual and Group Behavior – Acquisition of Human Resources – Development oriented appraisal system – Interpersonal Feedback and Performance Counseling – Giving and Receiving Feedback – Developing Dyadic Relationship through effective counseling.

Unit III

Performance Management - Succession planning - Quality of work life balance – Altruism - determinants - implications for organization co-operation – benefits – factors affecting co-operation-how to build collaboration - competition benefits- conflicts-types/levels-consequences-management conflict.

Unit IV

Organization effectiveness – concept – kaizen – benchmarking - Just-in time – downsizing – outsourcing - organizational change - change process - resistance to change - requisites for successful change.

Unit V

HRD Cross Cultural Dimensions - HRD Climate – HRD-OD Interface – HRD-OD Approach to Industrial Relations — HRD Experiences in India – Emerging Trends and Perspectives - HRD Scenario in Indian Organization - its problems and prospects - Challenges and Issues in HRD.

Note: Emphasis will be given to case discussion and article reviews

Text Books:

1. Rao V.S.P, “Human Resource Development”, Himalaya Publishing House, New Delhi
2. R. Krishnaveni, Human Resource Development, Excel Books , 2009
3. Lalitha Balakrishnan, Human Resource Development, Himalaya Publishing House 2010

References:

1. Udai Pareek, “Human Resource Development”, 3rd Edition, Oxford and Indian Book House. London, 2007.
2. Kandula, S.R, “Strategic Human Resource Development” Prentice Hall of India
3. John. P.Wilson, “Human Resource Development”, 2nd Edition, Kogan Page Publishers, 2005.
4. P.C. Tripathi, “Human Resource Development”, Sultan and sons, New Delhi

Journals/Additional Readings and other Materials:

- Harvard Business Review
- Human Resource Development Journal
- Human Resource Management Review
- Training and Development Journal

- Academy of Management Review
- Business Week
- HRD Times
- Management and labour studies
- The IUP Journal of Organization Behaviour

Course Objectives:

- The course creates self awareness through Transactional analysis for the personal growth of the students.
- Understanding communication and its effectiveness.
- Understand the effect of behaviour has on oneself, other people and on the organisation
- To understand ego states and transaction analysis
- To enhance assertiveness in individual life.
- To overcome barriers through effective counseling.

Course Outcomes (Cos) :

Learners should be able to

1. Improve self awareness and enhance self motivation
2. Develop communication and language which increases confidence in personal and public life
3. Enhance individual assertiveness
4. Focus on benefits of transactional analysis
5. Demonstrate meeting skills as interpersonal skills
6. Formulate the counselling techniques which when applied helps to overcome problems efficiently.

Unit I

Self-definition and perception, self-schemes, gaining self-knowledge, self-awareness, self-effectiveness, self-presentation motivation and strategies, self-monitoring, impression management-self esteem.

Unit II

Communication and language, models of - oral – qualities and profile of good speakers, written – clarity, responsibility, simplicity, style– barriers - ways of overcoming –paralanguage, eye contact, facial expression, Kinesics, body language, Deception.

Unit III

Assertiveness -Nature, importance & relevance to organizational life – Assertion and Aggression, assertive writing , preparing for assertive business writing – tools, tips, pitfalls, persuasion when to say Yes/No being assertive with oneself –cutting , rewriting editing and how to enhance individual assertiveness?

Unit IV

Ego states, exclusion, contamination strokes, life position, type of transaction, time structure – withdrawal, Rituals, pastimes, activities, games type, stamps, racket and sweat shirts, scripts, advantage and disadvantage of TA.

Unit V

Intervention - counseling -steps -Elements of counseling – counseling as a helping strategy and significant predicating people’s problem journey in a life space – anxiety and counseling to develop organizations, check list for counselors, training for counseling

Note: Emphasis will be given to case discussions and article reviews

Textbook:

Dr. Venkatapathy.R and Jackson.P.T.Aditya, “Managing Interpersonal Effectiveness”, Himalaya Publishing House, New Delhi 2009.

References:

1. Thomas Haris, “I’m Okay You’re okay”, Himalaya Publishing House, New Delhi, 2007
2. Fisher Uray, “Getting to say Yes”, Himalaya Publishing House, New Delhi, 2009
3. Robert Albert and Michael Emmonds, “Complete guide to Assertive Living”, Jaico Publishing house, New Delhi, 2009

Journals:

1. Alive
2. Readers Shelf
3. Asian Journal of Professional Ethics & Management

Course Objectives:

- To understand the purpose, process and applications of human resource planning in the context of different organizational strategies.
- To make the students be aware of the need and ways of changes in organization as a whole.
- To develop the concepts of OD interventions at group and organisational level.
- To know the impact of group dynamics and its impact on organizational productivity
- The course intends to gain a thorough understanding of the organization's ability to assess its current functioning. to achieve goals
- The students gain ability to implement tools of intervention for effectively bringing change.

Course Outcomes (Cos):

Learners should be able to

1. Application of various organizational theories in designing the structure
2. Analyze the role of innovation, decision making process in building organizational culture and ethics.
3. Handle the challenges in bringing Change in Organizational performance
4. Gain ability to implement tools of intervention for effectively bringing change
5. Have practical awareness about the current trends in organizational development in companies.
6. Analyze the prospects of OD in Indian Organisations

Unit I

Introduction to Organizational Development: Concepts, Nature and Scope, Meaning and definition – characteristics of O.D: Historical perspective of O.D: Underlying Assumptions, Beliefs and Values in OD - Foundations of OD – Models and theories.

Unit II

Group Dynamics, Inter group Dynamics and Organizations as Systems Organizational Climate – The process of OD – operational components of OD: Diagnostics, Action and process – Maintenance components.

Unit III

Introduction to OD Interventions: Classifications of OD interventions - Team Interventions: Inter-group and third party peacemaking Interventions: Personnel, Interpersonal and group process interventions: Comprehensive Interventions: Structural Interventions and applicability of OD.

Unit IV

OD strategies at work - Implementation and assessment of OD - Failure and success in O.D efforts - Assessment of O.D and Change in Organizational performance: The impact of OD.

Unit V

Some key considerations and Issues in O.D: Issues in consultant - Client relationship: Mechanistic & Organic systems and contingency approach: Power, politics and OD – research on OD - The future prospects of OD - Some Indian experience in OD.

Note: Emphasis will be given to case discussion and article reviews.

Text Book:

1. Wendell L. French, and Cecil H.Bell Jr, “Organisation Development”, Prentice Hall Of India, New Delhi, 2008

References

1. Raimann Pattanayak, “Training for Organisation Development”, Anmol Publishing House, 2009.
2. Beckhard and Richard, “Organisational Development: Strategies”, Prentice Hall India, New Delhi, 2007
3. Wendell L French and Cecil H.Bell Jr, “Organisation Development Behaviour Science Interventions for organization Improvement” Prentice Hall of India, New Delhi, 2008
4. Kavita Singh, “Organization Change and Development”, Excel Books, 2009

Course objectives:

- Students understand the business system concepts and role of systems analyst
- Understand the processes of constructing the different types of information systems
- Provides knowledge on system planning and investigation
- To make the students to know the use of systems design techniques, methodologies, and tools
- Make students proficient in systems specializations.
- To make the students understand the system implementation and security aspects of system

Course Outcomes (Cos):

1. Effectively perform the role of system analyst
2. Construct a model to carry out the feasibility study and cost benefit analysis
3. Comprehend knowledge on system design and system security to improve the productivity of system management.
4. Implement code of ethics in system management
5. Provide a solid foundation of systems principles and an understanding of how business function is carried on
6. Gain expertise in system testing and quality assurance

Unit I

Overview: Introduction - business Systems concepts, The system development life cycle – life cycle models - waterfall model, prototyping model, incremental model, spiral model, RAD model - Role of systems analyst.

Unit II

System Analysis: System planning and Initial Investigation - Information gathering - Tools of structured analysis - Feasibility study, Cost benefit analysis.

Unit III

System Design: The process and stages of system design - Major development activities - Input and output forms design - File organization and database design - Sequential - Logical and Physical views of data - Normalization.

Unit IV

System Implementation: System testing and quality assurance -The nature of test data - The test plan-Quality Assurance - Role of the data processing auditor - Implementation and software maintenance hardware/software selection, Project Scheduling and Software.

Unit V

System Security: Introduction, definition and Threats to system, security, control measures.

Disaster/recovery planning: the plan, Ethics in system development, ethic codes and standards of behavior.

Note: Emphasis will be given to case discussion and article reviews.

Text book:

1. Elias M.Awad, "System analysis and design", 2nd Edition, Galgotia publication, New Delhi, 2010

References:

1. Jr Jain. V.K., "System Analysis and Design", 1st edition. Dream Tech Press, New Delhi 2009.
2. Senn, "Analysis and Design of Information System", Mc Graw Hill 2009.
3. Alli Baharami, "Object Oriented Systems Development", 1st edition. McGraw Hill 2010.

Course Objectives:

- Disseminate knowledge to students on recent trends and developments in technology which covers e-Commerce e-Security, e-Logistics and knowledge management aspects.
- Learn about the physical components needed for information system in Nanotechnology.
- To acquaint with network security systems.
- To provide a clear understanding of e-learning models on e-logistics and supply chain management.
- To give better understanding of knowledge management
- To provide clear view on GIS Standards & Standardization process of GIS development

Course Outcomes (Cos) :

1. Familiarity with e-commerce simplifies the workload in personal and organizational system.
2. Develop skills on e-security which improves the efficiency in work.
3. Helps to develop network security in relevant areas
4. Design a e-learning models that provides a clear understanding on e-logistics and supply chain management.
5. Illustrate how current technologies and decision-support tools can be utilized to the advantage of business operations
6. Communicate effectively knowledge management techniques

Unit I

Overview of an E-Commerce, Internet, Intranet, Extranet, Goals of E-Commerce – Difference between E-Commerce and E-Business- Models of E-Commerce- Limitations and Advantages of E-commerce, Banking-Transactions: Inter-Banking, Intra Banking, Electronic Payments, (Payment-Gateway Example)- Securities in E-Banking-SSL, Digital Signatures, Service Provided- ATM Smart card, ECS- Electronic Clearing System- Telephone, Electricity Bills.

Unit II

E-Security- Firewalls, Electronic Market, E-shop, Introduction to Security, Types of Securities, security tools, Network Security. CRM: Sales, Marketing and Service Management, BPO/BCP- Needs-Guidelines-Merits & Demerits, Call Center-Functioning, Ethics, Disaster Recovery Management, Case Study.

Unit III

Content Management and Disseminations: E-learning-Models WBT, CBT, Virtual Campus, LMS & LCMS, Video conferencing, Chatting, Bulletin, Building Online community, Asynchronous and Synchronous Learning, Case Study.

Unit IV

E-Logistics- Logistics and Supplier Chain Management, Warehousing management, Transportation/Distribution Management. E-Governance models- G2B, G2C, C2G, G2G- Challenges to E-Governance, Strategies and tactics for implementation of E-Governance- Case Study.

Unit V

Knowledge Management-Components- Types –models-Knowledge Management Cycle- tools- approaches. GIS/GPS-Nature of geographic data, Spatial objects & data models, Getting map on computers, GIS Standards & Standardization process of GIS development, Implementation and deployment Phases.

Note: Emphasis will be given to case discussion and article reviews.

Text Book:

1. **Gerard** H. Gaynor, “Handbook of Technology Management”, Tata Mcgraw Hill 2009.

References

1. E-Governance: Case Studies-Ashok Agarwal , Hyderabad, India Universities Press 2008.
2. Management Information System-Jawadekar, Mc Graw Hill Education Books In India.
3. The Essential Guide to Knowledge Management - Amrit Tiwana , Prentice Hall

Course Objectives:

- To make students understand the the impact of the implementation of new software, hardware, and networking technologies
- Provides knowledge on process models that can be utilized to the advantage of business operations
- To understand the process of software design and components
- To know about the life cycle process of the software testing and methods
- To know about the concept of quality in software development.
- To exhibit knowledge software configuration and management

Course Outcomes Cos) :

1. Design models to manage the data resources of organizations.
2. Expertise on software design creates career opportunities
3. Hands-on implementation of a data base in corporate environment
4. Gain knowledge in software design
5. Helps to bring new techniques in Software testing
6. Expertise in Software Configuration and Management

Unit I

Fundamentals -A Generic View of Process – Process Models – The Waterfall Model – Incremental Model –Evolutionary Model – Specialized Model – The Unified Process – Agile Process – Agile Models – Software Cost Estimation – Planning – Risk Analysis – Software Project Scheduling.

Unit II

Requirement Analysis -System Engineering Hierarchy – System Modeling – Requirements Engineering: Tasks – Initiating the Process – Eliciting Requirements – Developing Use Cases – Negotiating Requirements – Validating Requirements – Building the Analysis Models

Unit III

Software Design- Design Concepts – Design Models – Pattern Based Design – Architectural Design – Component Level Design – Component – Class Based and Conventional Components Design – User Interface – Analysis and Design.

Unit IV

Software Testing – Strategies: Conventional – Object Oriented – Validation Testing – Criteria – Alpha – Beta Testing – System Testing – Recovery – Security – Stress – Performance – Testing Tactics – Testing Fundamentals – Black Box Testing – While Box Testing – Basis Path – Control Structure.

Unit V

SCM And Quality Assurance-Software Configuration and Management – Features – SCM Process – Software Quality Concepts – Quality Assurance – Software Review – Technical Reviews – Formal Approach To Software Quality Assurance – Reliability – Quality Standards – Software Quality Assurance Plan.

Note: Emphasis will be given to case discussion and article reviews.

Text Book:

1. Roger Pressman. S, “Software Engineering: A Practitioner's Approach”, Sixth Edition, Tata Mc graw Hill 2007

References:

1. Fleegeer. P, “Software Engineering”, Prentice Hall of India, 2009
2. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli, “Fundamentals of Software Engineering”, Prentice Hall of India, 2010.
3. Sommerville, “Software Engineering”, Seventh Edition, Addison Wesley, 2011

Course Objectives:

- To make the students understand the ways and means of finance for entrepreneurs.
- To get familiar with various sources of funds available for capital formation.
- To highlight the importance of various decision making areas of financial management
- Students get acquainted with the short term sources and cash management
- Knowledge on venture capital, hire purchase and leasing
- To train the students in project plan preparation.

Course Outcomes (Cos):

1. Estimate planning and capital expenditures related to project.
2. Developing the skills required to be a successful entrepreneur.
3. Evaluate the ways and means of raising funds to the business including forms of financing.
4. Develop competency in venture capital, hire purchase and leasing
5. To maintain ethical standards in individual and business life
6. The student will be able to apprehend different level of facilities available to run the business

Unit I

Project planning & Project Appraisal: Concepts - Capital Expenditures - Importance and difficulties - Phases of Capital budgeting - Levels of Capital budgeting - Estimation of Project Cash flows -Expenditures - Time value of money. Payback period - NPV of inflows - IRR concepts -Cost of acquiring capital - Planning of portfolio. Risk Analysis - Economic Risk - Industry Risk - Company Risk - Financial Risk.

Unit II

Sources of Finance: Various sources of Finance available: Long term sources -Equity Shares, Preference Shares and debentures- Kinds Private Placements- IPO-SEBI- FDI- Institutional Finance - Banks - IDBI, IFCI, IIBI, ICICI, SIDBI, SFC's in India - Merchant Banks in India - NBFC's in India - their way of financing in India for small and medium business.

Unit III

Short Term Sources: banks and financial Institutions that give short term finance - Bills Discounting - Factoring - Working Capital - Concepts - Importance -Cash Management - Inventory Management - Receivables Management - Sources of Working Capital.

Unit IV

Venture Capital, Hire Purchase And Leasing: Venture capital - meaning - origin - importance - Venture capital in India - Benefits. Hire Purchase - Concept - Evaluation of Hire Purchase Proposals - Leasing - Overview -Tax aspects - Lease Accounting - Evaluation of Leasing Proposals.

Unit V

Preparing the Financing Plan: General considerations - Construction Financing- Long term financing - Withholding Tax Considerations - Estimating the Borrowing capacity of a project- Loan repayment. Parameters - Borrowing Capacity, assuming full Draw down Immediately prior to project Completion & Periodic Loan Draw downs - applications to Hypothetical High Speed rail Project- Annual Coverage Tests.

Text book:

1. Indian Financial Systems - M. Y. Khan. (Tata McGraw - Hill Publishing Corporation Limited, New Delhi).

References:

1. Projects - Planning, Analysis, Selection, Implementation and Review - Prasanna Chandra. (Tata McGraw - Hill Publishing Corporation Limited, New Delhi).
2. Financial Markets - Gordon & Natarajan. (BPB Publications).
3. Investment Management - V. K. Bhalla. (S. Chand & Company Publishers Ltd.,)
4. Project Financing- Asset based Financial Engineering - John D Finnerty - John Wiley & Sons Inc, New York

Course Objectives:

- Developing the entrepreneurial skill and promoting the qualities, traits, of entrepreneur and is taught in this course.
- To make them understand the value of entrepreneurial promotions and economic development.
- To provide an overview of the competences needed to become an entrepreneur
- To make them know the available international entrepreneurship opportunities
- Provides knowledge on steps for starting a small industry
- Gain understanding on the role of government in promoting entrepreneurship

Course Outcomes (Cos):

1. Students will gain awareness of entrepreneurial skills
2. Knowledge to setup new ventures and make profitable business
3. Capital Budget planning and carry out feasibility study
4. Generating innovative ideas and find ways to apply these ideas to solve issues and problems in different industries and settings.
5. Knowledge to appraise the environment and start new ventures
6. Analyze the role of government in business

Unit I

Entrepreneur - meaning- importance-Qualities, nature, types, traits, culture, similarities and economic and differences between Entrepreneur and Intrapreneur. Entrepreneurship development-its importance- Role of Entrepreneurship -Entrepreneurial environment.

Unit II

Evolution of Entrepreneurs - Entrepreneurial promotion. Training and development - motivation: factors - mobility of Entrepreneurs - Entrepreneurial change - occupational mobility-factors in mobility - Role of consultancy organizations in promoting Entrepreneurs - Forms of business for Entrepreneurs.

Unit III

Creating and starting the venture - Steps for starting a small industry - selection of types of organization - International entrepreneurship opportunities.

Unit IV

Managing, growing and ending the new venture - Preparing for the new venture launch - early management decisions - Managing early growth of the new venture - new venture expansion strategies and issues - Going public - ending the venture.

Unit V

Entrepreneurship Development and Government: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available. Women Entrepreneurs - Reasons for low / no women Entrepreneurs their Role, Problems and Prospects

Text book:

1. Vasanth Desai "Dynamics of Entrepreneurial Development and Management Himalaya Publishing House

References:

1. N.P.Srinivasan & G.P.Gupta, "Entrepreneurial Development", Sultanchand & Sons.
2. P.Saravanelu "Entrepreneurship Development", Eskapee Publications.
3. Satish Taneja, "Entrepreneur Development", New Venture Creation.
4. Robert D.Hisrich, Michael P.Peters, "Entrepreneurship Development", Tata McGraw Hill edition.

Course Objectives

- To make students understand all aspects of Project Management covering project identification formulation, planning, scheduling & control.
- Enable students to acquire concepts, tools & techniques of project management.
- To sensitize the students to complexities of project management.
- To enhance the students of project financing and development banks
- To know the implementation of project and preparation of project report
- To evaluate the project performance and evaluation of costs.

Course Outcomes (Cos):

1. Inculcate in the students the expertise required for formulating project ideas and projecting cash flows as well as evaluation of project proposals.
2. To analyze project feasibility
3. To know the difficulties in project implementation and provide solutions
4. Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
5. Helps students to develop project models
6. Initiate students to carry out social and government projects

Unit I

Project management – Concept of a Project – Categories of Project - Project life cycle- Definition of project management - The project as a conversion Process - project environment - complexity of projects - the relationship between project Management and line management - current issues in project management- system approach to project management - Roles and responsibilities of project manager.

Unit II

Project planning - project planning as a value adding activity - process of project planning - managing the planning process - communicating project plans - dealing with increased complexity through net work diagrams - Analyzing the network- Critical Path Analysis - Activity on Nodes diagramming- Dealing with the uncertainty Programme Evaluation and Review Technique- Computerized Project Management - planning with standards.

Unit III

Project financing and development banks - Development banking and western world - debt Equity ratio - Equity and Preference Share Capital - Internal Generation of Funds - Leasing Financing - Public sector bonds - Debentures- Assistance from International financial - Short Term funds for Working capital- All India Development Corporation- Specialized Institution - Investment Institution - means of financing - project financing package - procuring funds.

Unit IV

Project implementation - stages - Bottlenecks in project implementation - Guidelines for effective implementation - Management techniques for project management - project monitoring - essentials - roles - tools and techniques - Project management performance indicators performance improvement - project management environment - management reporting - report designing - project evaluation - project review.

Unit V Project feasibility study - Market Feasibility - Technical Feasibility - Financial Feasibility - Economic Feasibility - Critical Success factors- Demand forecasting techniques.

Text Book:

1. Project Planning, Analysis, Selection, implementation and Review – Prasanna Chandra - Tata McGraw Hill Publishing Company Ltd

References:

1. Project Management - Harvey Maylor - Macmillan India Ltd.
2. Project Management - S. Choudhury - Tata McGraw Hill publishing
3. Project Management Principles & Techniques - B.B. Goel- Deep & Deep publications Pvt Ltd.
4. Project Management A systems Approach to Planning Scheduling and Controlling- Harold Kerzner, CBs Publishers & Distributors, New Delhi.

15MBAPB303A FUNDAMENTALS OF COMMERCIAL BANK MANAGEMENT 4004

Course objectives:

- To understand the history and growth of banks and process of financial intermediation
- To understand the basic concepts of advances, deposits and Negotiable Instruments Act.
- To make the students understand the nuances of modern banking.
- To know the principles for lending services and other agency services of financial institutions
- To know the procedure for Opening of bank accounts, Types of deposit account: Savings account, Current account
- To provide the knowledge of e-banking and its impact of business operations

Course outcomes (Cos):

1. Analyze the banking services offered and recommendations of committees on banking process.
2. Categorize various Negotiable Instruments, Duties of paying and collecting banker
3. Create bank account and evaluate the bank rate for securities
4. Demonstrate knowledge of the liabilities of paying and collecting banks - bills of exchange and promissory notes.
5. To assess various services provided by the banks
6. Gain knowledge in e-banking ,m-banking and Cheque Transaction System

Unit I

Introduction to Banking: Role of banks, Brief History of banking in India, Structure of banking sector in India, Rationale of Banking Sector reforms, Basle Committee recommendations, Banker Customer relationship, RBI Act (Salient Features), Latest recommendations of Basel Committee.

Unit II

Negotiable Instruments – Cheques - Meaning, Characteristics, Crossing, Endorsement, Duties of paying banker, Duties of collecting banker, bouncing of cheques. Liabilities of paying and collecting banks

Unit III

Deposits - Opening of bank accounts, Types of deposit accounts: Savings account, Current account, fixed deposit, Recurring deposit, Certificate of deposit, KYC Norms. Monthly income plan.

Unit IV

Advances - Principles of Sound Lending, Methods of granting advances, Types of securities, Modes of creating charges, Bank guarantees, Interest rates: Base rate, Fixed vs. floating rates, Registration of charges with ROC. RBI norms on bank charges

Unit V

Other Services - ATM, EFT, e-banking, m-banking, Cheque Transaction System, Ancillary businesses: DD, Safe deposit lockers, Credit cards, Debit cards, Smart cards, NEFT/RTGS, Call center.

Text Book:

1. Dr. S. Gurusamy, *Banking Theory Law and Practice*, Uttar Pradesh: Tata McGraw Hill, 2009.

References:

1. Benton E. Gup and James W. Kolari, *Commercial Banking: The Management of Risks*, New Delhi: Wiley India, 2005.
2. Justin Paul and Padmalatha Suresh, *Management of Banking and Financial Services*, New Delhi: Pearson Education, 2010.
3. Dr. B.P. Narasa Reddy and Prof. Himachalam Dasaraju, *Dynamics of Commercial Banks in India*, Florida: Associated Publishers, 2011.
4. Timothy W. Koch and S. Scott Macdonald, *Bank Management*, Bangalore: Thomson South-Western, 2009.

Course objectives:

- To know the banker customer relationship and KYC norms
- To understand the basics of low cost, no cost and high cost deposits.
- To study on importance of nomination and the rules governing non-resident accounts.
- To understand the various types of term deposits
- To understand use of decision tools for effective resources mobilization and management
- To study the Nomination facilities, Deceased accounts, Inoperative accounts, Accounts of non-residents

Course outcomes (Cos) :

1. Create bank deposits and aware of banking relationship
2. Infer knowledge of saving deposits and its process
3. Demonstrate the creation of current account and its process
4. The knowledge of Payment of interest and Service charges, Issue of cheque books, closing of accounts
5. Knowledge of opening accounts and building customer relationship
6. Illustrate the different types of deposits and nomination facilities available

Unit I

Opening of deposit accounts - Relationship with customers, Opening of accounts: Individuals, Illiterate persons, Minors, Blind persons, Firms, Associations and Limited Companies. HUF

Unit II

Savings deposits - Introduction, Savings Bank account rules, Passbooks/Statement of accounts, Payment of cheques, Collection of cheques, Payment of interest and Service charges, Issue of cheque books, closing of accounts.

Unit III

Current Deposits - Introduction, Current account rules, Procedure of return of unpaid cheques, Minimum balance, Service charges, Statement of current accounts, closing of accounts.

Unit IV

Term deposits - Introduction, various types of term deposits: Fixed deposit, Monthly income plan, Recurring deposit, Payment of deposit: On due date, Pre-payment, Renewal of deposits, Advances against bank's own deposit - Base rate

Unit - V

Other Aspects - Nomination facilities, Deceased accounts, Inoperative accounts, Accounts of non-residents: NRE, NRO and FCNR accounts. DICGCI (Deposit Insurance alone). NRI

Text Book:

1. D. Muraleedharan, *Modern Banking: Theory and Practice*, New Delhi: Prentice Hall of India, 2009.

References:

1. Jyotsna Sethi and Nishwan Bhatia, *Elements of Banking and Insurance*, New Delhi: Prentice Hall of India, 2013.
2. Peter S. Rose and Sylvia C. Hudgins, *Bank Management & Financial Services*, New Delhi: Tata McGraw-Hill, 2012.
3. Reserve Bank of India, *Non – Resident Accounts*, Mumbai: Foreign Exchange Dealers' Association of India, 2000.
4. Reserve Bank of India, *Non – Residents Accounts*, Mumbai: Foreign Exchange Dealers' Association of India, 1992.

Course objectives:

- Understand the purpose of lending and the elements of income for banks.
- Understand the types of credit facilities and the procedure for granting various types of advances
- Understand the different types of securities and the methods of creating charges.
- To know the Agricultural Lending, Direct and Indirect Finance, and financing of Micro and Small enterprises
- To disseminate the knowledge of various financial bills
- To provide clear understanding of various credit available to customers and calculation of EMI

Course outcomes (Cos):

1. Create bank deposits and aware of banking relationship
2. Infer knowledge of saving deposits and its process
3. Demonstrate the creation of current account and its process
4. The knowledge of Payment of interest and Service charges, Issue of cheque books, closing of accounts
5. Knowledge of opening accounts and building customer relationship
6. Illustrate the different types of deposits and nomination facilities available

Unit I

Introduction to Advances - Lending, Profit maximization: Spread, Burden, Net Interest Income, Net Interest Margin, Net Interest expenses, Non Interest Expenses, Non-Interest income. Cost minimization

Unit II

Credit facilities and Securities - Principles of Sound lending, Methods of granting advances, Types of Securities, Modes of creating charges, Floating charge, Consortium lending, credit syndication. Pledge of shares

Unit – III

Priority Sector advances - Rationale of Priority Sector advances, Targets and sub targets under priority sector advances, Agricultural Lending: Direct and Indirect Finance, Micro and Small enterprises, weaker sections. SIDBI

Unit – IV

Bills Business - Introduction to Bills, Bills Purchased (clean bills), Bills purchased (Demand documentary bills), Bills discounting (Usance Bills). Foreign bills

Unit - V

Retail Lending - Home loans, Educational loans, Credit Cards, Consumer loans, other personal loans, Calculation of EMI: Effect of quantum of advance, repayment period and Interest rates on EMI. Impact of fixed and floating rates

Text Book:

1.M.P. Narayanan and Vikram K. Nanda, *Finance for Strategic Decision Making: What Non-Financial Managers Need to Know*, New Delhi: Wiley, 2013.

References:

- 1.Master Circular on Lending to Priority Sector, www.rbi.org.in
- 2.Prasanna Chandra, *Finance Sense: An Easy Guide for Non- Finance Executives*, New Delhi: Tata McGraw – Hill, 2000.
- 3.Stewart C. Myers and Richard A. Brealey, *Brealey Myers: Principles of Corporate Finance*, New Delhi: Tata McGraw-Hill, 2011.
- 4.James C. Van Horne and John M. Wachowicz, JR., *Fundamentals of Financial Management*, New Delhi: PHI, Thirteenth Edition, 2013.

Course Objectives:

- To have an exposure in retailing concept and consumer behavior in retail.
- To understand the retail marketing models and theories.
- To evaluate, plan and choose channels of retail distribution strategies.
- To get an insight in Foreign Direct Investment in retail sector
- To know the various retail models being applied in the market
- To know concepts of global retail and factors affecting the success of global retailing strategy.

Course Outcomes (Cos)

1. Apply marketing concepts in retailing and setting trends
2. Demonstrate retailing and its various concepts.
3. Construct business models in retail
4. Create strategies and tools for effective retailing
5. Evaluate marketing tools and techniques to interact with the customers.
6. To analyze the consumers decision making process and threats in global retailing.

Unit I

Retail: Meaning – Functions and special characteristics of a Retailer – Reasons for studying Retailing – Marketing-Retailer Equation – Marketing concepts applied to retailing – Retailing as a career – Trends in Retailing.

Unit II

Retail Model and Theories of Retail Development – Life cycle and phase in growth of retail markets – Business models in retail – other Retail models.

Unit III

Strategic Planning in Retailing: Situation Analysis – Objectives – Need for identifying consumer needs – Overall strategy, feedback and control – consumer decision-making process.

Unit IV

Retail in India: Evolution and Size of retail in India – Drivers of retail change in India – Foreign Direct Investment in retail – Challenges to retail developments in India.

Unit V

Global retail markets: Strategic planning process for global retailing – Challenges facing global retailers – Challenges and Threats in global retailing – Factors affecting the success of global retailing strategy.

Text Book:

1. Swapna Pradhan – Retailing Management – Text and Cases, Tata McGraw Hill – 2nd edition, 2004

References:

1. Barry Berman and Joel R Evans – Retailing Management – A Strategic Approach, Prentice Hall of India, 8th Edition, 2002.
2. James R. Ogden, Denise Ogden – Integrated, Retail Management – Biztantra 2005
3. Gibson G Vedamani – Retail Management – Functional Principles and Practice, Jaico Publishing House, Second edition, 2004.

Course Objectives:

- To understand the store layout plan and inventory management in retailing
- To have an exposure in retailing concept and consumer behavior in retail.
- To acquire knowledge on store layout and effective retail space management
- To understand the store security, insurance and credit management
- To evaluate, plan and choose channels of retail distribution strategies.
- To get an insight in Space Mix and Effective Retail Space Management

Course Outcomes (Cos):

1. Analyze the factors influencing store location and locate stores.
2. Evaluating a Retail Operation, Store Operating Parameters and its various concepts.
3. Eliminate the difficulties in operating a retail business.
4. Applying the Strategic Resource Model in Retailing
5. To understand the Floor Space Management and Retail Method of Inventory Valuation.
6. Estimate the Return on Inventory Investments and Stock Turnover

Unit I

Choosing a Store Location: Importance of location to a retailer – Trading Area Analysis
Regional Analysis – Characteristics of the trading areas

Unit II

Site selection: Actual site analysis and selection – Choice of a general location – characteristics of the available site – Retail store layout – the circulation plan – space mix and effective retail space management – Floor space management

Unit III

Operations Management: Operating a retail business – operations Blueprint – store maintenance, Energy management and renovations – Inventory management – store security – Insurance – Credit management – Computerization – Outsourcing – Crisis Management

Unit IV

Evaluating a retail operation: Store operating parameters – Using the strategic resource model in retailing – designing a performance programme

Unit V

Retail Inventory: Inventory Planning – Return on inventory investments and stock turnover – Inventory Management – Physical and perpetual inventory systems – retail method of inventory valuation

Text Book:

1. James R Ogden and Denise T Ogden – Integrated Retail Management, Biztantra, 2005

References:

1. Barry Berman and Joel R Evans – Retail Management – A strategic Approach, Prentice Hall of India, Tenth edition, 2006
2. Gibson G Vedamani – Retail Management – Functional Principles and Practice, Jaico Publishing House, Second edition. 2004
3. Swapna Pradhan – Retailing Management : Text and Cases – Tata McGraw Hill Publishing Company Ltd., 2004

Course Objectives:

- To understand the basic concepts of merchandising, strategies and forecasting.
- To have an exposure on factors affecting merchandising function and functions of Merchandise Manager.
- To understand the Merchandise Buying and Promotional measures.
- To evaluate the sources, Branding Strategies, Category Management and the Components of category management strategies.
- To know the marketing tools used to gain customers in business
- To get an insight Visual Merchandising, Display Planning and Characteristics of effective display trends.

Course Outcomes (Cos) :

1. Demonstrate knowledge in merchandising and its various concepts and how it is done in global level.
2. To evaluate the factors of merchandising and formulate appropriate strategies
3. To formulate merchandise budgets to minimize costs
4. Analyze the ways that merchandising is used in marketing tools and techniques to interact with their customers.
5. To estimate pricing and analyze merchandise performance
6. Innovate visual merchandising to increase the sales volume

Unit I

Merchandising – meaning – concept – factors affecting merchandising function – merchandise manager-functions – merchandise hierarchy – merchandise mix – components of merchandise management – merchandise strategies

Unit II

Merchandise planning - steps involved – merchandise control – the open to buy – assortment planning – steps involved – merchandising stages- merchandise budgets and forecasting

Unit III

Merchandise buying – types of buying – sources of supply-identifying and contracting - evaluating sources – branding strategies – category management – components of category management – category management and business process – role of category captain.

Unit IV

Merchandise performance – retail pricing – elements – merchandise allocation – analyzing merchandise performance – methods – integrating dollar and unit concept – gross margin return on investment – mark ups and downs – shrinkage in retail management

Unit V

Visual merchandising – types of display – display planning – characteristics of effective display – selling power of display – methods of display – window display and interior display – space management – planning layout.

Text Book:

1. Chetan Bajaj And Ranjith – Retail Management – Oxford University Press, second edition 2005

References:

1. Gillespie. Hecht and Lebowitz – Retail Business Management, McGraw Hill Book company, Third edition 2002
2. Gibson G. Vedamani – Retail Management: Functional Principles and Practices, Jaico Publishing House, Second Edition 2004
3. James R. Ogden. Denise T. Ogden – Integrated Retail Management, Wiley Pvt Ltd, 2005

Course Objectives:

- To have an exposure in international marketing management concept
- To understand the international marketing management and market segmentation.
- To know the process of promoting the product in the international market
- Acquire knowledge on pricing strategies and factors influencing pricing
- To provide better understanding on international distribution systems and strategy related to distribution channel
- To learn about marketing communication and promotion programmes

Course Outcomes (Cos):

1. Ability to analyze the scope of international marketing and International marketing management process
2. Demonstrate the International Market Segmentation and Positioning
3. Ability to determine product policies and pricing strategies and environment factors affecting international prices
4. Focuses on risk involved in multinational product planning and market communications.
5. Ability to understand structure of international distribution systems and Distribution channel strategy
6. Demonstrate capabilities in international marketing communication and promotion programme

Unit I

Introduction, Importance and Challenges – Nature, Importance and scope of International Marketing, Domestic marketing vs. International marketing, International marketing management process – an overview, influence of physical, economic, socio-cultural, political and legal environments on International marketing information, scanning and monitoring global marketing environment; international marketing information system.

Unit II

International market segmentation, positioning, Analysis of world market, market analysis, international marketing research, screening and selection of markets, International market entry Export, Licensing , Franchise, Joint Venture, Multinational operations, contract manufacturing

Unit III

International Product Policies – Major product decisions – product features and quality, product design, labeling, packaging, branding and product support services; strategies in multinational product planning, international product life cycle, New product development, International Trade

Unit IV

International Pricing Decisions – international Price determination, price escalation, international pricing process and policies, delivery terms and currency for export price quotations, international transfer pricing, methods of determining transfer pricing, Differential Pricing

Unit V

International marketing communication – communication with foreign buyers, planning and preparing, international promotion programme, Media structure, planning media strategy, corporate advertising.

Text Book:

1.Nargundkar- International Marketing (Excel Books)

References:

- 1) Czinkota - International Marketing (Thompson, 8th Ed.)
- 2) Cateora Graham - International Marketing (TMH, 10th Ed.)
- 3) Siddiqui- International Marketing (Wiley Dream tech)
- 4) Cherunilam F - International Trade and Export Management (Himalaya, 2007)
- 5) Varshney R.L, Bhattacharya B - International Marketing Management (Sultan Chand & Sons, 9th Ed.)
- 6) Jain S. – International Marketing (Thomson)

Course Objectives:

- To have an exposure to International Distribution system and Logistics
- To have an exposure in broad conceptual focus on documentation in exports and imports
- To understand the Logistics and International marketing channel decision.
- To acquire knowledge on the procedures to be followed to Export and Import License
- To get an insight on the international trade terms and legal framework involved in it.
- To understand the concept of export, EXIM strategies, custom clearance and Export incentive schemes.

Course Outcomes (Cos):

1. Demonstrate retailing and its various concepts.
2. Evaluate the value adding perspective of logistics and distribution system.
3. Analyze the linkage of logistics with operations, manufacturing and supply chain.
4. Analyze international terms of trade and trade contracts related to logistics
5. Prepare documents on the exports and imports of goods
6. Understand EDI and custom operations

Unit I

International Distribution system and Logistics – International marketing channel decision, importance and scope of channel decisions, channels between nations, international physical distribution decisions, nature of physical distribution

Unit II

Transportation – Importance of effective transportation system, service choices and their characteristics, cost characteristics and role fixation, In-company management vs. outsourcing, shipping structure – Sea borne trade, international shipping characteristics, important international sea routes, liner & tramp operations, liner freighting, CFC and ICD, Indian shipping – growth, policy and problems, major Indian ports, International Air Transport, freight rates, India's exports and imports by air – problems and prospects, Air cargo, I.A.T.A.

Unit III

Documentation - Naming the enterprise, forms of ownership, opening a bank account, Need for documentation, Process of obtaining Export and Import License:- general registrations, registrations with RBI, registration with Licensing authorities, registration with appropriate EPC/Commodity Board's. Main commercial documents: statutory documents for exporting country, statutory documents for importing country, and documents for claiming export benefits.

Unit IV

International Trade Terms – International Trade Terms – trade contract and trade terms, credit risk management and payment terms,, LC & parties involved, types of LC, UCPDC – major clauses, consignment sale, transit risk management – contract of cargo insurance parties, Insurance policy and certificate, cargo loss clauses – procedure and documentation

Unit V

Clearance – excise duty – definition, types of duties, legal framework – central excise act and rules, tariffs, customs act 1962, customs tariffs act 1975, foreign trade act 1992, physical examination of goods, EDI and custom operations

Text book:

Khanna K K - Physical Distribution Management : Logistical Approach (Himalaya, 2007)

References:

Johnson J, Wood D- Contemporary Logistics.

Reji Ismail- Logistic Management (Excel Books)

Dornier- Global Operation & Logistic Management (John Wiley)

Course Objectives:

- To understand the framework of international business negotiations
- To acquaint the students with the model of the negotiation process with different strategies and planning
- To enhance students knowledge in international culture and negotiation
- To have an understanding of the negotiating conventions and expectations between foreign counterparts
- To become aware of the ethics in Negotiations, retail marketing mix and Promotional measures.
- To evaluate, plan and choose channels of retail distribution strategies.

Course Outcomes (Cos):

1. To make the students to define International Business Negotiations and its various concepts.
2. Examine Cultural the aspects of International Business Negotiation and its impact
3. To evaluate the licensing agreements in various business forms
4. Get an insight in ethics in negotiations
5. Analyze the framework and support institutions for negotiations
6. Practice ethics in negotiations and develop business etiquettes

Unit I

Nature of International Business Negotiations: Framework for international business negotiations - Background factors - Impact of national culture, organizational culture and personality on buyer-seller interaction – a model of the negotiation process with different strategies and planning – Distributive bargain and integrative negotiations.

Unit II

Cultural aspects of International Business Negotiation. Role of culture, patterns of cross-culture behavior and communication. Importance of understanding the negotiating conventions and expectations between foreign counterparts. Comparative and inter-cultural studies of negotiating behavior.

Unit III

Inter-firm negotiation studies: buyers' negotiating strategies in international sourcing, negotiating sales, export transaction and agency agreements. Negotiating licensing agreements, negotiating international joint ventures, projects. Cooperative negotiation for mergers and acquisitions.

Unit IV

Frameworks and support for international business negotiations: multinational, bilateral trade agreements, government supported trade delegations, international trade fairs, international trading houses, industry associations.

Unit V

Ethics in negotiations. Differences from an ethical perspective of the importance of relationship development, negotiating strategies, decision making methods, contracting practices, illicit behaviours such as bribery. Best practices in negotiations, business etiquette. Personality and negotiation skills.

Text book:

1.Claude Cellich, Subhash Jain, *Global Business Negotiations: A Practical Guide* ,South-Western Educational Publishing

References:

- 1.Pervez N. Gauri and Jean Claude Usunier, *International Business Negotiations*, Elsevier ltd.
- 2.Leigh L, *Negotiation Theory and Research*. Thompson.

Course Objectives:

- Emphasize challenges and opportunities for Business Process Reengineering across the process life cycle.
- To understand the importance of business process reengineering and kaizen.
- To gain expertise in ISO standardization and its benefits
- To enable the students to understand the relevance of change management in business process reengineering.
- To familiarize the process of implementation of Business Process Engineering
- To understand the Change Management in Business Process Reengineering

Course Outcomes (Cos):

1. Analyze the Business Process Reengineering and Kaizen and its various concepts.
2. Categorize the benefits of ISO standards
3. Evaluate the Implementation of Business Process Reengineering
4. Get an insight the Pitfalls in organizational environment
5. Demonstrate Application of negotiation in BPR and Implementation of changes
6. Estimate the ways of Change Management in Business Process Reengineering and techniques to interact with their customers.

Unit I

Business Process Reengineering and Kaizen - BPR: Definition, Japanese Business strategy, Kaizen and Management, Characteristic features of Kaizen relevant to BPR. New developments in BPR

Unit II

Business Process Reengineering and other Management concepts - Issues in BPR, BPR and TQM, QFD, ISO standards, ERP. Benefits of ISO standards.

Unit III

Implementation of Business Process Reengineering - Business vision and process objectives, Identification of processes to be reengineered, Measurement of processes, Design. Evaluation of process prototype.

Unit IV

Reengineering Structure and Pitfalls - BPR leader, Process owners, Reengineering teams, Pitfalls in organizational environment. Complacency management, Reengineered process, Appraisal system

Unit V

Change Management in Business Process Reengineering - Structure of change, Approaches to radical change, Management of change in BPR, Application of negotiation in BPR. Implementation of changes

Text book:

1.P.N. Rastogi, “*Re- engineering and Re-inventing the Enterprise*”, New Delhi: Wheeler Publications, 2007

Reference Books:

1. B.R.Dey , “*Business Process Reengineering and change Management*” ,Biztantra, 2004
2. John Jeston and Johan Nelis, “*Business Process Management: Practical Guidelines to Successful Implementations*”, Singapore: Elsevier Ltd, 2008.
3. David J. Sumanth, “*Total Productivity Management*”, USA: CRC Press Ltd., 2006.
4. H. Harrington, “*Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity and Competitiveness*”, New Delhi: Tata McGraw Hill, 2005.

Course Objectives:

- To understand the advanced maintenance management that provides an insight into maintenance planning, analysis, system, cost and advanced techniques
- To aware the functions of maintenance.
- To gain insight in the concept of Reengineering Maintenance Process
- To familiarize the students with Total Productive Maintenance.
- To enable the students to understand the concept of optimum overhaul.
- To make them understand the Management Information system and Technical audit

Course Outcomes (Cos):

1. Analyze and define maintenance concepts and strategies
2. Determine the design for maintainability and preventive maintenance
3. To evaluate Design out maintenance, Total Productive Maintenance - Reduction of Maintenance Cost
4. To categorize Reengineering Maintenance Process
5. Analyze the Total Productive Maintenance and Reduction of Maintenance Cost
6. Develop knowledge on Maintenance Management Information System & Technical Audit

Unit I

Maintenance Concepts - Objectives and functions of maintenance, types, Maintenance strategies.

Organization for maintenance, Five Zero concept New Developments in Maintenance

Unit II

Failure Data Analysis - MTBF, MTTF, Useful life, Survival curves, Repair time distribution,

Break down time distributions, Poisson, Exponential and Normal distribution. Availability of

repairable Systems, Maintainability prediction, Design for maintainability. Preventive

Maintenance

Unit III

Maintenance Planning - Overhaul and repair: Meaning and difference, optimal overhaul / Repair

/ Replace maintenance policy, Re placement Decisions: Optimal Interval. Group Replacement

Unit IV

Maintenance Systems - Fixed time maintenance, Condition based maintenance, Operate to

failure, Opportunity maintenance, Design out maintenance, Total Productive Maintenance.

Reduction of Maintenance Cost

Unit V

Advanced Techniques - Reliability Centered Maintenance (RCM) – Total Productive Maintenance (TPM) - Philosophy and implementation, Signature analysis - Expert systems – Concept of Terro technology, Reengineering Maintenance Process, Concept of reliability, Reliability improvement, Concept of maintainability and maintainability improvement, Maintenance Management Information System & Technical Audit

Text Book:

1.R.C.Mishra and K.Pathak, “*Maintenance Engineering & Management*”, New Delhi: Prentice Hall India, 2006.

References:

1. P. Gopalakrishnan, A.K.Banerji, “*Maintenance and Spare Parts Management*”, New Delhi: Prentice Hall of India, 2006.
2. Kelly and M.J. Harris, “*Management of Industrial Maintenance*”, Butterworth and Company Limited, 2008.
3. A.K.S.Jardine, “*Maintenance, Replacement and Reliability*”, Pitman Publishing, 2006.
4. U.K. Singh and J.M. Dewan, “*Maintenance Management*”, New Delhi: Common Wealth Publishers, 2007.

Course Objectives:

- To gain knowledge on lean manufacturing system
- To enable the student to understand the Designing of 5S and Kanban Signaling
- To have an exposure in the integrated perspective of Lean thinking apart from covering all the basic tools needed.
- To enable the student to acquire the knowledge of Value Stream Mapping
- To get an insight with the implementation of various lean manufacturing techniques. ,
- To aware of Lean line optimization

Course Outcomes (Cos):

1. To analyze the lean manufacturing system in manufacturing industries
2. Define Lean Manufacturing System and its various concepts.
3. Demonstrate lean implementation in service
4. Practice Kanban Strategies and inventory management
5. Analyze the ways of Lean Implementation and Milestones tools and techniques to interact with the workers
6. Evaluate the customer demand and Customer response policy

Unit I

Benefits of Lean Manufacturing System - History and modern applications, MRP and their impact, Lean manufacturing model, Kanban Methodology, Continuing evaluation, Strategic Business Analysis. Internet and e-commerce applications & Reverse Auction

Unit II

Understanding Product, Process and Demand - Value Stream Mapping - Scope, Selecting parent parts, Lean line, Demand, Documenting process flow, Talk time, Process linking and Balancing - Imbalance, Approach, Resource, Definition, Physical Layout, Designing 5S, Kanban Signaling

Unit III

Kanban Strategies - Process, Single, Multi Card system, Inventory Management, Advantages and Disadvantages. Team Establishment: Commitment, Physical facilitation, Management Structure. Transformation process & perpetual inventory

Unit IV

Lean Implementation and Milestones - Software requirement milestones, Understanding process, Product and Materials, Checking, Factory design, Line startup, Lean implementation in services

Unit V

Lean Line management - Matching customer demand, Customer response policy, Lean line optimization, Resistance to change, Flexibility and rewards.

Text book:

1. Michael L.George, *Lean Six Sigma*, Tata McGraw Hill, 2002.

References:

1. Dennis P.Hobbs, *Lean Manufacturing Implementation*, J.Ross Publishing, 2009.
2. Liker, *The Toyota Way*, New Delhi: Tata McGraw Hill, 2004.
3. Garry Conner, *Lean Manufacturing for the Small Shop*, Society of Manufacturing Engineers, 2008.
4. Allan, Robinson and Stewart, *Lean Manufacturing – A Plant Floor Guide*, Society of Manufacturing Engineers, 2001.

Course Objectives:

- To understand the components of Personality Development
- To enhance the personal etiquette among students
- To equip students with the basic knowledge of building relationship with superiors and staff
- To develop students critical and innovative thinking
- To inculcate the knowledge of organizing seminars, conferences and conducting meetings
- To improve managerial skills and goal setting among students

Course Outcomes (Cos):

1. Demonstrate capabilities of lateral thinking and handling criticisms
2. Practice business etiquettes and aware cross-cultural etiquette
3. Demonstrate goal-setting and problem-solving
4. Develop proactive thinking
5. Ability to communicate effectively.
6. To gain professionalism in personal and organizational life

Unit I

Personality Development / Personal Branding for Career Success – SWOT Analysis – Knowing your personality – Emotional Quotient – Lateral thinking – Handling criticisms – Body language

Unit II

Personal etiquette - Good work practices, Dress code, Code of Good conduct, Handling ethical dilemmas – Business etiquettes — Behaviour at work - Awareness of Diversity, Respecting others' space, Greeting in business setting, Meeting people in business setting, developing relationship with superiors and staff - Dining Etiquette - Cross Cultural Etiquette

Unit III

Managerial Skills – Innovative planning – Conducting professional meetings and conferences – Customer retention and satisfaction – Goal setting and problem solving.

References:

1. Hurlock, E.B. (2006). Personality Development, 28th Reprint. New Delhi: Tata McGraw Hill.

Course Objectives:

- To impart students and enrich communication and non-verbal activity such that students will be good on their communication.
- To understand the use of language in day-to-day business life
- To provide the skills in improving social communication
- Make students to understand the value of face to face communication
- To train them in group discussions and interviews
- The students shall be familiar with conducting meetings, seminar and conferences.

Course Outcomes (Cos):

1. The student will able to get practice with Verbal communication and Non- Verbal communication.
2. Demonstrate the understanding of face to face Communication.
3. The students shall be familiar with conducting meetings, seminar and conferences.
4. Students attain competence in functional use of communication during both academic and non-academic life situations.
5. To draft effective business correspondence with brevity and clarity.
6. To stimulate their Critical thinking by designing and developing clean and lucid writing skills.

UNIT I**PERSONAL COMMUNICATION:**

Day-to-day conversation with family members, neighbours, relatives, friends on various topics, context specific – agreeing/disagreeing, wishing, consoling, advising, persuading, expressing opinions and arguing.

UNIT II**SOCIAL COMMUNICATION:**

Telephone calls (official), colleagues in the work spot, discussing issues (social, political, cultural), clubs (any social gathering), answering questions, talking about films, books, news items, T.V. programmes, sharing jokes.

UNIT III**GROUP / MASS COMMUNICATION:**

Group discussion (brainstorming), debate, panel discussion, anchoring / master of ceremony, welcome address, proposing vote of thanks, introducing speakers, conducting meetings, making announcements, Just-a-minute (JAM), Block and tackle, shipwreck, spoof, conducting quiz, negotiations, oral reports.

References:

1. Hurlock, E.B. (2006). *Personality Development*, 28th Reprint. New Delhi: Tata McGraw Hill.
2. Windshuttle, Keith and Elizabeth Elliot. 1999. *Writing, Researching and Communicating: Communication Skills for the Information Age*. 3rd Reprint. Tata McGraw-Hill. Australia.
3. Goleman, Daniel. 1998. *Working with Emotional intelligence*. Bantam Books. New York.

Course Objectives:

- Internship is aimed to feed industry - institutional- orientation among the students
- To sensitize students to the nuances of corporate culture and familiarize them with the corporate code of behavior.
- To educate the graduates to acquire skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity
- To give an insight into the working of the real organizations
- To inculcate the knowledge about business organizations in their totality
- To learn the opportunities available and plan their career

Course Outcomes Cos):

1. Demonstrate theoretical knowledge in solving real time problems.
2. Gain practical exposure of the core area of functioning in industry
3. Learn actual supervised professional experiences
4. Effectively communicate ideas and evaluate its impact on business environment.
5. Understand perspective about business organizations in their totality.
6. Discover career opportunities

During second semester vacation each student shall undertake a Summer Internship for 30 Days. The summer internship may be a general study of all functional areas of a company or may be a functional focus on a specialized functional area of management in a company. The students shall bring the attendance certificate from the company. He /She shall also submit a detailed report for Viva-voce Examination.

Course Objectives:

- To assess the overall knowledge of the student in the relevant field of Management
- Help them to gain the knowledge and skills required to excel in their career
- To test their learning and understanding of various concepts of the syllabus during the course of their programme
- To acquaint the students with fundamentals of communication and help them to transform their communication abilities
- To obtain frameworks and tools to effectively analyze and approach various Organizational situations.
- To prepare the students to face interview both in the academic and the industrial sector

Course Outcomes (Cos) :

1. Students get equipped with skills and knowledge to excel in their future careers
2. To develop an in-depth knowledge on the management concepts, theories and principles
3. Develop an ability to analyse and interpret contents and concepts to provide meaningful information in making management decisions
4. Recognize the application of various techniques to achieve the objective of the task
5. Determine opportunities and emerging challenges in the upcoming business trends
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to various courses.

A Comprehensive Viva Voce will be conducted at the end of the Semester. The panel shall consist of an external expert and faculty members who handled the courses. The viva is aimed to evaluate the student's knowledge in all the core and elective courses in the particular semester.

Course Objectives:

- Help the Students in developing their communication skills, especially presentation before the group.
- Develop and improve discussion skills
- The students will be able to analyze any given issue and to present before an identified group.
- Identify and comprehend main ideas and supporting idea in detailed manner
- Manage timings on discussion
- Develop and present options based on selected materials

Course Outcomes:

1. The students will be able to analyze any given issue and to present before an identified group.
2. Develop multiple thinking strategies to examine real-world issues and explore creative avenues of expression
3. Analyze the impact of word choice and tone that can have on presentation
4. Identify ways to make information more accessible to audience
5. Students will demonstrate the ability to construct a paper consistent with expectations of the discipline, including an appropriate style
6. Evaluate an enthusiastic and well-practiced method of presentation

The seminar motivates students to engage in Research in the subject area. To provide students with an overview and understanding of Global issues. It shall be based on concurrent trends of their specialization.

Course objectives:

- To develop new ability to practice new problem solving skills in group and use these skills in personal life
- The students understand proper usage of English in their profession and focus on report writing
- To develop employability and enterprise skills, such as teamwork and communication.
- To develop positive attitudes in the pupils towards study and work.
- To provide students with impartial advice about options that is available to them.
- To provide equal opportunity of access to careers inspiration and guidance.

Course Outcomes (Cos):

1. The ability to speak clearly, persuasively, and forcefully
2. Exhibit important life skills including Decision making, Problem solving and creative thinking.
3. Anticipate what they gain from educational experience
4. Track their progress and set bench mark
5. Identify the methods of assessment of knowledge and skills
6. Plan appropriate strategies to enrich the need based learning techniques

Self Introduction - Presentation on their own topic – Extempore - Group Activity - Group Discussion - Do's and Don'ts of Group Discussion - Group Discussion - Body language, Grooming & Resume - Resume correction.

Course objectives:

To make the students

- Being specialized in finance present day managers to be aware of short term movement of capital and problems related to working capital management
- To study about the importance of working capital.
- To learn the factors of cash management.
- To understand credit policy of receivable management.
- To learn the various techniques of inventory management.
- To provide clear view of committee's recommendation on working capital.

Course outcomes (Cos):

Learners should be able to

1. Estimate the requirements and manage the working capital required for the business
2. Analyze the different sources of capital and computation of cost of capital.
3. Develop cash management techniques
4. Evaluate the components of financial leverage, dividend policies and capital structure theories and its application in business.
5. Develop new techniques in managing and controlling inventory in organizations
6. Analyze the Committee recommendations on working capital financing

Unit I

An Overview - Importance of Working Capital Management - Components of Working Capital – concept of working capital – levels of working capital investment- Factors Influencing the Requirements of Working Capital, Issues and Practices of working capital management in India. Computation of Working Capital requirement (Problems) Concepts of Working Capital - Determinant of Working Capital - Issues in Working Capital Management.

Unit II

Cash Management – Facets of cash management – Motive of Holding cash – Factors influencing cash balance – Determining Optimum Cash Balance – Cash Planning – Managing cash collections and disbursement – Investing the Surplus in Marketable Securities. Cash Budget (Problems), Cash Management Practices in India.

Unit III

Problems -Receivables Management- Objectives - Credit Policies – Credit Terms - Nature and Goals of Credit Policy – Optimum Credit Policy - Credit Period - Collection Efforts - Credit Evaluation - Credit granting decision - Control of Receivables – Factoring – Definition and Mechanism – Advantages Problems.

Unit IV

Inventory Management-Nature of Inventories – Objective of Inventory Management - Need to hold Inventories - Techniques for managing inventory - Inventory Control System - A.B.C. analysis - Problems

Unit V

Working capital financing: Working Capital Control and Banking policy - Committee recommendations on working capital - New system of assessment of working capital finance. Working capital financing – Trade credit – Bank Credit – Commercial Papers – Certificate of Deposits– recent trends in working capital financing

Note: Problems 60 Marks and Theory 40 Marks.

Text Book:

1. V.K Bhalla, “Working Capital Management”, 9th Edition, 2010, Anmol Publications Pvt Ltd, New Delhi.
2. Khan & Jain, “Financial Management”, Tata McGraw Hill, New Delhi 2009.
3. P.C Tulsian, “Financial Management”, 3rd Edition, 2009, S.Chand & Co Ltd, New Delhi

References:

1. Lawrence J Gitman, “Principles of Managerial Finance” Pearson Education limited, 2009
2. I.M.Pandey, “Financial Management”, 10th Edition, Vikas Publishing House Pvt Ltd., 2010
3. Prasanna Chandra, Financial Management, 4th Edition, Tata McGraw Hill, 2007

Journals:

1. Journal of Financial Services and Management
2. Asia Pacific Business Review
3. Corporate India

Course objectives:

To make the students

- Understand the securities market and factors influencing risk
- To provide the knowledge of the structure and functioning of capital market
- To expose the concepts of investment Risks and Securities.
- To facilitate them to understand and exploit the tools available for analysis.
- To hassle the need of portfolio management and its application
- To understand the security analysis & portfolio management concept and its importance and its applications in business

Course outcomes (Cos):

Learners should be able to

1. Analyze the role of a financial manager, and their role in taking decisions professionally.
2. To clarify the structure and functioning of capital market.
3. Demonstrate knowledge and compute value of security analysis & portfolio management and apply the concept to Evaluate the business proposal applying capital budgeting techniques
4. Compute the security analysis & portfolio management
5. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions
6. Gain insight in risk management techniques

Unit I

Investments – Concepts and features- Objectives – Constraints - Investment vs Speculation - Investment Process Investment Planning - Investment Avenues – Securities Market – Participants – Securities – Indices - Risk and return – Types - Factors Influencing Risk.

Unit II

Over view of capital market - Structure in Indian capital market- Major players - Role of stock exchanges - Trading and settlement procedures at NSE and BSE. Securities Contract Regulation Act - Securities and Exchange Board of India - Indian debt market.

Unit III

Fundamental Analysis: Economic analysis – Economic Forecasting - Industrial Analysis - Industry life cycle – Analytical tools – SOWT – Porter’s Five Force Model – Company Analysis – Mode of analysis – financial analysis.

Unit IV

Forecasting individual stock performance: Technical analysis – Charting methods – Market indicators, Trends –Trend reversals- Moving average –Oscillators - CAPM –APT theory
Valuation of securities.

Unit V

Portfolio theory – Portfolio construction – Markowitz diversification model – Performance evaluation – Portfolio revision- Portfolio management and performance evaluation: Sharpe Index, Treynor Index, Jensen's Model.

Note: Emphasis will be given to case discussion and article reviews

Text book:

1. K.Sasidharan/Alex K Mathews, “Security Analysis and Portfolio Management”, Tata MC Graw Hill Education Private Limited, New Delhi 2013.
2. Punithavathy Pandian, “Security Analysis and Portfolio Management”, Vikas Publishing House Pvt Ltd, New Delhi 2013.

References:

1. Donald E. Fischer & Ronald J. Jordan, “Security Analysis & Portfolio Management”, Prentice Hall of India Private Ltd., New Delhi 2010
2. Prasanna Chandra, “Managing Investments”, Tata McGraw Hill. 2010
3. V.A.Avadhani, “Securities Analysis and Portfolio Management”, Himalaya Publishing House, 2008.
4. Kevin’s, “Security Analysis and Portfolio Management”, Prentice hall of India, 2010.

Additional References:

1. www.moneycontrol.com
2. www.icicidirect.com
3. www.capitalmarket.com
4. Weekly E-Magazine Equity Pulse
5. Karvy the Finapolis

Course objectives:

- To make the students
- To clarify the structure and functioning of concepts of Bonds, Derivatives, Futures
- To expose the concepts of futures and options
- To impart the structure and functioning of commodities market.
- To equip young managers with the knowledge of emerging commodities derivatives trading practices in India.
- To explain the regulatory framework of these markets and domestic and international historical developments in commodities market.
- To understand the settlement and risk management in commodity trading

Course outcomes (Cos) :

- Learners should be able to
1. Understand the role of a financial manager, and their role in taking decisions professionally
 2. Apply derivatives as risk management tools for hedging market risk exposure
 3. Demonstrate knowledge and compute value of security analysis & portfolio management
 4. Estimate the eligibility of stock for futures and options trading.
 5. Compute the commodity trading: commodity derivatives – commodity exchanges in India
 6. Demonstrate capabilities of teamwork, problem-solving, critical thinking, and communication skills related to finance decisions

Unit I

Bonds attributes – bond returns & prices – risk structure of bonds – forecasting interest rate bonds – the term structure of interest rates. Bond management strategies; - passive – semi active – active – passive and active strategies – new innovations in bonds.- Bond portfolio management.

Unit II

Introduction to Derivatives: Definition – types – market index: types of index; introduction to futures and options; forward contract – limitations – features, futures Vs forward contract. Introduction to options – distinction between futures and options, pay of for derivative contracts.

Unit III

Futures and options , trading systems – basis of trading – eligibility of stock for futures and options trading – clearing and settlement; clearing entities – members – banks – mechanism – settlement mechanism – regularity framework-case studies in relevant topics.

Unit IV

Introduction to commodity trading: commodity derivatives – commodity exchanges in India – types of instruments available for trading – pricing – commodity derivatives, hedging, speculation, arbitrage in commodity derivative markets. Case studies in relevant topics.

Unit V

Clearing, settlement and risk management in commodity trading, Calendar and settlement schedule – position determination – settlement mechanism - settlement price – margining – final statement – exception handling – regularity framework. Case studies in relevant topics.

Note: Emphasis will be given to case discussion and article reviews

Text Book:

1. Sunil K. Parameswaran, “Future and Options”, Tata McGraw Hill, Noida. 2009
2. John Hull, “Options Future and other Derivatives”, Pearson Education, 2009

References:

1. R.Vijaya Bhaskar & B.Mahapatra, “Derivatives Simplified”, Response Books, 1st edition, 2007.
2. “Indian Institute of Banking & Finance-Commodity Derivatives”, Macmillan India Ltd, 1st edition, 2009.
3. D.C.Patwari & Anshul Bhargava, “Options and Futures”, Jaico Publishing House, 3rd edition, 2009.
4. Yadav, Jain and Peyrard, “Foreign Exchange Markets”, Macmillan, 2008.

Journals/ Additional readings and other materials:

1. <http://finance.mapsofworld.com/finance/international/finance-journal.html>
2. <http://www.moneycontrol.com/>
3. <http://www.moneycontrol.com/sensex/bse/sensex-live>
4. <http://www.icicidirect.com/>
5. <http://www.capitalmarket.com>
6. Weekly E-Magazine Equity Pulse
7. Karvy the Finapolis

Course Objectives:

- To equip the students with the various dimensions of product management such as Brand Positioning and its Preference.
- To get familiarize with the portfolio management and competitor's analysis
- To develop familiarity and competence with the strategies
- To understand the tactics involved in building, leveraging and defending strong brands in different sectors.
- To equip the students with the various dimensions of product management such as Brand Positioning and its Preference.
- To possess knowledge on building brand equity

Course Outcomes (Cos):

1. Analyze the product concepts and new product development
2. Developing strategies for new product development using various models
3. Construct branding strategy considering social and political aspects of brands
4. Evaluate the failure of branding using new media
5. Create models for brand positioning
6. Evaluate brand equity and brand valuation for successful implementation of branding strategy.

Unit I

Products - Concepts - New Product Development – Strategies - Launching Strategies, Product Life Cycle - Portfolio Management - BCG, GE, Porter's Model, Competitor's Analysis, Customer Analysis, Market potential, Product Demand pattern and Trend Analysis.

Unit II

The Concept of Brands - The Economic Importance of Brands - The Social and Political Aspects of Brands - Difference between Marketing and Branding - Changing Rules of Marketing and Branding in India - Digital Dimension, Consumer Activism, Leveraging Technology - Why Some Companies Fail in Using New Media.

Unit III

Introduction to Brand Positioning: The 4Ps – An Inherently Futuristic Model - 4Ps in the IT Age
 - Brand Positioning - Fundamentals of Brand Positioning - First Movers - Mistakes in Brand
 Positioning – Introspection - Gaining Brand Preference.

Unit IV

The Brand Relevance Model: The First Mover Advantage - Managing a New Category - The
 Different Levels of Innovation - Understanding Brand Relevance – Categorization - Creating
 New Categories or Subcategories — Four Tasks - How Categorization Affects Information
 Processing and Attitudes

Unit V

Packaging – Labeling - Brand Rejuvenation - Brand Success strategies - Brand Resilience -
 Brand Equity - Brand valuation - Building global brands - Branding failures.

Text Books:

1. Lehmann & Winner , Product Management, Mcgraw Hill, 2004
2. Product and brand management- K.Venugopal Rao –Himalaya Publishing House, 2010

References:

1. Subroto Sengupta, Brand Positioning, Tata Mcgraw Hill Education Private Limited, 2005
2. David Aaker. Brand Relevance – Making Competitors Irrelevant. Jossey Bass. 2011
3. Hamel, G. & Prahalad, C.K. Competing for the Future, Harvard Business School Press, Boston, 1994
4. Kartikeya Kompella, Building Brands, Building Meaning: A guide to increasing the financial value of brands through building positive meaning, Viva Books Private Limited, 2006

Journals

1. Journal of Brand Management
2. Journal of Brand Strategy
3. Journal of Product & Brand Management

Websites

1. www.brandingmagazine.com
2. www.thesmartceo.in
3. www.campaignindia.in

Course Objectives:

- To have an exposure in retailing concept and consumer behavior in retail.
- To know the theories of retail management and classification of models
- To give a perspective of the Indian retailing scenario
- To understand the retail marketing mix and Promotional measures.
- To evaluate, plan and choose channels of retail distribution strategies.
- To get an insight in IT application and international retailing trends

Course Outcomes (Cos):

1. Adopt strategies to the challenges in retailing and gain competitive advantage
2. Construct models for direct marketing
3. Demonstrate knowledge of the various forms of Retail outlets and current trends in Retail
4. Analyze the retail marketing mix and draw plan for effective combination
5. Adopt information tools and techniques to interact with their customers.
6. Inculcate ethical values, enabling to set value standards and belief to have positive outcomes

Unit I

Retailing – Introduction – Importance – Challenges in retailing — Consumer behavior in retail context –demographic and socio-economic factors – strategic Retail Planning process – opportunities and Competitive advantage

Unit II

Theories of retail development-The Evolution of retail format –Theories in retail development-environmental, Cyclical and conflict theory – The concept of life cycle in retail - Retail Models – Classification – Store Based – Non store based – Direct Marketing – Franchising – Forms - Mall Management – Mall Designs.

Unit III

Retail Marketing Mix – Product decision – Nature, selection & delivery decision - Pricing decision- concepts - leader pricing - odd pricing - Promotion decision – advertising, sales promotion & publicity - channel & channel management

Unit IV

Application in retail - IT applications in retail – Database marketing, data mining and business intelligence – Electronic retailing – Developing decision support systems – Visual Merchandising – Store location and Site location.

Unit V

Global retailing trends - Indian and International retailing trends – Indian Retailers in Jewellery - Textiles – Food - Music and Electronics – Ethics in retailing – Social responsibility & Consumerism, E-CRM.

Note: Emphasis will be given on Case discussion and Article reviews.

Text Book:

1. George H. Lucas, Robert P. Bush, Larry G.Gresham, “Retailing”, All India Publishers.
2. David Gilbert, “Retail Marketing Management”, Prentice Hall

References:

1. Barry Berman, “Retail management A Strategic Approach”, 9th Edition, 2007
2. David Gilbert, “Retail Marketing Management” 2nd Edition, 2009
3. Judy Strauss, Adel El-Ansary, “E–Marketing”, 3rd edition, Raymond Frost, 2010
4. Mrs. Suja Nair, “Retail Management”, 4th Edition, Himalaya Publishing House, 2009

Journals:

1. International journal of retailing
2. Retailer – Franchise House
3. Retailer- Franchise house, Haryana
4. Journal of service research
5. IAMS journal of business spectrum, Bangalore

Course objectives:

- To understand the need and importance of maintaining a good relationship with customers
- To expose to the various approaches of Customer Relationship Management
- To have an in-depth knowledge in CRM structures, planning and implementation
- To acquire acquaintance in Concepts and Context of relationship Management
- To gain familiarity by understanding Customers Behaviour and role of relation manager
- To identify Customer perception with the concepts and practical implications of customer relationship management

Course outcomes (Cos) :

1. Formulate tools for effective customer relation towards organization
2. Analyze the customer database and profile and serve to their expectations
3. Build CRM models based on customer psychology behind customer relationship
4. Estimate the Customer behavior in relationship perspectives
5. Recognize Data Ware housing and use the Data mining for CRM
6. Develop the CRM software packages

Unit I

Introduction - Definitions - Concepts and Context of relationship Management – Evolution - Transactional Vs Relationship Approach – CRM as a strategic marketing tool – CRM significance to the stakeholders.

Unit II

Understanding Customers - Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behavior in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments.

Unit III

CRM structures - Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications.

Unit IV

CRM planning and implementation - Strategic CRM planning process – Implementation issues – CRM Tools - Analytical CRM – Operational CRM – Call center management – Role of CRM Managers.

Unit V

Trends in CRM – E-CRM Solutions – Data Warehousing – Data mining for CRM – an introduction to CRM software packages

Text Books:

1. G.Shainesh, Jagdish, N.Sheth, Customer Relationships Management Strategic Prespective, Macmillan 2005.
2. Alok Kumar et al, Customer Relationship Management : Concepts and applications, Biztantra, 2008

References:

1. H.Peeru Mohamed and A.Sahadevan, Customer Relation Management, Vikas Publishing 2005.
2. Jim Catheart, The Eight Competencies of Relationship selling, Macmillan India, 2005.
3. Assel, Consumer Behavior, Cengage Learning, 6th Edition.
4. Kumar, Customer Relationship Management - A Database Approach, Wiley India, 2007.
5. Francis Buttle, Customer Relationship Management: Concepts & Tools, Elsevier, 2004.
6. Zikmund . Customer Relationship Management, Wiley 2012.
7. Mohammed Hp/ Sagadevan.A Customer Relationship Management- A step by step approach

Course objectives:

- To learn about industrial relations concepts and objectives.
- To gain familiarity in the industrial relation trends of India
- To know about the industrial conflict and handling the disputes.
- To understand collective bargaining and formation of trade unions
- To focus on industrial safety and psychological problems
- Thorough understanding on labor welfare measures

Course outcomes (Cos):

1. Evaluate the significance of industrial relations
2. Analyze the grievance techniques and adopt suitable grievance method to settle disputes
3. Ability to manage industrial conflicts and disputes
4. Evaluate the role the collective bargaining and manage the settlements
5. Create awareness on occupational hazards with HR and Industrial safety
6. Effective implementation of welfare measures in order to have a peaceful industrial relation

Unit I

Industrial Relations – Concepts and Approaches – causes of poor Industrial Relations-Effects of poor Industrial Relations-Suggestions to improve Industrial Relations- Trends in India. Trade unionism –objectives - functions – structure.

Unit II

Industrial Conflicts – industrial disputes –Types - causes –handling and settling disputes – employee grievances – steps in grievance handling – Employee discipline-causes-types-kinds of punishment-procedure for taking disciplinary action.

Unit III

Collective Bargaining:-Concept – function and importance – Principles and forms of collective bargaining – Procedure – conditions for effective collective bargaining – worker's participation in management:- Role and methods of worker's participation – Management participation in Trade Unions.

Unit IV

Industrial Safety – Causes of accidents – Prevention – Safety Provisions – Industrial Health and Hygiene – Importance and Problems – Occupational hazards – Diseases – Psychological problems – counseling.

Unit V

Labour Welfare – Concept – Objectives – Scope – Need – Voluntary Welfare Measures – Statutory welfare measures – Welfare Funds – Education and training schemes – Child labour – Female labour – Contract labour – Construction labour – agricultural labour.

Note: Emphasis will be given on Case discussion and Article reviews.

Text Book:

N.G Nair, Latha Nair, “Personnel Management and Industrial Relations”, Sultan Chand & Sons, New Delhi, 2007

References:

1. P.C. Tripathi, “Personnel Management and Industrial Relations”, Sultan Chand & Sons, New Delhi, 2009
2. C.B Marmora, “Dynamics of Industrial Relation”, Himalaya Publishing House New Delhi, 2007
3. Arun Monappa, “Industrial Relations”, Tata McGraw Hill, New Delhi, 2009
4. P.Subba Rao, “Essentials of human Resource Management and Industrial Relations”, Himalaya Publishing House, Mumbai, 2008.

Journals:

1. Techno First
2. A practical journal for HRM
3. Indian Management
4. Global pensions
5. Asian management Review

Course objectives:

- To know the role and functions of training and development in organization,
- To understand the theories, principles and their implications for the effectiveness of training programs.
- To elucidate on Implementation of Training – Physical arrangements – Classroom management – Trainer's skills and styles
- To understand Career Planning and Factors affecting Career Choices, Career Stages, Career anchors, Succession planning
- To realize the need of controlling in improving the performance of the organization.
- To enable students to synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behaviour and improve results

Course outcomes (Cos):

1. Ability to train and develop employees to improve organizational efficiency.
2. Assess various key factors in designing training programme
3. Designing the training methods for employees as per the requirement of organization
4. Analyze the efficiency of employees and develop career planning
5. Gain knowledge in management development programmes
6. Evaluate the training programmes and prepare a report

Unit I

Training concepts - Features of Training and Development – Objectives – Benefits of Training and Development – Principles of Training, Scope of Training and Development, Historical development of Training and Development, applying to organizational effectiveness

Unit II

Concepts of Learning, Components of Learning – Principles of Learning – Learning Theories – E –Learning - Training Process – Key factors in designing training programme - Assessing Training needs – Methods of TNA – Training Design – Constraints in Training Design

Unit III

Implementation of Training – Physical arrangements – classroom management – Trainer's skills and styles – Transfer of Training - Evaluation of Training – need – types of instruments – Evaluation design – Models of Training evaluation.

Unit IV

Training Methods – On and Off the Job training Techniques - Lecture Methods, Programmed Learning – Discussion methods, case Methods, Role Play, Business games, in-basket exercises, Field Training, Audio-Visual Aids, Static and Dynamic media – Computer based training, Training methods adopted by Successful Indian Organizations.

Unit V

Career Planning – need - Factors affecting Career Choices, Career Stages, Career anchors, Succession planning - steps. Management Development – Need & Importance – Management characteristics – skill acquisition – training for Executive level management - Emerging Trends and Future Prospects in Training and Development.

Note: Emphasis will be given on Case discussion and Article reviews.

Text book:

1. Dr. V. Janaki Raman, “Training and Development”, Biztantra 2009

References:

1. Sahu. R.K, “Training for Development”, Excel Books 2008
2. Pareek Uday and T.V. Rao, “Designing and Managing human resource system”, Oxford and IBH Publishing Co. Pvt. Ltd, 2009
3. P.L. Rao, “Training and Development”, Excel Books 2009
4. P. Nick Blanchard & James W. Thacker, “Effective Training”, Prentice Hall of India 2008
5. Noe, R.A. Employee, “Training & Development”, Irwin/McGraw Hill, 2009
6. Tapomoy Deb, “Training and Development”, ANE Books, India 2008.

Journals/ additional readings and other materials:

1. Harvard Business Review
2. Human Resource Management
3. Human Resource Development Quarterly
4. Human Resource Management Review
5. Training and Development Journal
6. Personnel today
7. Academy of Management Journal
8. Management and labour studies
9. The IUP journal of Organization Behavior
10. IIMB Management Review

Course objectives:

- To make the students to be familiar with Wages, Salary, incentives, Compensation and pay scale systems
- To understand the Concept of Equity and Components of Compensation
- To understand the compensation designing and factors deciding compensation designing
- To know the basics of compensation, various incentives and fringe benefits applicable
- To understand the fundamentals of wages, salary, incentives, compensation and pay scale systems and apply lifelong
- To have relevant knowledge of social security laws for employees of the organization

Course outcomes (Cos):

1. Design the compensation plan suitable to their organization
2. Formulate incentives and retirement plans
3. Evaluate the existing fringe benefits and design new programmes for organization
4. Analyze the Internal and External Equity in Compensation Systems
5. Classify the Laws Relating to Workmen's Compensation, Employee's State Insurance, and Provident Fund
6. Evaluate the Compensation plans provided by Public sectors & Private Sectors

Unit I

Concept and Nature of Compensation – Concept of Equity & Compensation, Nature and Form of Compensation, Compensation Plans- Types of Compensation plans, Designing Wage, salary and Compensation Policies, Factors Influencing Wage and Salary Administration. Wage – Theories of Wages, Types of Wages – Time rate, piece rate, debt method, Wage differentials, Competitive Imperatives influencing Compensation.

Unit II

Compensation Designing – Job analysis, Identifying job contents, Process of Job Analysis, Job Analysis Questionnaire, Designing Compensation, Factors affecting Compensation Designing Pay for Performance, Pay by Seniority, Group Piece rate, Production sharing plan, Employee Profit sharing Employee stock ownership, Gain Sharing. Incentives and Retirement plans: Basic

Pay, Provisions for Dearness allowance – Calculation of total compensation package, various methods of compensating cost of living Neutralization factors.

Unit III

Incentives and Fringe Benefits – Incentives – Definition, Types of Incentives, Individual incentives: Measured day Work, Piece work, standard hour, Gain sharing, its advantages and disadvantages, Organization Wide incentives – Scanlon Plan, Kaiser Plan, Profit sharing, on-financial incentives, Fringe Benefits – Definition, Objectives, Types of Fringe Benefits.

Unit IV

Planning for Improved Competitiveness: Diagnosis and Bench Marking, Obtaining Commitment; Determination of Inter and Intra-industry Compensation Differentials, Internal and External Equity in Compensation Systems. Compensation provided by Public sectors & Private Sectors.

Unit V

Social Security Laws – Laws Relating to Workmen’s Compensation, Employee’s State Insurance, Provident Fund, Gratuity and Maternity Relief. Wages and Bonus Laws – The Law of Minimum Wages, Payment of Wages, Payment of Bonus. Objectives and scope of these Laws. Equal Remuneration Act Working of Different Institutions related to Reward system like Wage Boards, Pay Commissions. The Impact of fifth pay scale on Central and State Government.

Note: Emphasis will be given on Case discussion and Article reviews.

Text Book:

1. Er. Soni Shyam Singh, “Compensation Management” Excel Books, 2009.

References

1. Sunil Bhaksi, “Compensation Management”, Galgotia Publications, New Delhi 2000
2. R.S. Dwivedi, “Managing Human Resource and P.M in Indian Enterprise” Galgotia Publishing Company, New Delhi.2009
3. Wayne Cascio, “Managing Human Resource” Tata McGraw Hill, New Delhi, 2007.

Journals/ additional readings and other materials:

1. Harvard Business Review
2. Human Resource Development Journal
3. Human Resource Management Review
4. Training and Development Journal

5. Personnel today
6. Academy of Management Journal
7. Academy of Management Review
8. Business Week
9. HRD times
10. Management and labour studies
11. The IUP journal of Organization Behavior

Course Objectives:

- To understand the practices and technology to start an online business
- To analyse the technology requirements for Ecommerce
- To know the different business models available for running a e-business
- To study the different ways of payment and payment services available.
- To acquire knowledge on the E-supply chain management relating to e- business.
- To know about E-business models and Virtual Merchants

Course outcomes (Cos)

1. Ability to manage an e-business
2. Analyse the various market forces influencing the I-way
3. Assess the different technology for managing business online
4. Apprehend different level of applications available to run the business
5. Analyze the different marketing strategies
6. Apply the different E-supply chain management relating to e- business

Unit I

E-Commerce: What is E-Com – Need- Types of E-Com-E-Com framework - E-Com and media convergence - E-Com consumer applications – E-Com organization application. Business models for E-commerce: E-business models based on relationship of transaction parties.

Unit II

Market forces influence the I-way - components of the I-way - public policy issues shaping the I-way enabling technologies of the WWW- Case studies on I – way.

Unit III

E-business models - E-payment systems – Digital payment requirements, digital E-Token systems, properties of electronic cash, and cheque payment systems on the Internet, risk and E-Payment system, designing E-Payment system, digital signature.

Unit IV

E-marketing: Traditional Marketing, identifying Web presence goals, browsing behavior model, on-line marketing, E-Advertising, internet marketing trends, E-Branding, marketing Strategies.

E-customer relationship management: Customer relationship management, typical business touch points.

Unit V

E-supply chain management: E-Supply chain -E-strategy: Information and strategy, the virtual value chain, seven dimensions of E-Commerce strategy, value chain and E-Strategy, planning the E-Commerce Project, Strategies for Web site development - Case study: mobile commerce

Note: Emphasis will be given on Case discussion and Article reviews.

Text Books:

1. Joseph. P.T, “E-commerce A Managerial Perspective”. 1st Edition, Prentice Hall of India. New Delhi, 2002
2. Ravikalakota, Andrew B. Whinston, “Frontiers of E-commerce”, 1st edition. Pearson Education Singapore, 2000

References:

1. Jason R. Rich, “The Unofficial Guide to Starting an E-commerce Business”, 1st edition. IDG Books India Private Limited, New Delhi, 2008.
2. Laudon Traver, “E-Commerce (Business, Technology)”, Pearson Education, 2007.
3. David Whitley, “E-Commerce”, TATA McGraw Hill, 2009.

Journals:

1. E-commerce time.com, Magazine on Internet – Online
2. International Journal of E-Commerce
3. International Journal on media management

Course Objectives

- To understand project management cycle in software development
- To study resources planning in software development
- To know about acquisition Process of Hardware, Software and Network
- To know the different ways of testing and quality models for software projects
- To apprehend different acquisition process and performance evaluation used
- To understand the risk management associated with implementation of software management

Course outcomes (Cos):

1. Able to identify the software models and software development process
2. Analyze the risk management in project finance
3. Design Resources Planning suitable for organization
4. Ability the undertake testing and develop quality models for software projects
5. Evaluate the acquisition process and its performance
6. Able to identify and managing risk in software

Unit I

Introduction-Software Project Management - An overview of Project planning- Stepwise planning- -Overview of COCOMO Model, PERT/CPM, Reileigh Curve -Project Organization - Risk Management -Project Finance -Procurement Management -Project Scheduling

Unit II

Software Project Management -Resources Planning and Estimation, Different Methods in brief- Function Point Analysis in some details-Use of CASE Tools-Introduction to MS Projects- Design and Development –Schedule -Resource Allocation-Progress Review

Unit III

Testing -Overview of Test Plan-Generation of Test Cases, Test Data -Types of Testing -Quality Concepts - ISO, CMM -Production / Implementation -User Acceptance Tests -Parallel Runs- Maintenance -Types - Adaptive, Corrective, Preventive Version Control and Configuration Management-Documentation Methods for all these topics.

Unit IV

Acquisition Process - Hardware, Software, Network, Infrastructure -Requirement Planning-
 Sizing-Selection Methodology including Benchmarking -Documents involved
 IT HRM –Selection –Retention –Training -Career Path Planning -IT Operations –Scheduling -
 Performance Evaluation

Unit V

Risk management- Nature of risk- Managing risk- evaluating risk - A software management
 process frame works- Life cycle phases- software maintenance and configuration management.
 Maintenance characteristics- Maintenance task- Maintenance side effects

Text books:

1. Roger S. Pressman & Martin L.Shooman David Gilbert, “Software Engineering”
2. Edwin Bennetan, “Software Project Management”.

References:

1. Donald. J. Reifer, “Software Project Management”, 6th edition, Wiley 2006.
2. Kelkar, “Software Project Management”, 2nd edition, Prentice Hall India,2007
3. Roger. S. Pressman, “Software Project Management”,3rd Ed, Himalaya publishers, 2007

Journals:

1. IEEE journals of data compression
2. IEEE data engineering-bulletin (Vol 15-20), 2002

Course objectives

- This course aims to enhance the understanding of the students with respect to the conceptual framework and the technological infrastructure of Enterprise Resource Planning.
- It also aims to expose the students to the implementation issues and future trends associated with ERP.
- To know the future trends in ERP systems to have good relation with customers.
- To understand the concept of Enterprise Resource Planning, its implementation, future trends in ERP and apply the learning's lifelong.
- To evaluate the need of ERP for an organization, select the best vendor and implement the module that is appropriate for the organization need
- To apprehend different Sales and Distribution tools used

Course outcomes (Cos):

1. Determine the right choice of ERP systems curtailing the needs of organization
2. Gain insight in storage management database administrator
3. Evaluate the factors determining the success and failures of ERP
4. Illustrate how current technologies and decision-support tools can be utilized to the advantage of business operations
5. To analyze the future trends in ERP systems to have good relation with customers.
6. To apprehend the application of different Sales and Distribution tools for business.

Unit I

Introduction- purpose of database system –View of data-data models-database languages-transaction management-storage management database administrator-database users-system structure.

Unit II

Entity relational model: basic concept –key entity relationship diagram, weak entity sets, E-R features, specialization, generalization, relational model-structure of relational databases-relational algebra-views.

Unit III

SQL –background- basic structures-set operations-aggregate functions-null values-nested –sub queries-derived relations-views –modification of the database-joined relations-data definition language-embedded SQL features – Data warehousing-concepts-architecture-data transformation-user interface-distributed database.

Unit IV

ERP concepts: introduction to ERP system-review of DBMS & Transaction processing concepts – Information models – Financial model – Financial Accounting, controlling - Issues in Customizing - ERP system for organization. Introduction to Business Information flows – Work flows.

Unit V

Sales and distribution – basic functions – billing – Electronic data interchange – transportation .Case studies – SAP R/3, people soft – oracle financials – development tools – administration tools – reporting and analysis tools and integration tools – BPR – implementation project management – meaning – business benefits of ES

Note: Emphasis will be given on Case discussion and Article reviews.

Text Books:

1. Abraham Silberschatz, Henry F Korth, S.Sudharshan, “Database System Concepts”, 3rd edition, Tata Mc Graw Hill, New Delhi, 2007
2. Michael Hammer, “Enterprise Resource Planning” 3rd edition, Tata Mc Graw Hill, New Delhi, 2008

References:

1. Alexis Leon and Mathews Leon. “Database Management Systems”.1st Edition. ,Vikas Publication New Delhi 2009
2. Raghu Rama Krishnan, Johannes Gehrke. “Database Management Systems”, 3rd Edition. Tata McGraw Hill. New Delhi 2008

Journals:

1. IEEE Journal of Data compression
2. IEEE Data Engineering – Bulletin (Vol-15-20), 2002

15 MBAPE401A**4 0 0 4**

TECHNOLOGY INNOVATION AND SUSTAINABLE ENTERPRISE FOR MANAGEMENT

Course Objectives

- The course focuses on different matters of importance related to Technology and Innovation Management.
- Provides clear understanding on the Technology Transfer and Joint Ventures
- Enable students to know web marketing and its strategies in marketing research.
- To know about Web Marketing strategies
- To understand E-Mail Marketing and Instant Market Research
- To study Enterprise Resource Planning from an entrepreneurial perspective

Course Outcomes (Cos):

1. Appreciate the role of technology in the modern business economy
2. Analyze the key aspects of Technology Transfer and Joint Ventures and implement in business
3. Assess and develop the necessary critical factors in the Web Marketing
4. Identify and evaluate opportunities for new technologies
5. Compare and contrast the different forms of intellectual property protection in terms of their key differences and similarities.
6. Students will be able to analyze the Enterprise Resource Planning and e-Business Blueprint Planning

Unit I

Innovation: - Need - Objectives of innovation - Technology innovation - its importance - Knowledge Management- need - Business strategies related to knowledge management - Knowledge Management Approaches-Transformation of an enterprise through Knowledge Management - Creating Knowledge Management System in Organization Establishing Knowledge Management through IT- Organizational culture for Knowledge Management - Future of Knowledge Management

Unit II

Technology Transfer and Joint Ventures -Policy, Procedure & Practices-India's Technology base and Capabilities-Preference of Indian Technology-major Constraints and problems- Operational constraints-Problems in Indian Business Environment Problems in Finalization of Agreement-

Major Problems in Technology transfer Collaboration Agreements, R& D, Import Substitution, Scaling, Diagrams- Patterns and Intellectual Property rights.

Unit III

Web Marketing- Meaning- Benefits of Web Marketing-Myths and Facts in Web Marketing- Web Psychology: Understanding the Internet mind- The Internet and the Law: Copyright, Censorship, Privacy, Jurisdiction- Do's and Don'ts on Web.

Unit IV

Web marketing Strategies- Choosing the strategy- Online store fronts -Target Marketing Attracting Customers- Web Advertising - E-Mail Marketing-Instant market research -Securities Issues

Unit V

Enterprise Resource Planning: The E- Business backbone -Meaning- ERP decision Enterprise Architecture Planning- ERP Implementation- The Future of ERP Applications- Procurement- e-Business Blueprint Planning.

Text book:

1. Technology Transfer and Joint Ventures Abroad-R.R.Azad, Deep& deep Publications, New Delhi

Reference Books:

1. Knowledge Management for Competitive advantage - Harish Chandra Chaudharaty, Excel Books Publications, New Delhi
2. Web Advertising and marketing Thomas J Kuegler,Jr. Jrd Edition-Prentice- Hall of India, New Delhi
3. E-Business Roadmap for Success- Dr.Ravi Kalakota- Perason Education
4. "Frontiers of Electronic Commerce", Ravi Kalakota, Andrew B. Whinston, Addition -Wesley, 2000.

Course Objectives:

- To know the fundamental parameters used to generate an idea for business plan
- To understand the business plan sources through trade and industries associations
- To study the industry analysis for applying skills and tools to manage and analyze the gap.
- Helps to understand the marketing plan and sales strategy
- To acquire knowledge on emerging ethical issues in business
- To develop the ethical decision making process

Course Outcomes (Cos):

1. Prepare a business plan considering the basic parameters of capital management and change
2. Critically analyse the sources of information for business plan
3. Identify the gap for applying expertise skills and tools.
4. Evaluate the emerging ethical issues in business.
5. Formulate the ethical decision making process
6. Analyze the Business Ethics in a Global Economy and emerging ethical issues in business

Unit I

Business Plan - Meaning- The why of business plan - Basic parameters - Timing of decision undertaken Project parameters - the common considerations - Factors of successful business - capital management- financial control - anticipating change and adaptability.

Unit II

Business plan process - sources of information - Internet, government sources and statistics - offline research resources - library - SBDC'S - Trade and industries associations - sources of market research - evaluating data- benefits of market study - coverage of market study - information sources.

Unit III

Business plan components - The Executive summary - company description - Industry analysis and trends - Target market - Competition - strategic position and risk assessment - Marketing plan and sales strategy - operations - Technology plan - management and organization

Unit IV

Business ethics - Definition and importance - Benefits of business ethics - emerging ethical issues in business - Ethics as a dimension of social responsibility.

Unit V

The ethical decision making process - understanding ethical decision making and corporate governance - Individual factors - organizational factors - Implementing and auditing ethics programs - Business ethics in a global economy

Text book:

1. Business ethics - Ethical decision making and cases. O.C. Ferrell John Paul 23.

Reference books:

1. Fraedrich, Linda Ferrell. 6th edition, published by Biztantra.
2. Business ethics - William H. Shaw 4th edition Published by Thomson Wadsworth
3. Rhonda Abrams " The Successful business Plan Secret \$ Strategies " prentice
4. Rhonda Abrams "The business plan in a day" Prentice.
5. Business plan preparation - Entrepreneurship Development Institute of India

Course Objectives:

- To understand entry of multinationals and innovation of new products
- To study cultural impacts and changes on business
- To study the international trade theories and strategies for managing global entry
- To get familiarize with the Import and Export Acts
- To gain knowledge on the strategic responses to changing environment
- To know the legal acts in India relating to Industry.

Course Outcomes (Cos):

1. Evaluate the modes of entry of multinationals and innovation of new products
2. Demonstrate the Social Responsibility of Business.
3. Critically analyse the cultural changes and its impact on business
4. Formulation of strategies to get profit from global business
5. Estimate the export and import acts for managing global entry.
6. The student will able to evaluate the legal acts in India relating to Industry and the role of cultural diversity in Business Environment.

Unit I

Business - Concepts and Significance - Entry of Multinationals - New Changes in Business - Innovation of new products - Technological changes – Competition in Business - Social Responsibility of Business.

Unit II

Cultural concept - Cultural change - Culture and Workplace - Cross culture - Culture and Competition - Differences in culture - Cultural theories - Impact of Culture on Business - Managing Cultural impacts and changes.

Unit III

Nature of Competition - Heckscher Ohlin Theory - The new Trade Theory - National Competitive Advantage - Porter's Diamond - Impact of Competition - Managing Competition - Updating of new technology. Era of Globalization - Significance - Strategy and the firm - Profiting from Global Expansion - Pressures for cost reductions and Local responsiveness - Strategic Choice - Entry mode - Liberalization of Indian economy - Export and Import acts - Managing global entry

Unit IV

Strategic Responses to changing environment - Portfolio Related, Process Related and Structure Related - Aligning HR Strategy - strategic Changes - Planned Changes - drawbacks- Unplanned Change - Steps in Planned Change - Changes and Amendments in Labors Laws - International Trade Unions and Business Associations

Unit V

Legal acts in India - Industrial Developmental Regulation Act (IDRA) - New Industrial Policy - New Economic Policy - Abolition of MRTP Act and introduction of Competitive Act - Consumer Protection Act - Imposing of MODVAT in India - Political Environment -Political uncertainty - Impact of Politics on Business- GATT - WTO- TRIPS –TRIMS - Consumer movements, Right to information

Text book:

1. Business Environment - Francis Cherunilam. (Himalaya Publishers)

Reference Books:

1. Business Environment - Aswathappa. (Himalaya Publishers)
2. International Business - Francis Cherunilarn. (Prentice Hall of India).
3. International Business: Competing in the Global Market Place - Hill. C. W. (Tata McGraw - Hill Publishing Corporation Limited, New Delhi).
4. Indian Economy - A. N. Agarwal. (Wishwa Prakashan).

Course Objectives:

- To understand documentary credits and letters of credit
- To apprehend to export finance and Pre-shipment finance
- To study the different types of post-shipment finance
- To understand the strategic rules governing import credit
- To know the Export and Import policy of India
- To provide knowledge on the various incentives given by the Government of India for exports

Course Outcomes (Cos):

1. Ability to file documentary credits and letters of credit
2. Critically analyse export finance related to Pre-shipment finance and documentation
3. Critically analyse the rules governing the post-shipment finance
4. Examine the strategic rules governing import credit
5. Evaluate the Export and Import policy of India and role of RBI in export finance
6. Evaluate the incentives given by the Government of India for exports

Unit I

Introduction to Documentary credits - Documentary Credits, Letters of Credit, Parties to letters of credit, Types of letters of credit, Documents in documentary credit. FOB, CIF, C&F

Unit II

Export Finance – Pre-Shipment Advance - Pre-shipment finance, Types of Pre-shipment finance, Disbursements of packing credit advance, Overdue Packing Credit Advances and their follow up, Packing Credit in Foreign Currency (PCFC). Transshipment

Unit III

Export Finance – Post-Shipment Advance - Post – shipment finance, Rules governing post-shipment finance, Types of post-shipment finance, Crystallization of overdue export bills and their follow up. Forward cover procedure

Unit IV

Imports - Import letter of credit, Rules governing Import credit, Forward exchange contracts for imports, Payment for import of goods. Technology imports procedure

Unit V

ECGC and EXIM Bank - Export and Import policy of India, Incentives given by the Government of India for exports, Role of RBI in promoting export credit, ECGC – Types of policies, EXIM bank – its role and their promotional activities. Foreign Trade shows

Text Book:

1. Reserve Bank of India, *Documentary Credits*, Mumbai: Foreign Exchange Dealers' Association of India, 2000.

Reference Books:

1. Reserve Bank of India, *Exports Finance*, Mumbai: Foreign Exchange Dealers' Association of India, 2000.
2. Reserve Bank of India, *Trade and Exchange Control Regulations Relating to Imports*, Mumbai: Foreign Exchange Dealers' Association of India, 2000.
3. Dun and Bradstreet, *Foreign Exchange Markets*, New Delhi: Tata McGraw-Hill, 2007.
4. Thummuluri Siddaiah, *International Financial Management*, New Delhi: Pearson, 2010.

Course Objectives:

- To make the student to aware of accumulation of NPA, rule regarding rehabilitation of sick units and recovery of dues
- To know the procedure for classification of non-performing assets
- To study the concessions under Income Tax Act for mergers and unwillingness to pay and inability to pay
- To understand the process of recovery of advances and the role of Credit Guarantee Corporation.
- To know about provisioning to various Non- Performing assets and write – off of advances
- To understand Securitization and Reconstruction of Financial Assets and Securities Interest Act

Course Outcomes (Cos):

1. Analyze the impact of sickness on industries and ways & means of preventing sickness
2. Classify the non-performing assets accumulated in their organization
3. Evaluate the concessions under Income Tax Act for mergers and unwillingness to pay and inability to pay
4. Student will discover the process of recovery of advances
5. Understand the importance of Credit Guarantee Corporation
6. Develop the procedure for Accounting Practices.

Unit I

Sickness and its Prevention - Causes and detection of sickness, Follow up of advances, Post – sanction inspection, ABC norms, Sick Industrial companies Act – BIFR. Risk averseness

Unit II

Non-Performing Assets - Introduction to NPAs, Income Recognition, Asset classification: Standard, Sub-standard, Doubtful and loss assets, Provisioning to various Non- Performing assets and write – off of advances. Gross NPA and Net NPA

Unit III

Rehabilitation of sick units - Classification of units as viable and non-viable, Guidelines for drawing rehabilitation scheme, revival by Mergers and Amalgamations, Concessions under Income Tax Act for mergers. Unwillingness to pay and inability to pay

Unit IV

Recovery of dues - Corporate Debt Restructuring, Civil suits, Debt Recovery Tribunal, Securitization and Reconstruction of Financial Assets and Securities Interest Act SARFASI, Asset Reconstruction Company, Compromise agreements CIBIL

Unit V

Credit Guarantee Corporation - Objectives of Credit Guarantee Corporation, the small loans Guarantee scheme, the small loans (SSI) Guarantee Scheme, Accounting practices. Crop insurance

Text book:

1. I. M. Pandey and Ramesh Bhat, *Cases in Financial Management*, New Delhi: Tata McGraw-Hill, 2000.

References:

1. Master Circular on NPA – Norms for Classification of Advances, www.rbi.org.in
2. Master Circular on Prudential Norms on Capital Adequacy, www.rbi.org.in
3. Master Circular on A Guide to Deposit Insurance, www.dicgc.org.in
4. Ciaran Walsh, *Key Management Ratios: How to Analyze, Compare and Control the Figures that Drive Company Value*, New Delhi: Macmillan India Ltd., 2006.

Course Objectives:

- To make the student to aware of regulations of RBI to banks
- To know the market risks- interest rate risks for asset and liability management
- To study the credit quality problem and credit scoring models for measurement of credit risk
- To study the basics of reducing off-balance sheet risks and comprehend Commercial letters of credit
- To understand the regulations of RBI to mitigate the risks
- To understand foreign exchange risk and the role to follow capital adequacy norms

Course Outcomes (Cos):

1. Classify the various risks faced by the banks
2. Student can able to analyze the regulations of RBI to banks on various risks.
3. Formulate the procedures for reducing market risks- interest rate risks for asset and liability management
4. Ability to develop the methods for measurement of credit risk,
5. Analyze off-balance sheet risks and commercial letters of credit and provide solutions
6. Estimate the solvency nature of a company and foreign exchange risk.

Unit I

Introduction to Risks - Risk, An introduction to various risks faced by banks, the impact of risks on banks profitability and the regulations of RBI to mitigate these risks. Zero risk assets

Unit II

Market Risks - Interest rate risks, Rate sensitive assets, Rate sensitive liabilities, Re-pricing risks, Liquidity risk, Asset liability management Committee: role and purpose. Maturity buckets

Unit III

Credit Risk - Credit quality problems, Meaning of willful default and inability by borrower to pay the dues, Measurement of credit risk, Credit scoring models, Loan portfolio and concentration risk. Discriminant analysis

Unit IV

Off-Balance Sheet Risks - Commercial letters of credit, Standby letters of credit, Guarantees,

Derivative contracts: basics of reducing off-balance sheet risks. Notes on accounts

Unit V

Other Risks - Operational risk, Foreign exchange risk, Country or sovereign risk, Technology

risk, Insolvency risk and Capital adequacy norms. Sovereign rating by credit rating agencies

Text book:

1. Jayadev, *Commercial bank Management*, New Delhi: Tata McGraw-Hill, 2011

References:

1. Ciby Joseph, *Credit Risk Analysis: A tryst with strategic prudence*, New Delhi: Tata McGraw-Hill, 2007.
2. Mark S. Dorfman, *Introduction to Risk Management and Insurance*, New Delhi: PHI, 2009.
3. Dun and Bradstreet, *Financial Risk Management*, New Delhi: Tata McGraw-Hill, 2007.
4. Rene M. Stulz, *Risk Management and Derivatives*, New Delhi: Thomson South-Western, 2006.

Course Objectives:

- To have an exposure in international retailing segmentation
- To understand the trends in retail marketing and changing nature of boundaries.
- Students have basic understanding of Multi country Competition and Global Competition
- Acquire knowledge for entering and competing in foreign markets.
- To have clear insight of the Stages in development of International Operations
- Students learn about public relation and sales promotional strategies

Course Outcomes (Cos):

1. Analyze the international retailing and markets.
2. Discover the strategies and options for entering and competing in foreign markets.
3. Construct marketing tools and techniques to meet Multi country Competition and Global Competition
4. Access the retail operation through formulation of retail structure.
5. Gain knowledge on international retailing and markets.
6. Mapping Market Research and Sales Promotion Strategies

Unit I

International Trade – Barriers and Facilitators - Regional Economic/Political Integration - Cultural Influences on International Marketing - International Marketing Segmentation – Positioning - The Marketing Plan and Entry Mode Selection

Unit II

International Retailing - definitions, interpretations - Trends in the internationalization of retailing and evolution of international retailing - Motives for international retailing - the changing nature of boundaries – International - Where retailers internationalize - Assessing the potential of retail markets - Methods of international retailing - accessing retail markets.

Unit III

Competing in Foreign Markets - Why Companies Expand into Foreign Markets - Cross Country Differences in Cultural, Demographic and Market Conditions - Concept of Multi country Competition and Global Competition - Strategy Options for Entering and Competing in Foreign Markets - Quest for competitive Advantage in Foreign Markets

Unit IV:

Retail Structure - Enterprise Density - market Concentration - Developing markets - Stages in development of International Operations – Export - Management Contracts - Franchising – Acquisition and Mergers – Organic Growth - Choice of Market Entry - Domestic Market - Retail Operations - Non Domestic market.

Unit V:

Market Research – Segmentation – Targeting - Positioning – The Market Mix - Image Product range – Format – Price – Location – Distribution – Promotion - Promotional Mix and Advertising – Publicity – Public Relations and Sales Promotion Strategies - Personal Selling and Sales Management.

Text book:

1. Abbas J Ali Globalization of Business- Practice and Theory – Jaico Publishing House

Reference Books:

1. Nicolas Alexander International Retailing-Blackwell Business Publishers Ltd.
2. Arthur A Thompson, AJ Strickland, John E Gamble & Arun K Jain Crafting – Retail Mgt. –2010-11
3. Margaret Bruce, Chistopher Moore, Grete Birtwistle International Retail Marketing: A Case Study Approach
4. Allan M Findlay, Ronan Paddison and John A Dawson Retailing Environments in Developing Countries- Rutledge

Course Objectives:

- To understand the role of retailing and strategic business management in service sector
- To study the operations and financial aspects in retail planning
- To comprehend the human resources management in retailing
- To study the legal & compliances for a retail Store
- To know the procedures applicable for a Retail Store
- To emphasize on Mall management and its various forms.

Course Objectives (Cos):

1. Analyze the role of retailing and strategic business management in service sector
2. Know the retailing in banking and other financial services
3. Design the operations and financial aspects in retail planning
4. Comprehend the human resources management in retailing
5. Ability to resolve the legal and compliances for a retail Store
6. Discover strategies for mall management and its various forms.

Unit I

Marketing & Strategic Management: Retailing - Role, Relevance & Trends - Retail Customer - Retail market segmentation & franchising - Retailing in banking and other financial services - mutual funds and Insurance - Services marketing and management

Unit II

Operations & Finance in Retailing: Retail location strategy - Product and Merchandise management – Total Quality Management - Security measures - Footfalls / computerized methods & non computerized methods - Visual / display methods - Management of Obsolete goods

Unit III

Human Resources Management in Retailing: Retail organization - Laws involved in Human Resources - Motivation - Customer psychology - Training needs for employee - Top grading - Obstacles to Top grading - Coaching to fix weakness - Interviews guide

Unit IV

Legal & compliances for a Retail Store: License - Contracts & Recovery - Legal Process -PF/ESI & Exemptions - Food & Restaurants – PPF - IR – Law - Shops & establishments - IPR Patents, Copyright & Trademarks - Inclusion of Service Mark - Procedure and Duration of Registration Collective Mark - Procedures applicable for a Retail Store .

Unit V

Mall Management: Types of Various retail formats - Concepts in mall design - Factors influencing Malls establishments - Aspects in Finance - Aspects in security / accounting - Aspects in HR - Aspects in Quality management

Text Book:

1. Retailing Management Text & Cases- Swapna Pradhan- The McGraw Hill Companies

Reference Books:

1. Retailing Management -Levy & Weitz- The McGraw Hill Companies
2. Marketing Channel- Bert Rosenbloom- South Western -Thomson
3. Marketing Creating and Keeping Customers in an e-commerce world- Wiiliam G.Zikumund and Michael d Amico- South Western –Thomson
4. Retail Management A Strategic Approach – Barry Berman & Joel R.Evans- The Prentice Hall of India, New Delhi
5. Legal Aspects of Business –Akhileshwar Pathak- The McGraw Hill Companies

Course Objectives:

- To understand the basic concepts of personal and impersonal communication in retail
- Knowledge on communication programmes to develop brand images and building customer loyalty
- Students learn about planning, implementing and evaluating communication programs for retailing
- To know the ways of planning and allocating of communication budget
- Acquire knowledge on integrated marketing communications
- To learn the suitable technology for Integrated Marketing Communications

Course Outcomes (Cos):

1. Demonstrate capabilities concepts of personal and impersonal communication in retail
2. Organize communication programmes to develop brand images and building customer loyalty
3. Analyse the planning, implementing and evaluating communication programs for retailing
4. Apply the suitable technology for Integrated Marketing Communications
5. Apply the understanding of Retailing, Retail market segmentation, Retail location, merchandising, Retail operations and Retail Pricing in lifelong practice.
6. Demonstrate capabilities of analysing problems, team work and communication skills.

Unit I

Retail Communication – methods of communicating with customers – Paid and Unpaid Communication – Personal and Impersonal Communications.

Unit II

Communication programmes to develop Brand Images and Building customer Loyalty – Extending the brand name.

Unit III

Retail communication planning – setting objectives – communication budget – allocation of the promotional budget – planning and implementing and evaluating communication programs

Unit IV

Retail Communication Mix – Advertising – Sales promotion – Public Relations and Publicity
Personal selling – Point of Purchase displays.

Unit V

Integrated Marketing Communications – E tailing – E-commerce – Applications of Technology
– EDI, DBMS – Data Warehousing – Data mining - RFID

Text book:

1. Retailing Management - Michael Levy, Barton A Weitz, Ajay Pandit

References:

1. Retailing Management Text & Cases – Swapna Pradhan
2. Retail Marketing Management – David Gilbert
3. Retail Franchising - Manish Sidhpuria

15MBAPI401A MULTILATERAL TRADE AGREEMENTS AND REGULATIONS 4004

Course Objectives:

- Attempt to appreciate the conceptual and practical aspects of trade agreements.
- Acquaint the students with environmental, procedural, institutional and decisional aspects of trade.
- To develop capabilities to understand the International Business Laws
- To understand the dispute settlement and issues related to intellectual property regime.
- To understand Implications for International business and progress made by WTO in the last one decade
- Students get familiarize on the formation of regional blocks and its impact on trade.

Course outcomes (Cos):

1. Students can able to link theoretical concepts of trade in business situations
2. Analyze the prevailing international business laws to outsource their business
3. Evaluate the value of trade of their economies and other economies
4. Understand various International Commercial Dispute Settlement
5. Compare and estimate the various trade agreements among nations
6. Ability to manage resources, identify and carry out specific goal oriented tasks

Unit – I

Historical background of International Trade, Direction and Composition of International Trade. Terms of Trade, Trade as an engine of growth. Concept of Law - Types of law, Domestic and International and their jurisdiction. Regional Trade Agreements: Concept, origin, types. European Union, NAFTA, ASEAN, MERCOSUR –their structure, decision making, funding, implications on world trade.

Unit – II

Law of WTO: Introduction, Objectives, Functions, Structure, Principles, Agreements – implications for International business, Progress made by WTO in the last one decade. Tariff and Non-tariff barriers - implications for WTO members.

Unit – III

International Business Law – International Sale of Goods, Laws governing International Sale of goods – Domestic laws, International Treaties, International Mercantile Customs and Usages –

Inco terms, Rules on International Sale of Goods, International Commercial Dispute Settlement – Reconciliation, Arbitration etc.

Unit – IV

Intellectual Property: Historical Background, IPR Administration – WIPO, WTO, Indian Patent Office, Patents, Copyrights, Trademarks, Geographical Indications, Industrial Designs, Layout Designs, Trade secrets.

Unit V

Selected Regional Blocks- NAFTA, EU, ASEAN, SAARC, SAPTA, Indo-Lanka Free trade, Indo -Singapore CECA Globalization vs. Regionalization

Text book:

1. Vinod V Sople, “Managing Intellectual Property” PHI Learning Private Limited

Reference:

1. Palle Krishna Rao, “WTO text and cases” Excel Books

Course Objectives:

- To make students understand international trade and formation of economic integration
- To enhance knowledge on gains from trade and terms of trade
- To acquire knowledge on the determination of exchange rate, tariffs and quotas
- Students learn about the balance of payments and its consequences.
- To understand the concept and limitations of Foreign Trade Multiplier
- Familiarize the students with the knowledge of export promotion measures and growth of foreign trade

Course Outcomes (Cos):

1. Analyze the significance of Inter-regional and international trade for an economy
2. Gain insight on the regional integration of economies and multilateral arrangements
3. Analyze the impact of exchange rate fluctuation on home currencies
4. Students evaluate the policies pursued by various economic bodies in international trade
5. Analyze the balance of payments and its impact on business
6. Evaluate the benefits and schemes of government and other bodies for promotion of exports

Unit I

Introduction: International Economics- meaning, Scope & Importance Inter-regional and international trade. Importance of International Trade. Theoretical Aspects of Economic Integration: Free trade area, customs union and common market; Theory of customs union; Trade creation and Diversion effects.

Unit II

Theories of International Trade. Theory of Absolute Cost Advantage, Theory of Comparative Cost Advantage. Intra-Industry Trade. Gains from Trade, Measurement of gains, static and dynamic gains. Terms of trade – Importance & Types, Determinant's of Terms of trade, Causes of unfavorable terms of trade to less developed countries.

Unit III

Trade policy & Exchange Rate, Free trade policy - case for and against, Protections – case for and against, Types of Tariffs and Quotas, Determination of Exchange rate, Fixed & Flexible Exchange Rate- Merits & Demerits.

Unit IV

Balance of Payments, Balance of trade and Balance of payments: Concepts and Components - Equilibrium and Disequilibrium in Balance of Payments; Causes and Consequences, Measures to correct deficit in the Balance of Payments. International Monetary System, Devaluation; - Merits, Demerits and Limitations, Foreign Trade Multiplier; - Concept and Limitations, IMF, World Bank – Objectives, Functions & Performance.

Unit V

Foreign Trade in India, Recent changes in the composition and direction of foreign trade; Causes and Effects of persistent deficit in the Balance of Payments; Measures adopted by the Government to correct the deficit after 1991; WTO & India Export Promotion measures, Partial and Full convertibility of Indian Rupees, Export Promotion – Contribution of SEZ Foreign Trade policy 2009, Role of Multinational Corporations in India.

Text book:

1. Cherunilam, Francis, *International Economics*, TATA McGraw-Hill Publishing Company Ltd, New Delhi.

References:

1. Krugman, P.R. and M. Obstfeld, *International Economics : Theory and Policy*, Pearson.
2. D. Salvatore, *International Economics*, Wiley India.
3. Soderste, *International Economics*, Macmillan Press Ltd.

Course Objectives:

- To have an exposure to International Distribution system and Logistics
- To understand the code of conduct in Logistics and International marketing channel decisions.
- To acquire knowledge on the procedures and role of intermediaries in ocean transportation
- Detailed overview of the important sea routes and shipping ports and cost involved in consignments
- To provide knowledge with the consignment of goods through air transport
- To get an insight on the inventory control and warehousing facilities

Course Outcomes (Cos):

1. Evaluate the significance of the value adding perspective of logistics and distribution system.
2. Analyze the freight structure and practices of shipping
3. Make Strategic and Operational logistics decisions in the context of different modes of shipping
4. Practice of planning for inventory control and warehousing facilities
5. Gain knowledge to analyze the significance of Logistics in Global scenario.
6. Analyze the liners and freight structures to plan for business outsourcing

Unit I

Marketing Logistics: Concept, objectives and scope; System elements; Relevance of logistics in international marketing; International supply chain management and logistics; Transportation activity – internal transportation, inter-state goods movement; Concept of customer service.

Unit II

General Structure of Shipping: Characteristics, liner and tramp operations; Code of conduct for liner conferences; Freight structure and practices; Chartering principles and practices; UN convention on shipping.

Unit III

Developments in Ocean Transportation: Containerization; CFS and inland container depots; Dry ports; Multi-modal transportation and CONCOR; Role of intermediaries including freight booking, shipping agents, C&F agents, Ship owner and shipper consultation arrangements.

Unit IV

Air Transport: Air transportation –total cost concept, advantages, freight structure and operations; Carrier consignee liabilities.

Unit V

Inventory Control and Warehousing: Inventory management – concepts and application to international marketing; Significance and types of warehousing facilities; Total cost approach to logistics.

Text book:

1.D.M ,Lambert, S.R,James, *Strategic Logistic Management*, Tata McGraw Hill, New Delhi,.

References :

1. Branch, Alan, *Global supply chain management and International logistics*, Routledge.
2. G, Raghuram, *Shipping Management: Cases and Concepts*, Macmillan Publishers India ltd.
3. Sherlock, Jim, *Physical Distribution*, Wiley Blackwell.

Course Objectives:

- To understand the purchase functions and materials management.
- To study the vendor development and maintenance for purchasing of capital goods.
- To familiarize with materials planning and codification.
- To recognize the legal aspects of buying and assess the industry ethical practices in materials
- To familiarize the knowledge of warehousing management.
- To provide knowledge on the Materials Management Information system

Course Outcomes (Cos)

1. Demonstrate the concept vendor development and maintenance for purchasing of capital goods.
2. Able to manage and plan material flows and related information flows as part of the company's logistics process.
3. Examine the vendor's development and maintenance for purchasing of capital goods.
4. Creating practical engineering solutions for materials planning and codification
5. Classify the functions of Materials Management Information System
6. Develop a model for warehousing management and import-export logistics management.

Unit I

Purchasing Functions - Relationship of purchasing Department with other departments, Procurement, Supply management activities, Purchasing objectives and policies, Operating procedures, Purchasing cycles, Objectives of materials management, Organization of material function.

Unit II

Supply Sources - Importance of source selection, Vendor development & maintenance, Vendor rating, Competitive bidding, selecting the source, Negotiation: Objectives, Process, Techniques, Price negotiation, Purchasing of capital goods, Seasonal commodities, Insurance spares. Contract management

Unit III

Materials Planning - Materials Codification: Evolution of codes, Classification, Methodology, Advantages, Standardization: Definition, Specification, Advantages, Techniques, Pricing Principles: Price analysis, Discounts, Economic consideration in determining the right price

Unit IV

Materials Management - Materials management, Legal aspects of buying, Buyer-Seller relationship and ethics Industry ethical practices in Materials

Unit V

Warehousing Management - Stores management, Incoming material Control, Stores documentation & accounting, Materials Management Information System (MMIS). New developments in MMIS

Text book:

1.S.Chatterjee, “*Applied Materials Management*”, New Delhi: SAGE Publications, 2004.

References:

1. Tony Arnold J R and Stephen N Chapman, “*Introduction To Materials Management*”, New Delhi: Prentice Hall of India, 2009.
2. Gopalakrishnan P and Sundaresan M “*Material Management: An Integrated Approach*”, New Delhi: Prentice Hall of India Pvt Ltd, 2004.
3. A.K. Datta, “*Materials Management Procedures, Text and Cases*”, New Delhi: Prentice Hall of India Pvt. Ltd, 2009.
4. P. Gopalakrishnan, “*Purchasing and Materials Management*”, New Delhi: Tata McGraw Hill Publishing Company Limited, 2001.

Course Objectives

- To understand the concept of supply chain and logistics.
- To get familiarize with the key drivers of supply chain performance.
- To acquire knowledge of supply chain inventory
- To have clear understanding of supply chain network optimization models
- To provide basic concepts of freight management and ocean carrier management
- To enable the students to understand the international logistics and analytical tools necessary to solve supply chain problems.

Course Outcomes (Cos):

1. The students able to demonstrate the connection between company's internal materials management and the network in supply chain.
2. The students able to evaluate the material flow and related information flow as part of the company's logistics process.
3. Illustrate the engineering solutions to solve existing conflicts between good customer satisfaction and working capital.
4. The students will understand the importance of accurate planning and product data management as a part of Logistics Management.
5. Familiarize the key drivers of Logistics outsourcing.
6. Get an in-depth knowledge in Transactional Logistics

Unit I

Supply Chain - Fundamentals, Importance, Decision Phases, Process view, "Supplier-Manufacturer-Customer chain", Supply chain performance: Drivers, Structuring supply chain. Overview of supply chain models

Unit II

Overview of Demand forecasting in the supply chain - Aggregate planning, Managing predictable variability. Managing supply chain cycle inventory, Uncertainty, safety inventory, Determination of optimal level of product availability, Coordination in the Supply Chain

Unit III

Distribution Network Design - Role, factors influencing network, options, Value Addition. Models for facility location and capacity planning. Network design: Impact of uncertainty,

decisions using decision trees. Distribution center location models. Supply chain network optimization models. New developments in network designs

Unit IV

Logistic System - Evolution, Infrastructure and Networks. Freight Management, Route Planning, Containerization. Modal Characteristics, Inter-modal operators and transport economies. Ocean carrier management, import-export logistics management. Logistics outsourcing, 3PL / 4PL, Importance of Insurance, Reverse logistics

Unit V

Transactional Logistics - Framework and role of supply chain in e- business and b2b practices. Supply Chain IT Framework. International supply chain, GPS, tracking system, Software Packages in Supply Chain

Text book:

1. Sunil Chopra and Peter Meindl, *Supply Chain Management*, New Delhi: Pearson Education, NewDelhi, 2010.

References:

1. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi and Ravi Shankar, *Designing and Managing the Supply Chain*, New Delhi: Tata McGraw Hill Ltd, 2007.
2. Jeremy F Shapiro, *Modeling the Supply Chain*, New Delhi: Cengage India, 2006.
3. David N. Burt, Donald W. Dobler and Stephen L. Starling , *World Class Supply Management: The Key to Supply Chain Management*, New Delhi: McGraw-Hill, 2010
4. Sople Vinod V, *Logistics Management – The Supply Chain Imperative*, New Delhi: Pearson Education, 2007.

Course Objectives:

- To make the students understand the basic concepts of total quality management and appreciate its importance in today's business environment.
- To understand the quality management practice and TQM tools and its application in improving the organizational performance.
- To provide an insight on the process approach to TQM
- To get exposure on tools and techniques of various quality tools.
- To know the ways of winning quality awards
- To familiarize the students about the Quality Management System.

Course Outcomes (Cos):

1. Demonstrate the knowledge of quality management to improve organizational effectiveness.
2. Student will able to practice various aspects on total quality management
3. Acquire required diagnostic skills on use of various quality tools.
4. Student will get exposure on tools and techniques of quality management
5. Student will familiarize about the Quality Management System.
6. Apply the Quality tools and techniques in improving the performance.

Unit I

Introduction - Introduction and basic concepts, Definition of quality, Dimensions of quality, Evolution of TQM, TQM frame work, Cost of Quality.

Unit II

TQM Implementation - Leadership for TQM, Deming's quality principle, TQM implementation, PDCA cycle, Quality Circles, Quality Council, Supplier Partnership.

Unit III

Process approach to TQM - Process approach, Juran's Trilogy, Taguchi's loss function, Kaizen, Quality by design, 5S, ESI (Early Supplier Involvement), 5M.

Unit IV

Tools and Techniques - 7 Old quality control tools, Total productive maintenance, Failure mode and effect Analysis, POKAYOKE, Six Sigma, Toyota and Six Sigma.

Unit V

Quality Management Systems - Management systems for TQM, ISO 9000 & 14000 Quality management systems, Auditing and certification Process, Quality Awards

Text book:

1. Subburaj Ramasamy, “Total Quality Management”, New Delhi: Tata McGraw Hill Publishing Co. Ltd, 2008.

References:

1. Dale H. Besterfield et al, “Total Quality Management”, New Delhi: Pearson Education, 2011.
2. J.R. Evans and W.M. Lindsay, “Quality control and Management”, New Delhi: Cengage Learning 2010.
3. Barrie G Date, Ton Van Der Wiet and Jos Van Iwaarden, “Management Quality”, New Delhi: Wiley Publications, 2012.
4. Greg Brue, “Six Sigma for Managers”, New Delhi: Tata McGraw Hill Publishing Co. Ltd, 2002.

Course Objectives:

- To assess the overall knowledge of the student in the relevant field of Management
- Realize the knowledge and skills required to excel in their career
- To test their learning and understanding of various concepts of the syllabus during the course of their programme
- To acquaint the students with fundamentals of communication and help them to transform their communication abilities
- To obtain frameworks and tools to effectively analyze and approach various Organizational situations.
- To prepare the students to face interview both in the academic and the industrial sector

Course Outcomes (Cos):

1. Students get equipped with skills and knowledge to excel in their future careers
2. To develop an in-depth knowledge on the management concepts, theories and principles
3. Develop an ability to analyse and interpret contents and concepts to provide meaningful information in making management decisions
4. Recognize the application of various techniques to achieve the objective of the task
5. Determine opportunities and emerging challenges in the upcoming business trends
6. Demonstrate capabilities of problem-solving, critical thinking, and communication skills related to various courses.

A Comprehensive Viva Voce will be conducted at the end of the Semester. The panel shall consist of an external expert and faculty members who handled the courses. The viva is aimed to evaluate the student's knowledge in all the core and elective courses in the particular semester.

Course Objectives:

- To understand the problems in the functional areas of business enterprises
- To instill a spirit of work behavior among the student participants.
- Internship is aimed to feed industry - institutional- orientation among the students
- To sensitize students to the nuances of corporate culture and familiarize them with the corporate code of behavior.
- Learn actual supervised professional experiences.
- To understand the working environment and functions of departments

Course Outcomes (Cos):

The students will be able

1. Develop the skills, knowledge, attitudes, and perceptions along with the experience needed to constitute a professional identity.
2. Gain actual supervised professional experiences.
3. Get insight in working of the real organizations
4. Analyze the work behavior of the specific functional areas.
5. Match linkages among different functions and departments.
6. Discover career opportunities to students in exploring in their areas of interest.

Every student has to undergo major project in a company for a period of 25 working days during the fourth semester. He / She has to submit a project report containing details of company, company profile, different functional area problems and prospects. The project should be done during the fourth semester. A research project may be based on primary / secondary data.

The report should be well documented and supported by –

- Cover & Title Page
- Certificate, Company Certificate & Declaration
- Acknowledgement
- List of Contents, List of Tables & List of Charts
- Introduction of the Study
- Review of Literature
- Research Methodology
- Data Analysis & Interpretation
- Findings, Suggestions & Conclusion

- Bibliography
- Appendix

Course Objectives:

- To understand the human resource management
- To increase knowledge of HR planning, Selection, Recruitment, job analysis and its interrelations.
- To gain information on HR questions
- To know about Do's and Don'ts in HR Interview
- To understand the concept of role play
- To get an in-depth knowledge of global HR practices

Course Outcomes (Cos):

1. The ability to speak clearly, persuasively, and forcefully
2. Exhibit important life skills including Decision making, Problem solving and creative thinking.
3. Anticipate what they gain from educational experience
4. Track their progress and set bench mark
5. Identify the methods of assessment of knowledge and skills
6. Plan appropriate strategies to enrich the need based learning techniques

Introduction to HR - HR questions and Do's and Don'ts in HR - HR Interview - Mock HR – Role Play.

பாடத்திட்டப்பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கைமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

1. இந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாகஇடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்தமுழுமையானஅறிமுகம்பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல்மற்றும்தொல்லியல்சார்ந்தஆவணத்தேடலுக்குரியஆய்வுமனப்பான்மையுடன், இலக்கியங்களைஅணுகுதல்.
3. தமிழின்வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்' ; 'இணையதமிழ்' குறித்தபன்னோக்குஅணுகுமுறையிலானஆய்வுச்சிந்தனைமேம்பாடு.
4. வேலைவாய்ப்புக்குரியசுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத்திறன்மேம்பாடும்பெற்றிருத்தல் .
5. சமுதாயமற்றும்வாழ்வியல்மதிப்புகளைப்பேணுவதற்குக்கருவியாகஇலக்கியங்களைநாடுகின்றமனப்பான்மைவளர்ச்சி.
6. மொழிபெயப்புத்துறைசார்ந்தவேலைவாய்புத்திறன்பெற்றிருத்தல்

அலகு – I :இக்காலஇலக்கியம்

தத்துவம் : மகாகவிபாரதியார்- பகைவனுக்குஅருள்வாய்.

கவிஞர்ந.பிச்சுமூர்த்தி- கிளிக்கூண்டு

இயற்கை : பாவேந்தர்பாரதிதாசன்- அழகின்சிரிப்பு – ஞாயிறு.

சமுதாயம் :கவிக்கோஅப்துல்ரகுமான்- இன்றையநிலை

அறிவியல் : கவிஞர்சிற்பிபாலசுப்பிரமணியன்- காலம்.

பெண்ணியம் :கவிஞர்சிவரமணி- வையகத்தைவெற்றிகொள்ள

சூழலியல் :அன்பாதவன் - மரணம்

காதல்:வைரமுத்து -காதல்உயில்

தன்னம்பிக்கைபா.விஜய் - தன்னம்பிக்கை

அலகு – II :அறஇலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்டகுறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்டஐந்துபாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்டஐந்துபாடல்கள்

அலகு - III :சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன்வலியுறுத்தல்

2. தமிழ்விடுதூது - தமிழின்சிறப்புரைத்தல்

3. மதுரைமீனாட்சியம்மைப்பிள்ளைத்தமிழ்- தொடுக்கும்கடவுள்பழம்பாடல்

அலகு - IV :சிறுகதை

1. புதுமைப்பித்தன்-நிகும்பலை

2. தனுஷ்கோடிராமசாமி- கந்தகக்கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி- வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழக்குமரம்

அலகு- V :மொழிப்பயிற்சி

1. விண்ணப்பங்கள்எழுதுதல்மற்றும்கடிதப்பயிற்சி

2. மொழிபெயர்ப்புப்பயிற்சி

பாடநூல்:கற்பகச்சோலை – தமிழ்எடு.கற்பகம்பல்கலைக்கழகத்தமிழ்த்துறைவெளியீடு.

Course Objectives

This course enables the students to learn

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes(Cos)

On successful completion of this course, the students will be able to

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun

Kolatkars **Vocabulary:** Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

Rao, G. Chandralekha and et al. *Spring* 2013. Emerald Publishers: Chennai.

Reference

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai

Course Objectives

This course enables the students to learn

- The concepts of essentials of matrices and its geometrical applications.
- The convergence and divergence of the series
- To find the roots for the different types of the equation and its applications.
- Binomial, Exponential and Logarithmic series theorems
- Rolle's theorem and its application
- To find the Multiple roots and integral roots of the equation

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Acquire the knowledge on Hamilton theorem.
2. Explore the concept of convergence and divergence of series.
3. Explain the concept of Binomial, Exponential and Logarithmic series theorems.
4. Evaluate the roots any equation.
5. Understand the relation between the roots and coefficients of an equation.
6. Use Roll's theorem to produce results on Integral and multiple roots.

UNIT I

Basic concept – Eigen values and eigen vectors- Properties of eigen values and eigen vectors – Diagonalisation of a matrix – Orthogonal Matrices – Cayley-Hamilton theorem (Statement only) – Verification.

UNIT II

Convergence and Divergence of series – Series of positive terms – Comparison tests – Cauchy's condensation test - D'Alemberts Ratio test –Uniform convergence.

UNIT III

Binomial theorem – Statement only – Expansion of rational fraction- Exponential theorem – Statement – Summation of series-Logarithmic series theorem – Statement – Some important result – Summation of series.

UNIT IV

Theory of equations: Remainder theorem – Roots of an equation – Relations between the roots and coefficients of equation – Symmetric function of roots

UNIT V

Descarte's rule of signs – Rolle's theorem – Multiple roots –Integral roots.

TEXT BOOKS

1. Manicavachagam pillai., Natarajan.T., and Ganapathy.K.S, 2000. Algebra , Volume I ,S.Viswanathan printers and publishers Pvt Ltd, Madras. (For Unit- II,III,IV & V)
2. Veerarajan.T., 2007. Engineering Mathematics, Fourth edition ,Tata McGraw hill publishing company ltd, New Delhi.(For Unit-I)

REFERENCES

1. Goyal S.K, 2008.Algebra, Arihantprakasan,Meerut.
2. Sundaram V., Balasubramanian R., and K.A. Lakshminarayanan., 2000. Engineering Mathematics Vol. I , Vikas publishing house PVT., LTD, NewDelhi.
3. Manicavachagampillai., Natarajan.T., and Ganapathy., 1994. Algebra, Volume II , S.Viswanathan printers and publishers Pvt Ltd,Madras.

Course Objectives

This course enables the students to learn

- The concepts of essentials of concavity, inflection points and its geometrical applications.
- The basic concepts in derivatives of Algebraic, Exponential and Logarithmic functions.
- Curvature and radius of Curvature in Cartesian and Parametric co-ordinates.
- The concepts of Evolutes and Envelopes.
- The basics of Definite Integrals and Methods of Integration.
- The Higher order derivatives and its applications in business, economics and life sciences.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Evaluate the derivatives of Algebraic, Exponential, Logarithmic and Trigonometric functions.
2. Estimate the maxima and minima of any functions.
3. Apply the concept of radius of curvature and center of curvature in physical problems.
4. Calculate the definite integral by using the various methods of integration.
5. Evaluate the double and triple integrals of functions and change the order of integration in multiple variables
6. Describe the Beta and Gamma functions and evaluate multiple integral using Beta and Gamma functions.

UNIT I

Differential Calculus: Meaning of derivatives- Simple Differentiation of Algebraic, Exponential, Logarithmic and Trigonometric functions – Evaluation of First and Second order derivatives – Maxima and Minima of functions.

UNIT II

Curvature and Radius of curvature – Radius of curvature in Cartesian co-ordinates– Radius of curvature in parametric co-ordinates – Centre and circle of curvature– Evolutes and Envelopes

UNIT III

Integration: Introduction – Definite Integral – Methods of Integration – Integrals of functions containing linear functions of X – Integrals of functions involving $a^2 \pm x^2$ – Integrals of functions of the form $f(x) \cdot x^{n-1}$, $[f(x)]^n f'(x)$, $F[f(x)] \cdot f'(x)$ – properties of Definite Integral – Integration by parts.

UNIT IV

Multiple Integral: Introduction – Evaluation of Double and Triple integrals – Change of order of integration from Cartesian coordinates to polar coordinates.

UNITY

Beta and Gamma integrals-their properties, relation between them- evaluation of multiple integrals using Beta and Gamma functions.

TEXT BOOKS

- 1.Narayanan.S and T.K.M. Pillai,2000.Calculus vol 1 , Viswanathan Publishers,Chennai.(For Unit-I,II)
- 2.Narayanan.S and T.K.M. Pillai,2000.Calculus vol 2”, Viswanathan Publishers,Chennai.
(For Unit- III,IV&V)

REFERENCES

1. David V.Widder,2008.Advanced Calculus,Prentice Hall of India pvtLtd,NewDelhi.
2. Shanthi Narayanan & P.K.Mittal,2008. Integral calculus, S.Chand&Co,NewDelhi.

Course Objectives

This course enables the students to learn

- To understand basic theories and experiments in Physics.
- To understand the fundamentals of physics.
- To educate and motivate the students in the field of science
- To learn about the electronic component like Diode, transistor etc.
- To learn the logic gates and its applications
- To understand the Polarization and coherence of the optical science.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Describe Debroglie's concept of matter waves, Debroglie's wavelength and Thomson's experiment.
2. Design and construct Zener diode, Photo diode, Light emitting diode (LED).
3. Explain the concept of amplifiers, and perform amplifier as an adder, subtractor, differentiator and integrator.
4. Analyze binary, Octa, Hexa, decimal number systems and also relate ASCII and EBCDIC coding.
5. Develop Nand and Nor Gates as Universal Building Block and theorize De Morgan's theorem.
6. Explain Snell's Law, Planarization and coherence of optics.

UNIT – I**MODERN PHYSICS**

Debroglie's concept of matter waves- Debroglie's wavelength –Characteristics of Debroglie's matter waves- calculation of Debroglie's wavelength of material particles like electrons
–experimental study of matter waves-Thomson's experiment

UNIT – II**ANALOG ELECTRONICS**

Construction, characteristics and applications of Zener diode, Photo diode, Light emitting diode (LED); working, efficiency, ripple factor and advantages of a full wave rectifier-Qualitative analysis of a common emitter amplifier; Phase reversal of the output voltage; advantage of common emitter amplification circuit.

UNIT - III**AMPLIFIERS**

Circuit symbol polarity conventions and virtual ground or summing point of an operational amplifier; characteristics of an ideal operational amplifier; amplifier as an adder, subtractor, differentiator and integrator.

UNIT – IV**DIGITAL ELECTRONICS**

Number systems-Binary Octal-Hexa decimal-ASCII and EBCDIC-Redundant coding for error detection and correction. Basic logic design using digital integrated circuits. Truth tables, Boolean algebra, Simple arithmetic circuits-exclusive half adder-full adder-half subtractor, full subtractor. NAND AND NOR As Universal Building Block-De Morgan's theorem and its proof.

UNIT –V

OPTICS

Reflection–Refraction–Snell’s law–Total internal reflection–Interference–Diffraction– Polarisation – Coherence

TEXT BOOKS

1. Murugesan. R., Modern Physics, S.Chand & CO, New Delhi
2. Aruldas G. and P.Rajagopal, „Modern Physics“, Printice Hall of India, New Delhi, 2009

REFERENCES:

1. Rajam. J.B., Atomic Physics, S.Chand & Co, New Delhi.
2. Gupta and Kumar, 2000, Solid State Physics - Pragati Prakashan, Meerut.
3. Kittel. C., 1996, Introduction to Solid State Physics, 7TH Edition, John Willey & sons, New Delhi.
4. Dekkar. A.J. , 1900, Solid State Physics - Macmillan India Ltd., New Delhi.

Course Objective

This course enables the students to learn

- To acquire basic understanding of laboratory technique and to educate and motivate the students in the field of Physics
- To allow the students to have a deep knowledge of fundamentals of optics.
- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of electrical and optical systems for various measurements.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- To apply the mathematical concepts/equations to obtain quantitative results

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Test the Young's Modulus non uniform bending and static cantilever.
2. Measure the Refractive Index of liquid prism and solid prism
3. Categorize the characteristics of junction diodes.
4. Calculate μ of a lens and Thickness of a thin wire
5. Apply the various procedures and techniques for the experiments.
6. Use the different measuring devices and meters to record the data with precision.

Any 8 Experiments

1. Young's Modulus-Non Uniform bending-Opticlever
2. Young's Modulus-Staticcantilever
3. Rigidity modulus- Dynamicmethod
4. Acceleration due to gravity-Compound pendulum
5. Refractive Index of a liquidprism-Spectrometer
6. Refractive Index of a solid prism (I-d) curve-Spectrometer
7. Co-efficient of thermal conductivity-Lee's discmethod
8. Wavelength of spectral lines -Grating-minimum deviationmethod-Spectrometer.
9. Characteristics of a Junctiondiode
10. μ of a lens-Newton's ringmethod
11. Thickness of a thin wire-Air wedgemethod
12. Frequency of tuning fork and density of solid and liquid – Melde'sString

Course Objectives

This course enables the students to learn

- Teach and inculcate the importance of value based living.
- Give students a deeper understanding about the purpose of life.
- Teach and inculcate the essential qualities to become a good leader.
- The significance of being responsible citizens of the society.
- To inculcate the importance of harmonious living.
- To realize their role in the nation building.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Create self-confidence, self-esteem and personality development.
2. Execute the goals of life and improve positive thinking.
3. Perform the roles and responsibility of citizens and practice effective time management techniques.
4. Know the value of healthy friendship and the know the importance of relationships.
5. Relate the spirituality with altruism and sacrifice.
6. Understand the importance of family relationship, self-control, sacrifice and truthfulness.

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisations of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

Course Objectives

This course enables the students to learn

- Encourage the all-round development of students by focusing on soft skills.
- Make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
- Develop and nurture the soft skills of the students through individual and group activities.
- Expose students to right attitudinal and behavioral aspects and to build the same through activities
- To help formulate problem solving skills
- To create a desire to fulfill individual goals, and to educate students about unproductive thinking

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Solve Quantitative Aptitude questions and also solve problems on numbers, averages and ratios.
2. Understand the concept of verbal reasoning problem skills.
3. Understand the concept of blood relation, Image analysis and coding, decoding problems
4. Measure simple and compound interest of amounts and calculate profit and loss.
5. Describe active and passive voices and tense, subject and verb agreement.
6. Create the knowledge for goal setting and interpersonal skills.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT – II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

பாடத்திட்டப்பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கைமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

1. இந்தியகுடியுரிமைப்பணிமுதலானபோட்டித்தேர்வுகளில், விருப்பப்பாடமாகஇடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்தமுழுமையானஅறிமுகம்பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல்மற்றும்தொல்லியல்சார்ந்தஆவணத்தேடலுக்குரியஆய்வுமனப்பான்மையுடன், இலக்கியங்களைஅணுகுதல்.
3. தமிழின்வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்' ; 'இணையதமிழ்' குறித்தபன்னோக்குஅணுகுமுறையிலானஆய்வுச்சிந்தனைமேம்பாடு.
4. வேலைவாய்ப்புக்குரியசுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத்திறன்மேம்பாடும்பெற்றிருத்தல் .
5. சமுதாயமற்றும்வாழ்வியல்மதிப்புகளைப்பேணுவதற்குக்கருவியாகஇலக்கியங்களைநாடுகின்றமனப்பான்மைவளர்ச்சி.
6. மொழிபெயப்புத்துறைசார்ந்தவேலைவாய்புத்திறன்பெற்றிருத்தல்

அலகு - I : பக்திஇலக்கியம்

- 1.சைவம் -மூவர்தேவாரத்திலிருந்துதேர்ந்தெடுக்கப்பெற்ற15 பாடல்கள்
- 2.வைணவம் – ஆண்டாள்நாச்சியாரின்திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு- II:சங்கஇலக்கியம்**அ). எட்டுத்தொகை**

நற்றிணை:1.இலைஇலபிடவம், திணை – முல்லை,

ஆசிரியர் – விழிக்கட்பேதைப்பெருங்கண்ணனார்.

2. மடல்மாஊர்ந்து, திணை –குறிஞ்சி, ஆசிரியர் – மடல்பாடியமாதங்கீரனார்.

குறுந்தொகை : 1.உள்ளார்கொல்லோ,திணை –பாலை, ஆசிரியர் – பெருங்கடுங்கோ.

2.யாரினும்இனியன்,திணை – மருதம்,

ஆசிரியர் – வடமவண்ணக்கன்தாமோதரனார்.

ஐங்குறுநூறு : 1.நுண்ணோர்புருவத்த,திணை – குறிஞ்சி, ஆசிரியர் – கபிலர்.

2. அவறொறுந்தேரை,திணை – முல்லை, ஆசிரியர் –பேயனார்.

பதிற்றுப்பத்து- ததைந்தகாஞ்சி, ஆசிரியர் -பாலைக்கௌதமனார்.

பரிபாடல் - வையை- திரைஇரும்பனிப்பௌவம்,ஆசிரியர் -மையோடக்கோவனார்.

கலித்தொகை – கடும்புனல்கால்பட்டு,திணை – பாலை, ஆசிரியர் – பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடுஅமைக்குயின்ற, திணை – குறிஞ்சி, ஆசிரியர் – கபிலர்.

2.யான்எவன்செய்கோதோழி,திணை – பாலை,ஆசிரியர் –நோய்பாடியார்.

புறநானூறு- 1. சிறப்பில்சிதடுமுறுப்பில்,திணை –பொதுவியல்,

ஆசிரியர் –உறையூர்முதுகண்ணன்சாத்தனார்.

2.இளையருமுதியரும்வேறுபுலம்படா – ஆசிரியர் –கயமனார்.

ஆ).பத்துப்பாட்டு- சிறுபாண்ஆற்றுப்படை – கடையெழுவள்ளல்களின்சிறப்பு,

நல்லியக்கோடனின்சிறப்பு, ஈகைத்திறம்.

அலகு - III : காப்பியங்கள்

1.மணிமேகலை –பாத்திரம்பெற்றகாதை- தீவதிலகை, மணிமேகலைக்குச்சொல்லியது,

சிறைக்கோட்டம்அறக்கோட்டமாக்கியகாதை – மணிமேகலை

வேண்ட, மாவண்கிள்ளி, சிறைக்கோட்டத்தைஅறக்கோட்டமாக்கியது.

2.கம்பராமாயணம் - இலக்கியநயம்மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1.திருக்குறளில்மனிதவளமேலாண்மைக்கருத்துக்கள் - திருமிகுஹரிவிஜயலட்சுமி.

2.தமிழர்வளர்த்தநுண்கலைகள்: சிற்பமும்ஓவியமும் – தொ.மு. பாஸ்கரத்தொண்டைமான்.

3. சமயமும் தமிழும் – பேராசிரியர் அ.ச. ஞானசம்பந்தன்.

4. தமிழில் அறிவியல் – ஒருபார்வை - பேராசிரியர் சிவகுமார்.

5. இன்றைய நெருக்கடிப்பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2. பொதுக்கட்டுரைகள்

பாடநூல்: கற்பகச்சோலை – தமிழ் ஏடு. கற்பகம்பல்கலைக்கழகத்தமிழ்த்துறை வெளியீடு.

Course Objectives

This course enables the students to learn

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes(Cos)

On successful completion of this course, the students will be able to

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT II

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT III

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT IV

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

Syamala, V. *English for Communication. 2006.* Emerald Publishers: Chennai

Course Objectives

This course enables the students to learn

- First order exact differential equations, linear homogeneous and non-homogeneous equations of higher order with constant coefficients.
- The complete solution of a non-homogeneous differential equation with constant coefficients by the method of undetermined coefficients.
- The basic concepts of Partial Differential Equations.
- How to solve Partial Differential Equations using Charpit's method.
- The transform of a periodic function.
- The applications of the inverse Laplace transform.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Solve any first order homogenous and non homogenous differential equations.
2. Evaluate Exact differential equations, Clairaut's form of equations and linear equations with constant coefficients.
3. Solve any partial differential equations and describe different integrals of partial differential equations.
4. Estimate the standard types of partial differential equations and solve Lagrange's equations using Charpit's method.
5. Evaluate Laplace transforms of periodic functions and estimate integral using Laplace transforms.
6. Describe inverse Laplace transforms of periodic functions and solve Ode by using Laplace transforms.

UNIT I

Ordinary Differential equations : Definition – Formation of differential equations – Equations of first order and first degree – Variable separable – Homogeneous equations – Non homogeneous equations of first degree in X and Y – Linear equation – Bernoulli's Equation.

UNIT II

Exact differential equations – First order higher degree equations – Clairaut's form – Equations do not contain X explicitly – Equations do not contain Y explicitly – Equations Homogeneous in X and Y – Linear differential equations with constant coefficients.

UNIT III

Partial Differential Equations : Derivation of partial differential equations – Different integrals of partial differential equations - Standard types of first order equations – Equations reducible to the standard form – Lagrange's equation – Charpit's method.

UNIT IV

Laplace transforms: Definition-Sufficient conditions for the existence of the Laplace Transform- Laplace Transform of periodic functions- Some general theorems-Evaluation of integrals using Laplace Transform.

UNIT V

Inverse Laplace Transforms: Solving ordinary differential equations with constant coefficients using Laplace Transforms-Solving a system of differential equations using Laplace Transforms .

TEXT BOOK

1.Narayanan S.andT.K.M.Pillai, S.Viswanathan, 1996. Calculus, Printers and Publishers Pvt. Ltd, New Delhi.

REFERENCES

1. SankaraRao.K, 2005.Introduction to Partial Differential Equations, Prentice Hall of India Private limited, NewDelhi.
2. Veerarajan.T, 2004.Partial Differential Equations and Integral Transforms,TataMc Graw - Hill Publishing Company limited, NewDelhi.
3. Earl A. Coddington, 2002. An introduction to Ordinary differential Equations, Prentice Hall of India Private limited, NewDelhi.
4. Somasundaram.D, 2002.Ordinary differential Equations - A first course, Narosa Publishing House, New Delhi.

Course Objectives

This course enables the students to learn

- The concepts of exponential, logarithmic, trigonometric functions and their applications.
- The ability to use inverse functions to solve equations, specifically to solve exponential and trigonometric equations.
- Summation of Trigonometric series
- Gregory series, Euler series, Maclarines series and Rutherford series
- To evaluate the six trigonometric functions for a given angle
- To apply the definitions of angle of elevation and angle of depression in real life applications

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Describe the expansions of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ in terms of $\tan\theta$.
2. Evaluate the powers of sin and cosine function in terms of θ and also describe the expansion of powers of sine and cosine functions.
3. Explain about Hyperbolic functions and inverse hyperbolic function.
4. Discuss the logarithms of complex quantities and real , imaginary part of exponential functions.
5. Estimate the sum of any series of trigonometric functions.
6. Explain Gregory series, Euler series and Maclarine series, etc.

UNIT-I

Expansions of $\cos n\theta$, $\sin n\theta$ - Expansion of $\tan n\theta$ in terms of $\tan \theta$ - Expansion of $\tan(A+B+C+ \dots)$ - Formation of Equations.

UNIT-II

Powers of sines and cosines of θ in terms of functions of multiples of θ - expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of θ - Expansion of $\cos^n\theta$, $\sin^n\theta$ and $\sin^m\theta\cos^n\theta$

UNIT-III

Hyperbolic functions: Definition - Relation between Hyperbolic Functions -Periods of hyperbolic functions – Separation into real and imaginary parts – Inverse hyperbolic function.

UNIT-IV

Logarithms of complex quantities: Express $\log(x+iy)$ in the form $(A+iB)$ – The general exponential function – Real and imaginary part of Exponential functions.

UNIT-V

Summation of Trigonometric Series: Method of Differences - Gregory Series - Euler Series- Maclarine series and Rutherford series.

TEXT BOOK

1.Dr.Nigam.H.N., 1996. Trigonometry, Krishna Prakashan Media Pvt.Ltd, Meerut.

REFERENCES

1. Vittal.P.R. 2004. Trigonometry, Margham Publications,Chennai.
2. Veerarajan.T., Fourth edition 2007. Engineering Mathematics, Tata McGraw hill publishing company ltd, NewDelhi.
3. Sudha.S., 1998. Algebra Analytical Geometry(2D) and Trigonometry, Emerald Printing House Pvt. Ltd,Chennai.
4. Kandasamy P., Thilagavathy K., and K.Gunavathy., 2009. Engineering Mathematics, S.Chand& company Ltd, Ram Nagar, New Delhi-110055.

Course Objectives

This course enables the students to learn

- Basic knowledge on material properties.
- Magnetism and digital electronics.
- To educate and motivate the students in the field of science.
- Given the unit cell for some crystal structure, be able to draw the atomic packing arrangement for a specific crystallographic plane.
- Explain the use of X-ray diffraction measurements in determining crystalline structures.
- The Photo electric effect and its applications.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Explain about Bending of beams, Uniform and non-uniform bendings.
2. Estimate Torsion and Rigidity by static and dynamic methods.
3. Measure the surface tension surface energy and Vapour pressure over a surface.
4. Demonstrate Photo electric effect and Einstein's photo electric equation and apply photo electric in Nuclear physics.
5. Identify Raman effect, Raman shift and describe laser Raman spectrometer.
6. Understand the all concepts of solar physics such as: solar constant – measurement of solar radiations by Pyroheliometer and Pyranometer

UNIT-I**ELASTICITY OF SOLIDS**

Elastic constants of an isotropic solid - Relations connecting them - Poisson's ratio - Bending of beams - Uniform and non-uniform bending - Bending moment of a bent beam - cantilever - Static and dynamic methods - Torsion in a wire - Rigidity modulus determination by Static and dynamic methods.

UNIT-II**SURFACE TENSION**

Surface tension and Surface energy- Pressure difference across a spherical surface- Pressure difference across a curved surface - Angle of contact - Angle of contact for water in a glass - Vapour pressure over a flat and curved surface - Variation of Surface tension with temperature - Jaeger's method - Quinke's method.

UNIT-III

MODERN PHYSICS: Photo electric effect – Einstein's photo electric equation – verification of Einstein's photo electric equation by Millican's experiment – photo electric cells – applications Nuclear physics :characteristicsof nuclear forces – nuclear structure by liquid drop model– Binding energy – mass defect – particle accelerators – cyclotron and betatron nuclear Fission and nuclear Fusion.

UNIT-IV

LASER PHYSICS: Purity of spectral lines – Coherence length and time – spontaneous and induced emissions – population inversion – meta stable state – conditions for laser actions – Ruby laser – Helium – neon laser – applications of lasers – Raman effect – Raman shift – stokes and anti stokes lines – Laser Raman Spectrometer.

UNIT-V

SOLAR PHYSICS: solar constant – measurement of solar radiations by Pyroheliometer and Pyranometer – general applications of solar energy – flat-plate collector - box type cooker - solar water heaters – solar photo – voltaic cells – general applications of solar cells.

TEXT BOOKS

1. Murugesan. R., Modern Physics, S.Chand& CO, NewDelhi
2. Aruldas and P.Rajagopal, Modern Physics, Prentice Hall of India, NewDelhi.

REFERENCES:

1. Mathur. D.S., 2003, Elements of properties of matter - Shyamlal Charitable Trust, NewDelhi.
2. Brijlal and N. Subramanyam, 2004, Properties of matter, S. Chand & Company, NewDelhi.
3. Rai. G.D, Solar energy and its utilization, S.Chand& Co., NewDelhi.
4. Rajam. J.B., Atomic Physics, S.Chand& Co, NewDelhi

Course Objective

This course enables the students to learn

- To enhance the students to understand the concepts in integrated chips.
- To understand the optical and electronic properties of solids through experimentations.
- To learn the usage of electrical and optical systems for various measurements.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- To enable the students to gain knowledge on the basic principles of applied electronics
- To identify the strength, the given objects

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Perform basic experiments in mechanics, heat and electricity and analyze the data.
2. Acquire engineering skills and practical knowledge, which help the student in their everyday life.
3. Know the physical principles and applications of Electronics.
4. Apply the various procedures and techniques for the experiments.
5. Apply the mathematical concepts/equations to obtain quantitative results.
6. Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

ANY TEN EXPERIMENTS

1. Field Intensity-Circular coil- Vibration magnetometer
2. Co-efficient of thermal conductivity-Lee's disc method
3. Refractive Index of a prism (I-I'') curve-Spectrometer
4. Moment of a magnet-Circular coil-Deflection Magnetometer
5. Temperature coefficient of resistance of a thermistor-Post office box
6. Comparison of viscosities of two liquids
7. Study of logic gates using IC's
8. Study of NOR gate as Universal building block.
9. Study of NAND gate as Universal building block.
10. Verification of Basic logic gates using discrete components.

11. Determination of Cauchy's constant – Spectrometer

12. AC frequency -Sonometer

Course Objectives

This course enables the students to learn

1. The study creates awareness among the people to know about various renewable and non renewable resources of the region, enables environmentally literate citizens (by knowing the environmental acts, rights, rules, legislation, etc.) to make appropriate judgments and decisions for the protection and improvement of the earth.
2. Creating the awareness about environmental problems among people.
3. Developing an attitude of concern for the environment.
4. Motivating public to participate in environment protection and improvement.
5. About the interaction of human society (urban sprawl, energy use/generation, resource consumption and economics) with the Earth's systems.
6. To give students an understanding of how science and the scientific method work to address environmental problems

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Establish the Natural resources, Forest resources and water resources, etc.
2. Identify the cause and effects of pollution and measure the pollution in air, water, noise and soil.
3. Inspect the biodiversity and its conservation and threats to biodiversity.
4. Evaluate the social issues, urban problems and manage sustainable utilization of natural resources.
5. Analyze the ethics of environmental, environmental education, social justice and human heritage.
6. Sketch the preserving resources for future generation, common property resources, Ecology and its uses.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem - Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabilitation. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942
5. Patrick L. Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Course Objectives

This course enables the students to learn

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems and
3. To adopt new and faster methods of calculations.
4. Reinforcing competencies in soft skills which are crucial in a social setting
5. To help increase a person's self-esteem, to develop cognitive skills.
6. To making appropriate and responsible decisions, to create a desire to fulfill individual goals

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Solve Quantitative Aptitude questions and also solve problems on numbers, averages and ratios.
2. Understand the concept of verbal reasoning problem skills.
3. Understand the concept of blood relation, Image analysis and coding, decoding problems
4. Measure simple and compound interest of amounts and calculate profit and loss.
5. Describe active and passive voices and tense, subject and verb agreement.
6. Create the knowledge for goal setting and interpersonal skills.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Course Objectives:

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop self confidence in Group discussion, meeting and special addresses.

Course Outcomes:

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.
6. Able to understand the knowledge about business communication

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic) Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Reference Books

Language in Use: Kenneth Anderson, Cambridge University Press.

Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.

Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.

Dr. J. John Love Joy, Dr.FrancisM.Peter S.J. “Lets Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Course Objectives

This course enables the students to learn

- The strong foundation in the concepts of mechanics to know how the friction is regulating the motion of objects.
- About the motion of particles under the influence of various forces like gravitational force, central force, impulsive force etc., which plays an essential role in Applied Mathematics.
- The application of geometric and trigonometric properties in equilibrium and motion of particles.
- The basic concepts of Moments, Friction and Motions.
- To develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering.
- To help the student develop this ability to visualize, which is so vital to problem formulation

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Describe the Parallelogram, analytical expression, perpendicular triangle and polygon of forces.
2. Evaluate the resultant of parallel forces of two equal and unequal forces.
3. Measure the angle, coefficient and cone of friction and calculate moments of force.
4. Explain the concept of equation of motions and moment momentum, angular momentum in any physical situation.
5. Inspect the harmonic motions in straight line and two parallel lines and also express the simple and compound problem.
6. Apply the impact of an elastic sphere with a smooth fixed plane.
7. Evaluate the impacts of elastic sphere with a smooth fixed plane.

UNIT I

Force acting at a Point: Parallelogram of Force – Analytical Expression for the Resultant of two forces acting at a point – Perpendicular Triangle of Forces – Converse of Triangle of Force – Polygon of Forces Parallel Forces- To find the Resultant of two like parallel forces acting on a Rigid body – To find Resultant of two unlike and unequal Forces acting on a Rigid body – Resultant of number of parallel forces acting on a rigid body – Condition of Equilibrium of three Coplanar parallel forces – Center of two parallel forces.

UNIT II

Moments and Friction: Moment of a force – physical significance of moment of force – Geometrical representation of moment – sign and unit of moment – Varignons Theorem of moment- principle of moment. Friction – Laws of Friction – Angle, coefficient of Friction, cone of friction.

UNIT III

Coplanar motion : Equations of motion in polar coordinates- moment of momentum – angular momentum . Central orbits: Differential equation of a central orbit in polar coordinates- Apse -circular and elliptic orbits- Kepler's laws of planetary motion.

UNIT IV

Simple harmonic motion : Amplitude, periodic time, phase – composition of two simple harmonic motions of the same period in a straight line and in two perpendicular lines – Simple harmonic motion as the projection of uniform circular motion – The simple pendulum – The seconds pendulum-Compound Pendulum.

UNIT V

Impact : Impulsive force – Equations of motion for impulsive forces – motion of a shot and gun – Impact of water on a surface – Oblique impact of two elastic spheres – Impact of an elastic sphere with a smooth fixed plane.

TEXT BOOKS

- 1.Venkataraman.M.K., 1998 . Statics, Agasthiar Publications, Trichy.(For Unit – I, II & III)
- 2.Venkataraman.M.K.,2000 . Dynamics, Agasthiar Publications, Trichy. (For Unit – IV & V)

REFERENCES

1. DharmapadamA .V., 1993. Dynamics, S.Viswanathan printers and publishersPvt Ltd,Chennai-2..
2. Duraipandian, 2000. Text book of Dynamics, Emerald publishers,Chennai-2
3. Duaripandian.P.,LakshmiDuraipandian.,Muthamizh Jaya Pragasam, 2011.Mechanics,S.Chand& Company Ltd,NewDelhi.

Course Objective:

This course enables the students to learn

- The basic concepts of primary data and secondary data.
- Basic concepts in central tendency and statistical measures
- Commonly used probability distributions (both discrete and continuous)
- Central Limit theorem and their applications in various disciplines.
- To analyze forces and moments in two and three dimensions due to concentrated and distributed forces in various systems such as beams, frames and trusses.
- To understand the procedure for analysis of static objects; concepts of force, moment, and mechanical equilibrium.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Perform in primary and secondary data and illustrate in Bar and Pie diagrams.
2. Evaluate the mean, median and mode of any given data also evaluate quartiles and deviations.
3. Describe the Correlation, Rank Correlation and Regression of two variables.
4. Understand the basic concept of test of significance of z-test, t-test and chi-square test.
5. Compute probabilities and conditional probabilities in appropriate ways.
6. Derive the Binomial and Poisson distribution.

UNIT I

Meaning and definition of statistics – sources of data – collection of data – primary and secondary data - methods of primary data collection –sources of secondary data – Classification of data. Diagrammatic representation– Bar diagram and Pie diagram – Graphic representation – Histogram, Frequency distribution, Ogives.

UNIT II

Measures of central tendency - Arithmetic Mean, Median, Mode. Measures of dispersion – Range, Quartile deviation, Standard deviation and Coefficient of variation.

UNIT III

Correlation – meaning and definition – scatter diagram – Pearson's correlation coefficient Computation and interpretation – Rank correlation.

Regression: Regression in two variables – Regression coefficient problems.

UNIT IV

Test of Significance: Basic concepts – Z-test for two means – Small sample tests- t- test for single mean, two means – Chi Square Test.

UNIT V

Probability (Concept only) – Binomial distribution – Poisson Distribution – Normal distribution– Exponential Distribution (No derivations) and simple problems.

TEXT BOOK

1. Pillai R.S.N., and Bagavathi V., 2002., Statistics , S. Chand & Company Ltd, New Delhi.

REFERENCES

1. Navnitham P.A , 2004. Business Mathematics And Statistics, Jai Publications, Trichy,
2. Gupta S.P., 2001. Statistical methods, Sultan Chand & Sons, New Delhi.
3. Gupta S.C., and Kapoor V.K., 1999. Fundamentals of Mathematical statistics, Sultan Chand & Sons, Educational Publishers, New Delhi.
4. Dr.P.N.Arora, 1997, A foundation course statistics, S.chand& Company Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- It is well recognized nowadays the importance of Statistics as an indispensable tool for obtaining and spreading information.
- Importance has been enhanced by the use of computational resources and particularly the software SPSS, that showed, during the last decades, to be an effective tool for treating and analyzing statistical data.
- Ability to use SPSS procedures in handling data files and performing statistical analysis, and to interpret the outputs provided by the program.
- Acquiring sensitivity and critical thinking towards arguments and conclusions based on statistical studies.
- Understanding the fundamental principles underlying descriptive and inferential statistical reasoning; ability to perform current statistical analysis, selecting the most appropriate techniques and methods for collecting and processing statistical data.
- To Recognise some of the pitfalls associated with statistical analysis.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Describe and classify data using statistical terminology.
2. Apply SPSS Package, to find mean, mode, median for any data.
3. Test the significance of hypothesis using Z and Chi-square test.
4. Calculate the rank correlation in unpaired and tied ranks.
5. Design a program for analyzing data in SPSS package.
6. Know when to use basic statistical hypothesis tests (t-tests, chi-squared tests, correlation) and how to carry out these tests using SPSS.

1. Using SPSS Package, draw bar diagram and pie diagram for discrete series.
2. Using SPSS Package, calculate the Mean for individual, discrete and continuous series.
3. Using SPSS Package, calculate the Median for individual and discrete series.
4. Using SPSS Package, calculate the Mode for individual and discrete series.
5. Using SPSS Package, calculate the Standard deviation.
6. Using SPSS Package, calculate the Karl Pearson's Correlation.
7. Using SPSS Package, calculate the Rank Correlation Coefficient for Unpaired Rank.
8. Using SPSS Package, calculate the Rank Correlation Coefficient for Tied Rank.
9. Using SPSS Package, test the significance of hypothesis using Z-test.
10. Using SPSS Package, test the significance of hypothesis using Chi Square Test.

Course Objectives

This course enables the students to

- Understand fundamental accounting concepts and principles.
- Develop the capability to perform the basic accounting functions: the recognition, valuation, measurement and recording of the most common business transactions and the preparation of accounting statements.
- Deals with the “Fundamental Issues in Accounting” and comprises.
- Enable students to describe how people analyze the corporate financial under different conditions and understand why people describe the financial statements in different manner.
- Demonstrate an understanding of accounting principles
- Balance ledger accounts, prepare a trial balance, prepare a work sheet.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Use the fundamental accounting equation and book keeping to analyze the effect of business transactions on an organization's accounting records and financial statements.
2. Enrich the ability to create subsidiary books, sales book and etc.
3. Develop the ability to use accounting concepts, principles, and frameworks to analyze and effectively communicate information to a variety of audiences.
4. Promote the ability to use accounting information to solve a variety of business problems.
5. Demonstrate the applicability of the concept of Accounting to understand the managerial Decisions and financial statements.
6. Apply the Financial Statement Analysis associate with Financial Data in the organization.

UNIT I

Accounting – Definition- Fundamentals of Book Keeping – Branches of Accounting – Nature of Accounts - Accounting Concepts and Conventions – Journal –Ledger.

UNIT II

Subsidiary books – Introduction – Types of subsidiary books - purchases book - sales book- returns book - cash book - single column cash book – Two column cash book - Three column Cash book - petty cash book

UNIT III

Trial balance - Errors and their rectification - Final accounts of a sole trader with adjustments - Trading and Profit and Loss Account - Balance Sheet – Difference between Profit and Loss Account and Balance Sheet.

UNIT IV

Depreciation- Definition- Methods of depreciation- straight line method- written down value method- annuity value method- sinking fund method- provisions and reserves

UNIT V

Accounts for Non Profit organization- Receipts and Payments and income and expenditure account and Balance sheet – Difference between Receipts and Payments and income and expenditure account and Balancesheet

Note: Distribution of Marks between problems and theory shall be 75% and 25%.

TEXT BOOK

1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2012)PrinciplesofAccountancyNew Delhi .S.Chand& CompanyLtd.

REFERENCES

1. S. P. Jain & K. L. Narang, 2010, Advanced Accountancy, Sultan Chand & Sons. New Delhi
2. T.S.Grewal,(2011)Introduction to Accountancy, New Delhi S.Chand& CompanyLtd.
3. R.L.Gupta, V.K.Gupta and M.C.Shukla, 2010, New Delhi Financial Accounting,Sultan Chand .
4. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
5. K.L.Narang and S.N.Maheswari ,2010, New Delhi Advanced Accountancy-Kalyani Publishers.

Course Objectives

This course enables the students to

- Principles and Practices of banking represents the origin or banks, classification functions, Types of bank accounts, service banking and Indian money market.
- This paper provides the functioning and process of various banks.
- Fundamental knowledge of banking as service and bank as an institution which would form the basis for courses related to more areas of banking and insurance
- To have knowledge of banking, insurance and capital market law besides fundamental legal knowledge
- To introduce the students to the basic concept of banking as a financial intermediation service and bank as a financial institution.
- Know basics of International Banking and Finance

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Know the Banking system and modern commercial Banks
2. Describe the services of Banking
3. Measure the qualitative and quantitative of credits
4. Analyze the feature and deficiencies of money market.
5. Understand the banking system in rural and commercial banks.
6. To express their opinions about banking and insurance in written and oral form, based on the basic knowledge and skills they acquire.

UNIT I

Banks: Origin of Banks – Definition of Bank – Classification of Banks – Banking system – Unit Banking – Branch Banking – Functions of Modern Commercial Banks – Credit Creation by Commercial Banks.

UNIT II

Services Banking: Automated Teller Machine – Merchant Banking – Mutual Fund – Factoring service – Customer service – Credit card, debit card – E-banking, Privatization of commercial banks – Place of private sector banks in India.

UNIT III

Central Banking: Functions – Credit Control Measures – Qualitative and quantitative credit control measures – Role of RBI in regulating and controlling banks.

UNIT IV

Money Market: Features – Deficiencies in the Indian Money Market.

UNIT V

Special Banks: State Bank of India — Commercial banks and rural financing – Regional Rural Banks – Place of Co-operative banks in the Indian banking scene. Development Banking – IDBI – ICICI.

TEXT BOOK

1. Natarajan, Parameswaran. (2002), Indian Banking, : Sultan Chand and sons, New Delhi.

REFERENCES

1. Santhanam. (2001) Banking and Financial System Margham Publications, Chennai.
2. Vasant Desai. (1991), Indian Banking Nature Performance and Problem, Himalaya Publishing House, Mumbai.
3. Sundaram K.P.M. and Sundaram E.N. (1996) Modern Banking, Sultan Chand and Sons, New Delhi.

Course Objectives

This course enables the students to

- To learn about the atomic structure.
- To understand the quantum numbers and electronic configuration.
- To learn the different types of bonding.
- The basic principles of basic physical and inorganic chemistry. It enables the students to gain knowledge of chemistry involved in industries.
- To learn the electronic and structural properties of an atom.
- Understand the interdisciplinary nature of chemistry and to integrate knowledge of mathematics, physics and other disciplines to a wide variety of chemical problems

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. State the location, relative charge, and atomic mass of the sub-atomic particles.
2. Perform quantitative calculations based on the relationship between wavelength, energy, and the speed of light.
3. Define wavelength, frequency, and energy of a photon.
4. Identify, and rank the different types of light radiation.
5. Describe the photoelectric effect and relate the energy and/or intensity of the photons to the work function and kinetic energy of the ejected electrons.
6. Understand the relationship between discrete electron energy levels and atomic absorption and emission spectra.

UNIT-I

Atomic Structure: Bohr's theory and its limitations, dual behaviour of matter and radiation, de-Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure. Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2 , Schrödinger equation for hydrogen atom.

UNIT-II

Quantum numbers: Significance of quantum numbers, orbital angular momentum and quantum numbers ml and ms . Shapes of s , p and d atomic orbitals, nodal planes. Discovery of spin, spin quantum number (s) and magnetic spin quantum number (ms). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.

UNIT-III

Ionic Bonding: General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character.

UNIT-IV

Covalent bonding: VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements.

Concept of resonance and resonating structures in various inorganic and organic compounds.

UNIT-V

MO Approach: Rules for the LCAO method, bonding and antibonding MOs and their characteristics for $s-s$, $s-p$ and $p-p$ combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of $s-p$ mixing) and heteronuclear diatomic molecules such as CO, NO and NO⁺. Comparison of VB and MO approaches

TEXT BOOKS

1. J. D. Lee, A New Concise Inorganic Chemistry (V Edition), ELBS(2002).
2. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, Shobanlal& Company Ltd., Jalandar(2002).
3. Puri, Sharma &Pathania, Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar (2003).
4. V.Veeraiyan& A.N.S. Vasudevan, Text Book of Allied Chemistry(II Edition), HighmountPublishing House, Chennai(2005).

REFERENCES

1. Douglas, D. H. McDaniel and J. J. Alexander, Inorganic Chemistry: Principles of Structure and Reactivity (IV Edition), John Wiley & Sons, Inc.(1994).
2. F. A. Cotton, G. Wilkinson and P. L. Gaus, BasicInorganicChemistry (III Edition), Wiley-Interscience(1995).
3. J.E. Huheey, E. A. Keiter, R. L. Keiter and O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India,(2006).

Course Objectives

This course enables the students to

- Know the basic concept of computers.
- Understand the concept of Ms-word, Ms-Excel.
- Be able to work in Ms-PowerPoint.
- Knowledge about internet and the usage of E-Mailservices.
- Introduce the fundamentals of computing devices and reinforce computer vocabulary
- Provide foundational or “computer literacy” curriculum that prepares students for life-long learning of computer concepts and skills.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Understand the fundamental hardware components that make up a computer’s hardware and the role of each of these components
2. Understand the difference between an operating system and an application program, and what each is used for in a computer
3. Describe some examples of computers and state the effect that the use of computer technology has had on some common products
4. Describe the usage of computers and why computers are essential components in business and society.
5. Utilize the Internet Web resources and evaluate on-line e-business system.
6. Describe various types of networks network standards and communication software.

UNIT I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers-the computer system- types of Input/ Output and memory devices- computer software-categories of software.

UNIT II

Starting with MS Office Word – Working with Text – working with tables-Checking spelling and grammar-adding graphics to document- Mail merge- printing a document – Advanced features of MS Office Word-Keyboard shortcuts.

UNIT III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

UNIT IV

Starting with MS Office PowerPoint – Working with PowerPoint- Working with different views- Designing Presentations- Slide Show- Printing in PowerPoint.

UNIT V

The Internet-Evolution of Internet-Owner of Internet- Anatomy of Internet – Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

TEXT BOOK

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions.2011. Pearson, New Delhi.

REFERENCES

1. Pradeep K.Sinha, Priti Sinha. Computer Fundamentals, 2007, 6th Edition BPB Publications, New Delhi.
2. V. Rajaraman. Fundamentals of Computers, Prentice-Hall Of India Pvt. Limited,2003.
3. Wallace Wang.Microsoft Office 2007 For Dummies,1stEdition Wiley PublishingInc.

Course Objectives

This course enables the students to

- This course in curriculum is an introduction to the multimedia and its applications.
- This course enables students to understand how the web pages are designed interactively.
- How to critically evaluate website quality, learn how to create and maintain quality web pages learn to create and manipulate images.
- Gain the skills and project-based experience needed for entry into web design and development careers
- Set up a document, Incorporate Color Techniques
- Format the InDesign text to look professional

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

- Identify and describe the function of the general skill sets in the multimedia industry.
- Identify the basic components of a multimedia project.
- Identify the basic hardware and software requirements for multimedia development and playback.
- Identify a range of concepts, techniques and tools for creating and editing the interactive multimedia applications.
- Identify the current and future issues related to multimedia technology.
- Both theoretical and practical aspects in designing multimedia systems surrounding the emergence of multimedia technologies using contemporary hardware and software technologies.

UNIT I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images – Tagging images - Searching for images - Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects.

UNITV

Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks. Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic ActionScript concepts: ActionScript basics – Data type basics.

TEXT BOOKS

1. Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill . (Unit I, UnitII)
2. Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill. (Unit III)
3. Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press. (Unit IV, UnitV)

REFERENCES

1. Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, TataMcGraw-Hill.
2. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, Dream Tech Press, NewDelhi

Course Objectives

This course enables the students to

- To impart knowledge on both Aptitude and Soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- Adopt new and faster methods of calculations.
- Reinforcing competencies in soft skills which are crucial in a social setting
- Become self-confident individuals by mastering inter-personal, team management, and leadership skills.
- Take part effectively in various selection procedures adopted by the recruiters

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Solve the problem of finding time, speed and distance.
2. Apply the concept of permutation and combination in appropriate problems
3. Acquire the knowledge of data sufficiency.
4. Improve the English communication skills.
5. Improve the skills of resume writing and attitude.
6. Get knowledge of personality development and acquire the knowledge of how to attend the interview.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives:

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Prescribed Text:

Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

Reference:

Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.

Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam

Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.

Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Course Objectives

This course enables the students to learn

- The concepts of essentials of vector function, Gradient, Divergence Curl of a vector and its geometrical applications.
- The integration of vectors Line Integral, Surface Integral and Volume Integral.
- The Fourier series, Fourier transforms and its applications.
- The Z transform and Inverse Z transform.
- Compute the curl and the divergence of vector fields
- Use the fundamental theorem of line integrals

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Understand the concepts of partial derivatives and directional derivatives.
2. Use of line integrals of vector functions and their applications and also understand Gauss divergence theorem, Green's theorem and Stoke's theorem.
3. Understand the various concepts of Fourier series.
4. Know about the definition and properties of Fourier transforms
5. Solve the finite difference equations using Z transform.
6. Study the properties of Z-Transforms.

UNIT I

Introduction – Scalars and vectors – Differentiation of vectors – Derivative of a vector function – Some important results – Partial derivatives – Gradient, Divergence and Curl of a vector – Directional derivatives – Level surfaces.

UNIT II

Introduction – Integration of vectors – Line integral – Surface integrals. Volume integrals : Gauss divergence theorem – Green's theorem – Stoke's theorem.

UNIT III

Fourier series – Definition – Finding Fourier coefficients for a given periodic function with period 2π – Odd and Even functions – Half Range Series

UNIT IV

Definition of Fourier Transform-Properties of Fourier Transform- Inverse Fourier transform- Convolution theorem-Finite Fourier Sine & Cosine Transform – Parseval's theorem.

UNIT V

Introduction - Properties of Z- Transforms – Z- Transforms of some basic functions. Inverse Z Transforms - Z Transforms in solving finite difference equations.

TEXT BOOKS

1. Kandasamy P., Thilagavathy K., and K. Gunavathy, 2007 .Engineering Mathematics Vol. III , S. Chand & Company Ltd, New Delhi. (For Unit-I&II)
2. Veerarajan T., 2010. Engineering Mathematics - Semester II , Tata mcgraw Hill Company, New Delhi. (For Unit- III to V)

REFERENCES

1. Sundaram V., Balasubramanian R., and K.A. Lakshminarayanan., 2001. Engineering Mathematics Vol. III , Vikas publishing house PVT., LTD, New Delhi.
2. Janardhanan Pillay C.P., 2004. Vector Analysis and Differential Equations, Ajith Book Centre, P.O. Kanniyampuram, Ottapalam.

Course Objectives

This course enables the students to learn

- The mathematical concepts in optimal use of resources like LPP, TP, Assignment problems etc.
- Impart the basic concepts and applications of linear programming.
- The concepts of Queuing theory and its different types.
- Inventory Control and Stochastic Model.
- To introduce students to use quantitative methods and techniques for effective decisions-making.
- To impart the knowledge of formulation of practical problems using the linear programming method and its extensions.

Course Outcomes (COs)

On successful completion of this course, the students will be able to

1. Solve the Linear programming problems by using simplex method, Big M method and Duality method.
2. Get the Knowledge in Transportation models and Assignment problem.
3. Identify the basic analysis of queuing systems.
4. Identify the basic analysis of various inventory models.
5. Acquire the knowledge of Network representation.
6. Understand the role and application of PERT/CPM for project scheduling.

UNIT I

Linear Programming: Formulation of LPP – Graphical solution to LPP – Simplex method – Big M method- Duality in LPP.

UNIT II

Transportation model: Introduction – Mathematical Formulation – Finding initial Basic Feasible solutions – Optimum solution for non-degeneracy and degeneracy model - Unbalanced Transportation problems and Maximization case in Transportation problem.

The Assignment problem - Mathematical formulation of the problem – Hungarian method – Unbalanced Assignment problem- Maximization case in Assignment problem.

UNIT III

Queuing theory: Introduction – Characteristics of queuing system. Poisson process and Exponential Distribution – Classification of Queues. Single server – Infinite Capacity (M/M/1):(∞/FIFO), Single server – Finite Capacity (M/M/1):(N/FIFO), Multi server – Infinite Capacity (M/M/C):(∞/FIFO) and Multi server – Finite Capacity (M/M/C):(N/FIFO) models

Sequencing: Introduction – Definition. Processing n-jobs through 2 machines, Processing n-jobs through 3 machines.

UNIT IV

Inventory Control: Introduction – Costs involved in inventory – Deterministic EOQ models – Purchasing Model without and with shortage, Manufacturing Model without and with shortage – Stochastic Model - Price

break.

UNIT V

PERT and CPM: Network representation – Calculation of Earliest expected time, latest allowable occurrence time. CPM - various floats for activities – critical path. PERT –Time estimates in PERT- Probability of meeting scheduled date of completion of projects.

TEXT BOOK

1.Kanthi Swarup, Gupta P.K., and Man Mohan., 2003. Operations Research, Sultan Chand & Sons, NewDelhi.

REFERENCES

1. Anand Sharma, 2004 .Operations Research , Himalaya Publishing House , NewDelhi.
2. Kalavathy.S, 2002 .Operations Research , Vikas Publishers House Pvt Ltd., Trichy.
3. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2005.OperationsResearch (Resource Management Techniques), A. R. Publications, Nagapatinam.
4. Sharma J.K., 2009.Operations Research: Theory and Applications, Macmillan Publishers India Ltd, NewDelhi.

Course Objectives

This course enables the students to learn

- Geometry and its applications in the real world
- The basic concepts in Straight line, Sphere, Cone and Cylinder.
- The application of Geometrical figures.
- Geometric ideas in the language of the mathematician.
- Accurately identify the equations, properties and graphs of the parabola, circle and ellipse
- Demonstrate the ability to use trigonometric functions to find the parts of a right triangle and to solve problems involving right triangles

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Evaluate the angle between the lines, direction cosines
2. Describe the basic concepts in planes and to find the shortest distance between two given lines.
3. Explain the concepts of sphere and intersection of two spheres.
4. Acquire the knowledge on basic concepts Cone and find the equation of a right circular cone with vertex at the origin.
5. Understand the definition and concept of Cylinder.
6. Evaluate the problems related to cylinder and right circular cylinder.

UNIT I

Rectangular Cartesian co-ordinates – Distance between points – Direction cosines – Direction ratios – Angle between the lines – Conditions for perpendicularity and parallelism.

UNIT II

Straight line : Symmetrical form of the equations of a line – The plane and the straight line – Coplanar lines – The shortest distance between two given lines.

UNIT III

Sphere: Definition – Equation of the sphere – Length of the tangent – The plane section of a sphere – Equation of a circle on a sphere – Intersection of two spheres.

UNIT IV

Cone : Definition – Quadric cone – Cone whose vertex is at the origin .

Right circular cone : Definition –Equation of a right circular cone with vertex at the origin – Enveloping cone.

UNIT V

Cylinder : Definition – Equation of the cylinder – Right circular cylinder.

TEXT BOOK

1. Manicavachagom Pillay T.K., and T.Natarajan., 1996. Analytical Geometry 3D, S.Viswanathan printers & Publishers, Pvt Ltd, Madras.

REFERENCES

1. Venkataraman. M.K, 2000. Engineering Mathematics, Second Edition, TheNational Publishing Company, Chennai.
2. Kandasamy P., Thilagavathy K., and K.Gunavathy ., 2008. Engineering Mathematics, S.Chand Company Ltd, Ram Nagar, New Delhi.
3. Duraipandian.P ,Laxmi Duraipandian and D.Muhilan ., 2000. Analytical Geometry 3D ,Emerald Publishers, Pvt. Ltd, Chennai.

. Course Objectives

This course enables the students to

- Know the area of cost and management accounting.
- Identify the major differences and similarities between financial and management accounting.
- Understand the role of management accountant in an organization, and the importance of upholding ethical standards
- Expose students to methods and techniques needed by managers for performing functions such as costing, cost allocations, preparation of flexible budgets and variance analysis.
- Enhance the abilities of learners to develop the concept of management accounting and its significance in the business.
- Enable the learners to understand, develop and apply the techniques of management accounting

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Asses the significance and role of cost accounting
2. Import the knowledge on the nature of elements of cost and cost sheet preparation
3. Enrich the knowledge on the preparation of various budgets
4. Analyze the Financial Statement Analysis
5. Prepare budget and budgetary control
6. Acquire knowledge of Profit analysis.

UNIT I

Cost Accounting – Definition, meaning and scope – Relationship of Cost accounting with financial accounting and management accounting – Methods of costing – cost analysis – concepts and classifications – Elements of cost – preparation of cost sheet and tender — limitations of cost accounting.

UNIT II

Management Accounting – meaning, nature and Scope and functions of management accounting – relationship between management accounting, and financial accounting-role of management in decision making

UNIT III

Working Capital- concepts, kinds, importance of working capital-working capital requirements and their computation- sources of working capital - forecasting of working capital requirements

UNIT IV

Budget, Budgeting and budgetary control – definition, importance, essentials, classification of budgets, master budgets, preparation of different budgets – steps in budgetary control.

UNIT V

Standard costing – Advantages and disadvantages- Difference between budgetary control and standard costing- Variance- Types of variance- material and labor variances only.

TEXT BOOK

1. ShashiK.Gupta and R.K.Sharma 2009, Management Accounting. Kalyani Publishers. Ludhiana.

REFERENCES

1. R.S.N.Pillai and Bagavathi. 2005, Cost Accounting. New Delhi: S.Chand&Co.
2. S.P.Jain and K.LNarang,2006, Cost Accounting. Ludhiana : KalyaniPublishers.
3. M.C.Shukla and T.S.Grewal, Gupta. , 2008, Cost Accounting. New Delhi: Sultan Chand &Sons.
4. Man Mohan & Goyal. Management Accounting. Sahitya bhavan. NewDelhi:
5. Srinivasan. N.P. (2006). Management and Financial Accounting. Sterling Publishers Pvt Ltd. New Delhi.

Course Objectives

This course enables the students to

- Know about the HR principles on an organization
- Impart the knowledge on wage and salary administration
- Understand the other benefits avail by the employees.
- Develop, implement, and evaluate employee orientation, training, and development programs.
- Help the students focus on and analyze the issues and strategies required to select and develop manpower resources
- Develop relevant skills necessary for application in HR related issues

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Understand the fundamentals of HR and its interface with other functions in the organization
2. Understand the behavioral aspects at individual as well as organizational level
3. Study the tools & techniques in people management
4. Understand the strategic role of HR and global standards
5. Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.
6. Administer and contribute to the design and evaluation of the performance management program.

UNIT I

Introduction to HRM: Definition, Objectives and Functions of HRM –Role and Structure of Personnel Functions in Organization, Personal Principles and Policies.

UNIT II

Human Resource Planning: - Characteristics of HRP, Need for Planning HRP Process job Analysis, Job Design, Job Description, Job Specification. Selection Process - Placement and Induction, Training and Development, Promotion, Demotions, Transfers, Separation.

UNIT III

Wage and Salary Administration: - Factors Principles, Compensation Plan, Individuals, Group Incentives, Bonus, Fringe Benefits, and Job Evaluation Systems.

UNIT IV

Employee Maintenance and Integration:- Welfare and Safety, Accident Prevention, Administration of Discipline, Employee Motivation, Need and Measures.

UNIT V

Personnel Records and Reports: - Personnel Research and Personnel Audit, Objectives, Scope and Importance.

TEXT BOOK

S.S.Khanka. (2000), Human Resource Management, Sultan Chand & Sons, New Delhi.

REFERENCES

1. CS. Venkataraman and BK.Srivastva:-Personnel Management and HumanResources.
2. Yodder, Dale and Paul.DStandohar – Personnel Management and Industrial Relations.
3. Prasad, Lallan and A.M.Banerjee –Management ofHR

Course Objectives

This course enables the students to

- Learn about the fundamentals of Organic Chemistry
- Understand the Stereochemistry.
- Learn about saturated and unsaturated hydrocarbons
- Study of Catalytic hydrogenation and Carbons
- Acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary chemical literature.
- Professionalism, including the ability to work in teams and apply basic ethical principles.

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. The electronic structure of atoms and its influence on chemical properties
2. The principles influencing reactivity, including acid-base behaviors and reaction networks important in nutrition and metabolism
3. The principles influencing reactivity, including acid-base behaviors and reaction networks important in nutrition and metabolism
4. Balancing simple chemical reactions and strategies to balance them
5. The fundamental properties of atoms, molecules, and the various states of matter
6. Simple quantum mechanical treatments of atoms and molecules

UNIT I

Electronic effects: Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis.
Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.

UNIT II

Reactive Intermediates and Aromaticity:

Reactive Intermediates: Carbocations, Carbanions and free radicals.

Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.

Aromaticity: Benzenoids and Hückel's rule.

UNIT III

Stereochemistry: Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism and Diastereomerism. Threo and erythro; D and L; cis – trans nomenclature; CIP Rules: R/ S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).

UNIT IV

Alkanes and Alkynes:

Alkanes: (Upto 5 Carbons). Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation.

Alkynes: (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. Reactions: formation of metal acetylides, addition of bromine and alkaline KMnO_4 , Ozonolysis and oxidation with hot alk. KMnO_4 .

UNIT V

Alkenes: (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction).

Reactions: cis-addition (alk. KMnO_4) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration- demercuration, Hydroboration-oxidation.

TEXT BOOKS

1. Arun Bahl and B. S. Bahl, Advanced Organic Chemistry, S. Chand publisher(2010).
2. Jerry March, Advanced Organic Chemistry (IV Edition), John Wiley & Sons (ASIA) Pte. Singapore(1992).
3. L. Finar, Organic Chemistry (Vol. I, V Edition), Longman publishing group, E. L. B. S. Edition (1975).
4. I. L. Finar, Stereochemistry and the chemistry of the natural products (Vol. II, V Edition), Longman publishing group, E. L. B. S. Edition(1975).
5. R. T. Morrison & R. N. Boyd, Organic Chemistry (VI Edition), Prentice Hall(1992).

REFERENCES

1. N. Tewari, Advanced Organic Reaction Mechanism (III Edition), Books and Allied (P) Ltd, Kolkata(2011).
2. P. Ramesh, Basic Principles of Organic Stereochemistry (I Edition), Meenu Publications, Madurai(2005).
3. T. W. Graham Solomons and Craig Fryhle, Organic Chemistry (X Edition), John Wiley & Sons(2009).
4. Peter Sykes, A Guide Book to Mechanism in Organic Chemistry (VI Edition), Orient Longman (1988).
5. E L Eliel, Stereochemistry of Carbon Compounds, Tata McGraw-Hill, New Delhi(1992).

Course Objectives

This course enables the students to

- To impart knowledge on both Aptitude and Soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems.
- Adopt new and faster methods of calculations
- Reinforcing competencies in soft skills which are crucial in a social setting
- Work together as a team, for the benefit of their own, and the organization's, success
- Become more effective communicators and leaders

Course Outcomes (COs)

On successful completion of this course, the student will be able to:

1. Solve the problem of finding time, speed and distance.
2. Apply the concept of permutation and combination in appropriate problems
3. Acquire the knowledge of data sufficiency.
4. Improve the English communication skills.
5. Improve the skills of resume writing and attitude.
6. Develop the personality development and acquire the knowledge of how to attend the interview.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Course Objectives

This course enables the students to learn

- The Real and Complex number systems and the field axioms
- About the Upper bounds, lower bounds
- The concept of a set theory, countable and uncountable sets.
- Euclidean Space and its properties.
- The development of the mathematical skills to solve problems involving convolution, filtering, modulation and sampling.
- To appreciate how mathematics is used in design (e.g. conformal mapping);

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Understand the basic concepts of real and complex numbers.
2. Acquire the knowledge in relations and functions of sets.
3. Examine the different types of sets and its properties.
4. Describe the Weierstrass theorem and Cantor intersection Theorem.
5. Express the covering and compactness in metric spaces.
6. Evaluate the limit, continuity of complex and vector valued functions.

UNIT I

The Real and Complex number systems the field axioms, the order axioms –integers –the unique Factorization theorem for integers –Rational numbers –Irrational numbers –Upper bounds, maximum Elements, least upper bound –the completeness axiom–some properties of the supremum–properties of the integers deduced from the completeness axiom– The Archimedean property of the real number system .

UNIT II

Basic notions of a set theory: Notations –ordered pairs –Cartesian product of two sets – Relations and functions – further terminology concerning functions –one –one functions and inverse –composite functions –sequences –similar sets–finite and infinite sets –countable and uncountable sets – uncountability of the real number system.

UNIT III

Elements of point set topology: Euclidean space \mathbb{R}^n –open balls and open sets in \mathbb{R}^n . The structure of open Sets in \mathbb{R}^n –closed sets and adherent points –The Bolzano –Weierstrass theorem– the Cantor intersection Theorem.

UNIT IV

Covering –Lindelof covering theorem –the Heine Borel covering theorem –Compactness in \mathbb{R}^n – Metric Spaces –point set topology in metric spaces –compact subsets of a metric space –Boundary of a set.

UNIT V

Convergent sequences in a metric space –Cauchy sequences –Completeness sequences –complete metric Spaces. Limit of a function –Continuous functions –continuity of composite functions. Continuous complex valued and vector valued functions.

TEXT BOOK

1.Apostol.T.M.,1990. Mathematical Analysis, Second edition, Narosa Publishing Company, Chennai.

REFERENCES

1. Balli. N.P., 1981. Real Analysis, Laxmi Publication Pvt Ltd, New Delhi.
2. Gupta . S.L ., and N.R. Gupta ., 2003.Principles of Real Analysis, Second edition, Pearson EducationPvt.Ltd,Singapore.
3. Royden .H.L ., 2002. Real Analysis, Third edition, Prentice hall of India,NewDelhi.
4. Rudin. W.,1976 .Principles of mathematical Analysis, Mcgraw hill, Newyork.
5. Sterling. K. Berberian, 2004. A First Course in Real Analysis, Springer Pvt Ltd, NewDelhi.

Course Objectives

This course enables the students to learn

- The concepts of complex numbers and analytic functions.
- The concept of conformal mapping and bilinear transformation.
- The basics of Power Series and its convergence.
- About the Bilinear Transformation and Complex Integration
- Techniques of complex analysis that make practical problems easy (e.g. graphical rotation and scaling as an example of complex multiplication)
- To understand how complex numbers provide a satisfying extension of the real numbers

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Explain the basic concepts of complex number system and complex plane
2. Understand the ideas of analytic function and its properties.
3. Describe the convergence of power series and elementary functions
4. Evaluate cross ratio and construct conformal and bilinear transformation.
5. Perform integration on complex valued function.
6. Evaluate complex integration over a simple and closed curves.

UNIT I

Complex number system: Complex number-Field of a complex numbers-Conjugation –Absolute value of a complex number.Complex plane: Complex number by points- n^{th} root of a complex number-Angle between two rays- Elementary transformation- Stereographic projection.

UNIT II

Analytic functions: Limit of a function –continuity –differentiability – Analytical function defined in a region –necessary conditions for differentiability –sufficient conditions for differentiability – Cauchy-Riemann equation in polar coordinates –Definition of entire function.

UNIT III

Power Series: Absolute convergence –circle of convergence –Analyticity of the sum of a power series-Uniqueness of representation of a function by a power series- Elementary functions : Exponential, Logarithmic, Trigonometric and Hyperbolic functions. Harmonic functions: Definition and determination.

UNIT IV

Bilinear transformation-Circles and Inverse points-Transformation mappings $w=Z^2$, $w=Z^{1/2}$, $w=e^Z$, $w=\sin Z$, and $w=\cos Z$ -Conformal mapping-isogonal mapping.

UNIT V

Complex integration: Simple rectifiable oriented curves –Integration of complex functions- Definite integral- Interior and Exterior of a closed curve-Simply connected region-Cauchy's fundamental theorem-Cauchy's formula for higher derivatives- Morera's theorem.

TEXT BOOK

1.Duraipandian.P., Lakshmi Duraipandian.,1997.Complex analysis,Emerald publishers, Chennai-2

REFERENCES

1. Lars V.Ahlfors.,1979. Complex Analysis, Third edition, Mc-Graw Hill Book Company,New Delhi
2. Arumugam.S., Thangapandi Isaac., and A.Somasundaram., 2002. Complex Analysis, SCITECH Publications Pvt.Ltd,Chennai.
3. Choudhary.B., 2003. The Elements of Complex Analysis ,New Age International Pvt.Ltd ,NewDelhi.
4. Ponnusamy.S., 2004. Foundations of Complex Analysis, Narosa Publishing House,Chennai.
5. Vasishtha A.R ., 2005. Complex Analysis, Krishna Prakashan Media Pvt. Ltd.,Meerut.
6. Narayanan .S., T.K Manichavachagam Pillay, 1992. Complex Analysis.S.Viswanathan (printers & publishers) pvt Ltd, Madras.

Course Objectives

This course enables the students to learn

- The basic concepts to solve the algebraic and transcendental equations.
- Utilize computers to solve engineering problems which are impossible to solve by analytical means.
- To solve the simultaneous linear algebraic equations.
- To find the numerical solution for differential and integral equation.
- To prove results for various numerical root finding methods.
- To derive appropriate numerical methods to solve interpolation based problems.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Solve the algebraic and transcendental equations.
2. Evaluate the solution of simultaneous linear algebraic equations.
3. Relate the forward and backward differences and its operators.
4. Apply the Newton forward, backward and divided differences to find interpolation of equal and unequal intervals.
5. Express numerical integration and differentiation in applied areas.
6. Evaluate the numerical solution of ordinary differential equations.

UNIT I

Solution of algebraic and transcendental equations: Bisection method – Iterative method Regula Falsi method – Newton Raphson method – Horner's method – Graeffe's root squaring method.

UNIT II

Solution of simultaneous linear algebraic equations: Gauss elimination method – Gauss Jordan method – Method of triangularization – Crout's method – Gauss-Jacobi method – Gauss-seidel method.

UNIT III

Finite Difference: First and higher order differences – Forward and Backward differences – Properties of operator – Difference of a polynomial – Factorial polynomial – Error Propagation in difference table – operator E – Relation between Δ , E and D.

UNIT IV

Interpolation: Gregory Newton Forward and Newton Backward interpolation formula – Equidistant terms with one or more missing values – Interpolation with unequal intervals – Divided differences – Newton's divided difference formula – Lagrange's interpolation formula – Inverse interpolation formula.

UNIT V

Numerical Differentiation and Integration: Newton's Forward and backward differences to compute derivatives – Trapezoidal rule, Simpson's $1/3$ & $3/8$ rule. Solution of ordinary differential equations: R-K method (II order, III order and IV order).

TEXT BOOK

1. Venkataraman M.K., Fifth Edition, 2001. Numerical Methods in Science and Engineering, National publishing Company, Madras.

REFERENCES

1. Jain. M.K., Iyengar S.R.K., and R.K. Jain., 2004. Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi.
2. Vedamurthy V.N., N.Ch.S.N. Iyenger., 1999. Numerical Methods, Vikas Publishing House Pvt Ltd, New Delhi.
3. Kandaswamy. P., Thilagavathy K., and K. Gunavathy., 2013. Numerical Methods, S. Chand & Company Ltd., New Delhi.

Course Objectives

This course enables the students to learn

- Exercise user defined functions to solve real time problems.
- Illustrate flowchart and algorithm to the given problem.
- The basic structure of the programme, declaration and usage of variables.
- The basic MATLAB (matrix laboratory) programme.
- To develop an understanding of the elements of error analysis for numerical methods and certain proofs.
- To provide students with an introduction to the field of numerical \methods.

Course outcomes (COs)

On successful completion of this course, the student will be able to

1. Evaluate the roots of any algebraic equations.
2. Develop a program to solve linear algebraic equations in Gauss Jordan and elimination method.
3. Test the default programs for interpolation in Newton's forward and backward.
4. Predict the values using interpolation method.
5. Calculate the numerical solution of ordinary differential equations
6. Evaluate the integral and derivative by using numerical integration rules.

1. Roots of a given Algebraic Equation using Bisectionmethod.

2. Roots of a given Algebraic Equation using Newton Raphsonmethod.

3. Solution of linear algebraic equations using Gauss Eliminationmethod.

4. Solution of linear algebraic equations using Gauss Jordanmethod.

5. Solution of linear algebraic equations using Gauss Seidalmethod.

6. Interpolation using Newton's forward.

7. Interpolation using Newton's backward.

8. Interpolation using Lagrange'smethod.

9. Derivative using Newton's forward differenceformula.

10. Derivative using Newton's backward differenceformula.

11. The value of the given integral using Simpson's one thirdrule.

12. The value of the given integral using Trapezoidalrule.

Course Objectives

This course enables the students to learn

- Exercise user defined functions to solve real time problems.
- Illustrate flowchart and algorithm to the given problem.
- The basic structure of the programme, declaration and usage of variables.
- The basic MATLAB (matrix laboratory) programme.
- To understanding the MATLAB environment
- carry out simple numerical computations and analyses using MATLAB

Course outcomes (COs)

On successful completion of this course, the student will be able to

1. Explore the Basics of MATLAB and evaluate basic computation using input and output commands.
2. Built the inline and outline functions and solve matrix and array operations.
3. Express the script and function files.
4. Evaluate Eigen values and Eigen vectors using MATLAB.
5. Solve a linear system of equations using MATLAB.
6. Apply the MATLAB programme for solving Differential and Integral problems and find the Numerical solution.

UNIT I

Introduction - Basics of MATLAB, Input – Output, File types – Platform dependence – General commands.

UNIT II

Interactive Computation: Matrices and Vectors – Matrix and Array operations – Creating and Using Inline functions – Using Built-in Functions and On-line Help – Saving and loading data – Plotting simple graphs.

UNIT III

Programming in MATLAB: Scripts and Functions – Script files – Functions files-Language specific features – Advanced Data objects.

UNIT IV

Applications – Linear Algebra - Solving a linear system – Finding Eigen values and Eigen vectors – Matrix Factorizations.

UNIT V

Applications – Data Analysis and Statistics – Numerical Integration – ordinary differential equations – Nonlinear Algebraic Equations.

TEXT BOOK

1. Rudra Pratap, 2003. Getting Started with MATLAB-A Quick Introduction for Scientists and Engineers, Oxford University Press.

REFERENCES

1. William John Palm, 2005. Introduction to Matlab 7 for Engineers, McGraw-Hill Professional. New Delhi.
2. Dolores M. Etter, David C. Kuncicky, 2004. Introduction to MATLAB 7, Prentice Hall, New Delhi.
3. Kiranisingh.Y, Chaudhuri.B.B, 2007. Matlab Programming, Prentice-Hall Of India Pvt.Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The concept of algebraic structures and Mathematical Logics.
- lattices and its special categories which plays an important role in the field of computers.
- About the concepts of Relations and Functions.
- The fundamental concepts in graph theory, with a sense of some its modern applications.
- To solve problems using counting techniques and combinatorics.
- To apply algorithms and use definitions to solve problems to proof statements in elementary number theory

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Explore the mathematical logics in Tautology and theory of inference for predicate calculus.
2. Understand the basic concepts of relations and functions and composition of functions.
3. Describe the Phrase, structure grammar and context free grammar in Formal Languages and Automata
4. Express the partial ordering, Lattices and Boolean Algebra and Boolean functions in mathematical logics.
5. Describe paths, reachability, connectedness and matrix representation of directed and undirected graphs.
6. Apply the concepts of graph theory in real time problems.

UNIT-I

Mathematical logic: Connections well formed formulas, Tautology, Equivalence of formulas, Tautological implications, Duality law, Normal forms, Predicates, Variables, Quantifiers, Free and bound Variables. Theory of inference for predicate calculus.

UNIT-II

Relations and functions: Composition of relations, Composition of functions, Inverse functions, one- to- one, onto, one-to-one & onto, onto functions, Hashing functions, Permutation function.

UNIT-III

Formal languages and Automata: Grammars: Phrase–structure grammar, context-sensitive grammar, context-free grammar, regular grammar. Finite state automata- Deterministic finite automata and Non deterministic finite automata-conversion of nondeterministic finite automata to deterministic finite automata.

UNIT-IV

Lattices and Boolean algebra: Partial ordering, Poset, Lattices, Boolean algebra, Boolean functions, Theorems, Minimization of Boolean functions.

UNIT-V

Graph Theory: Directed and undirected graphs, Paths, Reachability, Connectedness, Matric representation, Euler paths, Hamiltonian paths, Trees, Binary trees simple theorems, and applications.

TEXT BOOK

1. Tremblay J.P., and R.P Manohar., 1975 . Discrete Mathematical Structures with applications to computer science, Tata Mc.Graw Hill, New Delhi .

REFERENCES

1. Sundaresan V., Ganapathy Subramanian K.S., and Ganesan K., 2002. Discrete Mathematics, A.R. Publications, Nagapattinam.

2. Veerarajan T., 2007. Discrete Mathematics with graph theory and combinatorics, Tata Mc-graw hill companies, New Delhi.

3. Sharma J.K., 2005. Discrete Mathematics, Second Edition , Macmillan India Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- Mathematical concepts and principles to perform numerical and symbolic computations.
- To investigate and solve mathematical and statistical problems.
- To write clear and precise proofs.
- To communicate effectively in both written and oral form.
- To analyse hypotheses and conclusions of mathematical statements
- To understand the basics of modular arithmetic.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Describe the divisibility theory, fundamental theorem of Arithmetic and theory of congruence.
2. Use Fermat's, little and Wilson theorems on congruence and number theoretic problems.
3. Establish the generalization of Fermat and Euler theorems also properties of phi function
4. Estimate the Primitive roots, indices and composite numbers.
5. Describe the basic concepts in Cryptography
6. Identify number theoretic concepts which are related to and used in cryptography

UNIT -I

Divisibility theory in integers, g.c.d, prime, fundamental theorem of Arithmetic, the theory of congruence.

UNIT -II

Fermat's theorem – Pierre de Fermat – Fermat's factorization method – the little theorem – Wilson theorem .

UNIT -III

Euler's generalization of Fermat's theorem – Euler's phi function – Euler's theorem – some properties of phi function.

UNIT -IV

Primitive roots and indices – the order of an integer – modulo n – primitive for primes composite numbers having primitive roots – the theory of indices. The Fermat conjecture – pythagorean Triples – The famous Last theorem.

UNIT -V

Cryptography – classical cryptography – some simple crypto system-Shannon's theory

TEXT BOOK

1. Neal Koblitz., 2006. A course in Number theory and Cryptography, 2nd Edition, Hindustan Book Agency, New Delhi.

REFERENCES

1. Stallings. W, 2000. Cryptography and Network Security, Prentice Hall India, NewDelhi.
2. Douglas Stinson, 2007. Cryptography theory and practise, Second edition, Chapman & Hall/CRC, NewDelhi.
3. David M Burton, 2006. Elementary number theory, 6th Edition, New age international Private limited, NewDelhi.

Course Objectives

This course enables the students to learn

- The mathematical theory of random variables and random processes
- To apply Stochastic Process in day to day life problems.
- How queueing theory are used as tools and mathematical models in the study of networks.
- The theoretical concepts and techniques for solving problems that arises in practice
- Expose the students to the basics of probability theory and random processes
- Understand the definition of a stochastic process and in particular a Markov processes

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Describe the concepts and definitions of stochastic Processes, Markov chains.
2. Understand the ideas about Markov Process and Poisson Process in discrete state space
3. Explain the Markov process with continuous state space also analyze Brownian motion, Kolmogorov equations.
4. Discuss the Branching processes, properties of generating functions Branching process and Time Markov Branching Process.
5. Develop the concepts of stochastic processes in queueing systems.
6. Execute the stochastic processes models for real world problems.

UNIT I

Definition of Stochastic Processes – Markov chains: definition, order of a Markov Chain – Higher transition probabilities – classification of states and chains.

UNIT II

Markov Process with discrete state space: Poisson process – and related distributions – properties of Poisson process, Generalizations of Poisson Processes – Birth and death Processes – continuous time Markov Chains.

UNIT III

Markov processes with continuous state space: Introduction, Brownian motion – Wiener Process and differential equations for Wiener process, Kolmogorov equations – first passage time distribution for Wiener process – Ornstein – Uhlenbeck process.

UNIT IV

Branching Processes: Introduction – properties of generating functions of Branching process– Distribution of the total number of progeny, Continuous- Time Markov Branching Process, Age dependent branching process: Bellman-Harris process.

UNIT V

Stochastic Processes in Queuing Systems: Concepts – Queuing model M/M/1 – transient behavior of M/M/1 model – Birth and death process in Queuing theory: M/M/1 – Model related distributions – M/M/1 - M/M/S/S – loss system - M/M/S/M – Non birth and death Queuing process: Bulk queues – M(x)/M/1.

TEXT BOOK

1. Medhi. J, 2006. Stochastic Processes, 2nd Edition, New age international Private limited, New Delhi.

REFERENCES

1. K. Basu, 2003. Introduction to Stochastic Process, Narosa Publishing House, New Delhi.
2. Goswami and B. V. Rao, 2006. A Course in Applied Stochastic Processes, Hindustan Book Agency, New Delhi.
3. G. Grimmett and D. Stirzaker, 2001. Probability and Random Processes, 3rd Ed., Oxford University Press, New York.
4. Papoulis. A and Unnikrishna Pillai, 2002. Probability, Random variables and Stochastic Processes, Fourth Edition, McGraw-Hill, New Delhi.

Course Objectives

This course enables the students to

- Eradicates the fear of Mathematics and instills confidence.
- Improves calculation speed and numerical skills
- Get basic knowledge in solving numerical problems using different methods.
- Facilitates a habit of analytical thinking and measured approach towards any problem
- Make mathematics easy and interesting
- Carry out tedious and cumbersome mathematical operations in a simple way

Course Outcomes (COs)

On successful completion of the course, students will be able to

1. Solve the simple and compound Multiplication arithmetic problems.
2. Understand the concept of different types of division.
3. Factorize the fraction of different kinds
4. Evaluate the solution for linear and quadratic equations.
5. Solve the differentiation problems.
6. Explore the concepts of Integration in the way of vedic sutras.

UNIT I

Actual Applications of the Vedic sutras- Arithmetical Computations – Multiplication – Practical Application in Compound Multiplication.

UNIT II

Division by the Nikhilam method – Division by the Paravartya method – Argumental Division – Linking note -Recapitulation and conclusion.

UNIT III

Factorization of Simple Quadratics- Factorization of Harder Quadratics. .

UNIT IV

Simultaneous Simple Equations – Miscellaneous (simple) Equations – Quadratic Equations.

UNIT V

Factorization and Differential Calculus – Partial Fractions – Integration by Partial fractions.

TEXT BOOK:

1.Jagadguru Swami Sri Bharati KrisnaTirthaji Maharaja,2004. Vedic Mathematics, Motilal Bansaridass Publishers Pvt Limited, New Delhi.

Course Objectives

This course enables the students to learn

- The concepts and principles of quality planning and quality conformance.
- To investigate control charts and allied techniques.
- To demonstrate the basic concepts of attributes and variables inspection.
- The basic concepts of Acceptance Sampling.
- To introduce students to statistical quality control (SQC) emphasizing those aspects which are relevant for SQC's practical implementation.
- To understand the purpose and function of statistical quality control.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Inspect the Quality conformance, quality adherence, quality assurance and management functions.
2. Identify total quality control in an industry.
3. Identify and apply various properties of control charts
4. Describe different types of control charts.
5. Explain the concept of sampling, attributes and variables inspection.
6. Discuss the different types of sampling plans and organize of quality control.

UNIT I

Total quality control in an industry. Quality planning, quality conformance, quality adherence. Quality assurance and quality management functions.

UNIT II

Control charts and allied techniques. Concept of quality and meaning of control. Concept of inevitability of variation-chance and assignable causes. Pattern of variation. Principles of rational sub-grouping.

UNIT III

Different types of control charts. Concept of process capability and its comparison with design specifications, CUSUM charts.

UNIT IV

Acceptance sampling. Sampling inspection versus 100 percent inspection. Basic concepts of attributes and variables inspection.

UNIT V

OC curve, Single, double, multiple and sequential sampling plans, Management and organization of quality control.

TEXTBOOK

1. D.C. Montgomery, 1985. Introduction to Statistical Quality Control, Wiley, New Delhi.

REFERENCES

1. Kandaswamy. P.K. Thilagavathy., and K. Gunavathy., 2004 . Probability statistics and Queueing theory, S. Chand & Company Ltd., New Delhi.
2. Nabendu Pal and Sahadevsarkar., 2008. Statistics concepts and applications, Prentice – Hall of India, New Delhi.
3. Grant. E.L. and R. Levenworth, 1988. Statistical Quality Control, 6th ed., McGraw-Hill, New Delhi.
4. Juran ,J.M. and F.M. Grayna, 1970. Quality Planning and Analysis, Tata McGraw-Hill, New Delhi.
5. Ryan T.P, 2000. Statistical Methods for Quality Improvement, Wiley, New York.
6. Ravichandran J., 2012. Probability and statistics for Engineers., First Edition, Wiley India.

Course Objectives

This course enables the students to learn

- About the continuous function, uniform continuity and connectedness
- The fundamental properties of the Real numbers.
- The concept of Riemann integrals.
- Concepts of Monotonic functions and its properties.
- About Riemann-Stieltjes integrals, sequences and series of functions
- Functions of bounded variation, grasp basic concepts about the total variation.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Understand about the categories of open sets and closed sets.
2. Explain the components of a metric space and connectedness of sets.
3. Evaluate the derivatives and infinite derivatives of the given functions.
4. Explore the properties of monotonic functions, total and bounded variation of functions
5. Evaluate the Riemann Stieltjes integral and change of variables
6. Demonstrate an understanding of the theory of functions, continuity, differentiation and integration.

UNIT I

Examples of continuous functions –continuity and inverse images of open or closed sets –functions continuous on compact sets –Topological mappings –Bolzano’s theorem.

UNIT II

Connectedness –components of a metric space – Uniform continuity : Uniform continuity and compact sets – fixed point theorem for contractions –monotonic functions.

UNIT III

Definition of derivative –Derivative and continuity –Algebra of derivatives – the chain rule –one sided derivatives and infinite derivatives –functions with non-zero derivatives –zero derivatives and local extrema – Roll’s theorem –The mean value theorem for derivatives.

UNIT IV

Properties of monotonic functions –functions of bounded variation –total Variation –additive properties of total variation on (a, x) as a function of x – functions of bounded variation expressed as the difference of increasing functions.

UNIT V

The Riemann - Stieltjes integral : Introduction –Notation –The definition of Riemann –Stieltjes integral – linear properties –Integration by parts –change of variable in a Riemann –stieltjes integral – Reduction to a Riemann integral.

TEXT BOOK

1. Apostol. T.M., 1990. Mathematical Analysis, Second edition, Narosa Publishing Company, Chennai.

REFERENCES

1. Balli. N.P, 1981. Real Analysis, Laxmi Publication Pvt Ltd, New Delhi.
2. Gupta . S.L , and N.R. Gupta ., 2003. Principles of Real Analysis, Second edition, Pearson Education Pvt. Ltd, Singapore.
3. Royden .H.L , 2002. Real Analysis, Third edition, Prentice hall of India, New Delhi.
4. Rudin. W, 1976 .Principles of Mathematical Analysis, McGraw hill, New York.
5. Sterling. K. Berberian , 2004. A First Course in Real Analysis, Springer Pvt Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The concepts of analytic function of complex number system, complex function and complex integration
- The concept of Singularities, real definite integrals and Meromorphic functions.
- Identify and construct complex-differentiable functions.
- Express functions as infinite series or products.
- To identify and construct complex-differentiable functions
- To express functions as infinite series or product

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Explain the fundamental concepts of complex analysis and mean value theorem and their role in modern mathematics and applied contexts.
2. Express the concepts of Taylor's and Laurent's series.
3. Evaluate the types of singularities of complex functions and its properties.
4. Understand the concepts of real definite Integrals.
5. Evaluate the poles and using integration of rational functions.
6. Describe the meromorphic function, Principles of argument and Rouché's theorem.

UNIT I

Zero's of a function-Cauchy's inequality-Liouville's theorem-Fundamental theorem of Algebra- Maximum modulus theorem- Gauss mean value theorem- Mean value of the value of a harmonic function on a circle- Term by term differentiation and integration of uniformly convergent series.

UNIT II

Taylor's series and Laurent's series : Taylor's series-Theorems and some related problems- Zero's of an analytic function- Laurent's series – Theorems and some related problems- Cauchy product and division.

UNIT III

Singularities – Isolated Singularities- Removable Singularity- Pole-Essential Singularity-Behaviour of a function at an isolated Singularity-Determination of the nature of Singularity-Problems- Residues- Residues theorem(statement only)- Problems.

UNIT IV

Real definite integrals: Evaluation using the calculus of residues – Integration on the unit circle – Integral with $-\infty$ and $+\infty$ as lower and upper limits with the following integrals:

- i) $P(x)/Q(x)$ where the degree of $Q(x)$ exceeds that of $P(x)$ at least 2.
- ii) $(\sin ax) \cdot f(x)$, $(\cos ax) \cdot f(x)$, where $a > 0$ and $f(z) \rightarrow 0$ as $z \rightarrow \infty$ and $f(z)$ does not have a pole on the real axis.
- iii) $f(x)$ where $f(z)$ has a finite number of poles on the real axis.

UNIT V

Meromorphic functions: Theorem on number of zeros minus number of poles –Principle of argument: Rouché's theorem – Theorem that a function which is meromorphic in the extended plane is a rational function.

TEXT BOOK

1. Duraipandian.P., Lakshmi Duraipandian.,1997.Complex Analysis, Emerald publishers, Chennai-2

REFERENCES

1. Lars V.Ahlfors.,1979. Complex Analysis, Third edition, Mc-Graw Hill Book Company,New Delhi.
2. Arumugam.S., Thangapandi Isaac., and A.Somasundaram., 2002. Complex Analysis, SCITECH Publications Pvt.Ltd,Chennai.
3. Choudhary.B., 2003. The Elements of Complex Analysis ,New Age International Pvt.Ltd , NewDelhi.
4. Vasishtha A.R ., 2005. Complex Analysis, Krishna Prakashan Media Pvt. Ltd.,Meerut.
5. Narayanan .S., T.K Manichavachagam Pillay, 1992. Complex Analysis.S.Viswanathan (printers & publishers) pvt Ltd, Madras.

Course Objectives

This course enables the students to learn

- Group homomorphism, isomorphism, automorphism and its related properties.
- Effectively write abstract mathematical proofs in a clear and logical manner.
- Locate and use theorems to solve problems in number theory and theory of polynomials over a field
- Identifying unsolved yet relevant problem in a specific field.
- To compute determinants and know their properties.
- To present the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Expertise on Sets, mappings and binary operations and relations.
2. Understand the concept of Subgroups and its properties.
3. Describe the concepts of Homomorphism of groups.
4. Understand the basic concepts of Rings and its properties.
5. Apply the concept of a field extension to various mathematical problems
6. Evaluate ideals and subrings in Rings and quotient rings.

UNIT I

Sets – Mappings – Binary operations and Relations. Groups – Abelian group, Symmetric Group – Definitions and Examples – Basic properties.

UNIT II

Subgroups – Cyclic subgroup – Index of a group – Order of an element – Fermat theorem – A Counting Principle - Normal Subgroups and Quotient Groups.

UNIT III

Homomorphisms – Cauchy's theorem for Abelian groups – Sylow's theorem for Abelian groups Automorphisms – Inner automorphism - Cayley's theorem, permutation groups.

UNIT IV

Rings: Definition and Examples – Some Special Classes of Rings – Commutative ring – Field – Integral domain - Homomorphisms of Rings.

UNIT V

Ideals and Quotient Rings – More Ideals and Quotient Rings – Maximal ideal - The field of Quotients of an Integral Domain – Euclidean rings.

TEXT BOOK

1. Vasishtha.A.R., 2005. Modern Algebra, Krishna Prakasam Mandir , Meerut.

REFERENCES

1. Herstein. I.N. 2010. Topics in Algebra, John Wiley & Sons, New York.
2. Artin.M., 2008. Algebra, Pearson Prentice-Hall of India, New Delhi.
3. Fraleigh.J.B., 2004. A First Course in Abstract Algebra , Seventh edition , Pearson Education Ltd, Singapore.
4. Kenneth Hoffman., Ray Kunze., 2003. Linear Algebra, Second edition, Pearson Prentice Hall of India Pvt Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The fundamental concepts in Graph Theory and some of its modern applications.
- To apply graph theory based tools in solving practical problems
- Hands-on implementation of algorithms to evaluate the reliability of given networks by applications of programming techniques.
- The use of these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.
- To apply graph-theoretic terminology and notation
- To understand and prove theorems/lemmas and relevant results in graph theory.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Understand the concept of undirected graphs, complete graphs, bipartite, weighted graph, shortest path.
2. Evaluate the Eulerian path and Hamiltonian cycles in any graphs.
3. Describe the concept of trees and a minimal spanning tree for a given weighted graph.
4. Apply the knowledge of planar graphs to solve the real-life problem.
5. Apply the principles colouring concepts of graph theory in practical situations
6. Express the graphs in the way of adjacency, incident and circuit matrices.

UNIT I

Undirected graph- Basic concepts- incidence and Degree of vertices- isolated vertex – pendant vertex – Path and Circuits: Isomorphism – Sub graphs – Walks, Paths and Circuits – Connected graphs and concepts – Euler graphs – Hamilton graph – Complete graph – Traveling Salesman problem.

UNIT II

Trees – Definition – some properties of trees – Theorems – Rooted and Binary trees – Spanning trees. Cut set and cut vertices – some properties of a cut set – sets in a graph – Theorems – Fundamental circuits and cut sets – Connectivity and Separability – Theorems.

UNIT III

Planar graphs – Kuratowski's two graphs – Theorems – Different representation of a planar graph – Detection of planarity – Thickness and crossings.

UNIT IV

Colourings – Covering partitioning – Chromatic number Theorems – Chromatic partitioning – Independent set – Finding a maximal independent set – Dominating set – Finding minimal dominating set – Chromatic polynomial – Theorems. Coverings – Theorems – Four colour problem - Five colour Theorem.

UNIT V

Directed graph – Definition – Some types of di-graphs – Directed path and connectedness – Euler di- graphs – Theorems – Trees with direct edges - Theorems – odd trees – Matrix representation – incidence matrix – Theorems – Circuit matrix – Adjacency matrix – Tournaments.

TEXT BOOK

1.Narsingh Deo., 2007. Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India Pvt. Ltd, New Delhi.

REFERENCES

1. Harary F., 1969. Graph Theory, Addison-Wesley publishing company, Inc., Amsterdam.
2. Bondy.J.A., and U.S.R.Murty., 2008. Graph theory and applications, Springer.
3. Balakrishnan, 2011, Graph theory, Springer publications.
4. West D.B., 2011. Introduction to Graph Theory, Prentice Hall, New Delhi.

Course Objectives:

The student should be made to:

- Understand the basic knowledge of fuzzy sets and fuzzy logic.
- To gain knowledge in fuzzy relations and fuzzy measures.
- Be exposed to basic fuzzy system applications.
- Explain the concepts of neural networks, fuzzy sets, and genetic algorithms.
- To develop the skills to gain a basic understanding of fuzzy set theory and fuzzy logic theory.
- To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Distinguish the crisp sets and fuzzy sets and understand the fuzzy logic .
2. Describe the concepts of fuzzy union - fuzzy intersection - combinations operations
3. Develop the fuzzy set theory into fuzzy relations and fuzzy graphs
4. Apply basic fuzzy measures and approximate reasoning.
5. Understand the concepts of Fuzzy decision making
6. Illustrate the fuzzy concepts in real time problems.

UNIT I

Crisp sets and fuzzy sets - basic concept of fuzzy set - fuzzy logic - operations on fuzzy sets - general discussion fuzzy complements.

UNIT II

Fuzzy union - fuzzy intersection - combinations operations.

UNIT III

Fuzzy relations and fuzzy graphs - fuzzy relation on sets and fuzzy sets - composition of fuzzy relations - properties of the min-max composition - fuzzy graphs - special fuzzy relations.

UNIT IV

Fuzzy measures - general discussion - belief and plausibility measures - probability measures - possibility and necessity measures.

UNIT V

Fuzzy decision making - individual decision making - fuzzy ranking methods - fuzzy linear programming.

TEXTBOOK

1. George J. Klir and Bo Yuan, 1995. Fuzzy sets and fuzzy logic theory and applications, Prentice- Hall of India private limited, New Delhi.

REFERENCES

1. Timothy J. Ross, 2000. Fuzzy logic with Engineering Applications, McGrawHill, Inc. New Delhi.
2. George J. Klir, Tina A. Folger, 2008. Fuzzy sets, uncertainty and information, Prentice Hall of India Pvt Ltd, New Delhi.
3. H.J. Zimmermann, 2006. Fuzzy set theory and its applications, Second Edition, Springer New Delhi.

Course Objectives:

The student should be made to:

- Understand the basic knowledge of Sets and subsets.
- Understand Lattices as algebraic Structures.
- To gain knowledge in diagrammatical representation of a poset.
- Be exposed to ideal lattice applications.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Define Sets, subsets, mappings and binary compositions also discuss the mathematical induction.
2. Develop ability to create Diagrammatical Representation of a Poset, lattices and sub lattices.
3. Understand the concepts of Homomorphism and Isomorphism of Lattices.
4. Evaluate Ideals, principal ideals and dual ideals in a ring.
5. Describe the length and covering conditions of lattices.
6. Apply the direct products in Lattice theory.

UNIT I

Sets and subsets – Relations – Equivalence Classes – Mappings or Functions – Binary Compositions
– The Numbers – Mathematical Induction.

UNIT II

Diagrammatical Representation of a Poset– Isomorphism – Duality – Product of Two Posets – Semi-lattices –
Complete Lattices – Sub lattices.

UNIT III

Dual Ideals – Principal Ideals – Principal Dual Ideals – Prime Ideals.

UNIT IV

Complements-Length and Covering Conditions–Homomorphism–Quotient Lattices.

UNIT V

Direct Products-Ideal Lattice-Isomorphism Theorem-Distributive Lattices-Direct Products.

TEXT BOOK

1. George Gratzner, 2003. General Lattice Theory, Second Edition, Birkhauser Verlag , Germany.

REFERENCE

1. Vijay K Khanna, 2006. Lattices and Boolean Algebras, Vikas publishing house Pvt ltd, Second edition, New Delhi.

Course Objectives:

The student should be made to:

- Gain a clear knowledge about Astronomy and its applications to the real world.
- show how **astronomical** information is collected, processed, interpreted, and shared
- Provide hands-on experience using various types of **astronomical** tools and instrumentation
- Develop observational and analytical skills.
- Describe the science of cosmology and its relation to other fields of science
- Explain how the scientific method and quantitative arguments are used in cosmology

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Enable the students to understand the General description of the Solar system.
2. Describe the ideas of Celestial sphere and its coordinates.
3. Understand the theories of Dip, Twilight and Geocentric parallex.
4. Apply the Tangent formula and Cassinis formula to find the Refraction.
5. Apply Kepler's laws to find the Relation between true eccentric and mean anomalies
6. Use analytical and mathematical skills to solve problems

UNIT I

General description of the Solar system. Comets and meteorites – Spherical trigonometry.

UNIT II

Celestial sphere – Celestial co – ordinates – Diurnal motion – Variation in length of the day.

UNIT III

Dip – Twilight – Geocentric parallex

UNIT IV

Refraction – Tangent formula – Cassinis formula.

UNIT V

Kepler's laws – Relation between true eccentric and mean anomalies

TEXT BOOK

1. G V Ramachandran, 1965, Text Book of Astronomy, Mission Press, Palayamkottai.

REFERENCE

1. Kumaravelu and Susila Kumaravelu S. Kumaravelu, 1984, Muruga Bhavanam, Astronomy, Chidambara Nagar, Nagarkoil.

15MMU691

PROJECT

Semester–VI
L T PC
10 0 0 5

Course Objectives:

The student should be made to:

- Know the fundamental concepts of Control systems and mathematical modelling of the system
- The learner gain a clear knowledge about Scalar Product, Backlash, stability analysis
- Understand the concepts of calculus of variations which play an important role in the problems of differential systems.
- Learn the concept of time response and frequency response of the system.
- Teach the fundamental concepts of Control systems and mathematical modelling of the system.
- Teach the basics of stability analysis of the system

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Describe the vector spaces and linear transformations and time state equations.
2. Understand the concepts of Linear Continuous time models for Physical systems
3. Identify the non-linear and non0linearities in describing function.
4. Understand the significance of Stability analysis.
5. Analyze the Linear continuous time invariant systems
6. Formulate optimal control problems and calculus of variations.

UNIT I

Mathematical preliminaries: Fields, Vectors and Vector Spaces – Linear combinations and Bases – Linear Transformations and Matrices – Scalar Product and Norms – Eigen-values, Eigen Vectors and a Canonical form representation of linear operators

UNIT II

State variable analysis-Linear Continuous time models for Physical systems– Existence and Uniqueness of Solutions to Continuous-Time State Equations – Solutions of Linear Time Invariant Continuous-Time State Equations–State transition matrix and its properties.

UNIT III

Non linear systems-Introduction – Non Linear Systems - Types of Non-Linearities – Saturation – Dead-Zone -Backlash – Jump Phenomenon etc;– Singular Points – Introduction to Linearization of nonlinear systems, Properties of Non-Linear systems – Describing function–describing function analysis of nonlinear systems

UNIT IV

Stability analysis: stability in the sense of Lyapunov, Lyapunov's stability and Lyapunov's instability theorems -Stability Analysis of the Linear continuous time invariant systems by Lyapunov second method – Generation of Lyapunov functions – Variable gradient method – Krasovskii's method. State feedback controller design through Pole Assignment – State observers: Full order and Reduced order.

UNIT V

Optimal control: Introduction to optimal control - Formulation of optimal control problems – calculus of variations –fundamental concepts, functional, variation of functional –fundamental theorem of theorem of Calculus of variations – boundary conditions – constrained minimization – formulation using Hamiltonian method – Linear Quadraticregulator.

TEXT BOOKS

1. Modern Control System Theory by M.Gopal – New Age International-1984
2. Modern Control Engineering by Ogata.K – Prentice Hall –1997

REFERENCES

1. Optimal control byKircks

Course Objectives:

The student should be made to:

- Get basic knowledge about Circle, Cone, Parabola, Hyperbola, Ellipse etc.
- Understand the concepts & advance topics related to two & three dimensional geometry
- Study the application of Sphere, cone and cylinder.
- Analyze how to trace the curve.
- Study the geometrical structures and use in to real life problems.
- Develop their inductive and deductive reasoning skills and to apply these skills in the advanced study of geometric relationships

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Construct the conics, Central Conics and Paraboloids with the respective applications.
2. Understand geometrical terminology of sphere, radical plane and co-axal system..
3. Describe the basic concepts of cone and cylinder
4. Use geometrical results to determine the properties of conicoid.
5. Recognize the properties of paraboloids and its motions.
6. Develop their inductive and deductive reasoning skills in Geometrical figures.

UNIT I

General equation of second degree. Tracing of conics. Tangent at any point to the conic, chord of contact, pole of line to the conic, director circle of conic. System of conics. Confocal conics. Polar equation of a conic, tangent and normal to the conic.

UNIT II

Sphere: Plane section of a sphere. Sphere through a given circle. Intersection of two spheres, radical plane of two spheres. Co-axal system of spheres

UNIT III

Cones. Right circular cone, enveloping cone and reciprocal cone. Cylinder: Right circular cylinder and enveloping cylinder.

UNIT IV

Central Conicoids: Equation of tangent plane. Director sphere. Normal to the conicoids. Polar plane of a point. Enveloping cone of a coinoid. Enveloping cylinder of a coinoid.

UNIT V

Paraboloids: Circular section, Plane sections of conicoids. Generating lines. Confocal conicoid. Reduction of second degree equations.

TEXT BOOK

1. R.J.T. Bill, Elementary Treatise on Coordinary Geometry of Three Dimensions, MacMillan India Ltd.1994.

REFERENCES

1. **P.K. Jain and Khalil Ahmad: A Textbook of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd.1999.**

Course Objectives

This course enables the students to learn

- The fundamental concepts of algebraic ring theory and fields.
- The basic central ideas of Polynomial ring.
- How to test if a polynomial is irreducible Finite Field (Galois Fields).
- How to convert the various matrix forms.
- Develop capabilities with an axiomatic treatment of transformation.
- Develop an understanding of the structure of sets with operations on them.

Course Outcomes (COs)

After successful completion of this course the students will be able to

1. Understand the concept and the properties of finite abelian groups.
2. Get pre-doctoral level knowledge in ring theory.
3. Attain good knowledge in field theory.
4. Define and study in details the properties of linear transformations.
5. Analyze the concept of trace and transpose.
6. Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts quadratic forms.

UNIT I

Another counting principle – application of theorems – Cauchy theorem – Sylow's theorem – Direct products – Finite Abelian groups.

UNIT II

Ring Theory- Basic definition- More ideals and quotient rings- Euclidean rings-A Particular Euclidean Rings –Polynomial Rings-Polynomial over the Rational Field.

UNIT III

Fields – Extension Fields-Finite Extension of F – Some basic Definitions and Theorem – Roots of a Polynomial – More about Roots – The elements of Galois theory.

UNIT IV

Linear Transformations-The Algebra Of Linear Transformation – Characteristic Root-Matrices-Canonical Forms –Triangular form-Nilpotent Transformations–Jordan form.

UNIT V

Trace and Transpose – Trace of T-Symmetric Matrix –Determinants–Hermitian Transformation, Unitary Transformation and Normal Transformation – Real quadratic forms.

TEXT BOOK

1. Herstein.I.N.,2010. Topics in Algebra ,Second edition, Willey and sons Pvt Ltd, Singapore.

REFERENCES

1. Artin.M., 2008. Algebra, Prentice-Hall of India, New Delhi.
- 2.Fraleigh.J.B., 2004. A First Course in Abstract Algebra , Seventh edition , Pearson Education Ltd, Singapore.
3. Kenneth Hoffman., Ray Kunze., 2003. Linear Algebra, Second edition, Prentice Hall of India Pvt Ltd, New Delhi.
4. Vashista.A.R., 2005. Modern Algebra, Krishna Prakashan Media Pvt Ltd, Meerut.

Course Objectives

This course enables the students to learn

- The basic principles of Riemann – Stieltjes Integral.
- Apply mathematical concepts and principles to infinite series.
- How to identify sets with various properties such as convergence.
- Have the knowledge of Lebesgue integral of functions and their properties.
- Understand the importance of undefined terms, definitions, and axioms.
- Use a variety of proof techniques to prove theorems using axioms, definitions, and previous results.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Get specific skill in Riemann Stieltjes integral and Lebesgue integral.
2. Attain knowledge in infinite series.
3. Demonstrate an understanding of the uniform convergence and differentiation.
4. Enrich their knowledge of measure theory and extremum problems.
5. Solve given problems at a high level of abstraction based on Implicit function.
6. Describe the fundamental properties of the real numbers that underpin the formal development of real analysis.

UNIT I

The Riemann – Stieltjes Integral:

Introduction – Basic Definitions – Linear Properties – Integration by parts – Change of variable in a Riemann – Stieltjes Integral – Reduction to a Riemann Integral – Step functions as integrators – Reduction of a Riemann – Stieltjes Integral to a finite sum – Monotonically increasing – Additive and linear properties – Riemann condition – Comparison theorems – Integrators of bounded variation – Sufficient condition for Riemann stieltjes integral.

UNIT II

Infinite series and infinite products:

Introduction – Basic definitions – Ratio test and root test – Dirichlet test and Able's test – Rearrangement of series – Riemann's theorem on conditionally convergent series – Sub series - Double sequences – Double series – Multiplication of series – Cesaro summability.

UNIT III

Sequences of functions:

Basic definitions – Uniform convergence and continuity - Uniform convergence of infinite series of functions – Uniform convergence and Riemann – Stieltjes integration – Non uniformly convergent

sequence – Uniform convergence and differentiation – Sufficient condition for uniform convergence of a series.

UNIT IV

The Lebesgue integral:

Introduction- The class of Lebesgue – integrable functions on a general interval- Basic properties of the lebesgue integral- Lebesgue integration and sets of measure zero- The Levi monotone convergence theorem- The lebesgue dominated convergence theorem-

Applications of Lebesgue dominated convergence theorem- Lebesgue integrals on unbounded intervals as limit of integrals on bounded intervals- Improper Riemann integrals- Measurable functions.

UNIT V

Implicit functions and extremum problems:

Introduction – Functions with non zero Jacobian determinant – Inverse function theorem – Implicit function theorem – Extrema of real valued functions of one variable and several variables.

TEXT BOOK

1. Rudin. W.,1976 .Principles of mathematical Analysis, Mcgraw hill, Newyork .

REFERENCES

1. Tom .M. Apostol .,2002. Mathematical Analysis, Second edition, Narosa Publishing House,New Delhi.
2. Balli. N.P., 1981. Real Analysis, Laxmi Publication Pvt Ltd, New Delhi.
3. Gupta . S.L ., and N.R. Gupta ., 2003.Principles of Real Analysis, Second edition, Pearson Education Pvt.Ltd,Singapore.
4. Royden .H.L ., 2002. Real Analysis, Third edition, Prentice hall of India,New Delhi.
5. Sterling. K. Berberian ., 2004.A First Course in Real Analysis, Springer Pvt Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- To develop the working knowledge on different numerical techniques.
- To solve algebraic and transcendental equations.
- Appropriate numerical methods to solve differential equations.
- To provide suitable and effective methods for obtaining approximate representative numerical results of the problems.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
- Provide a basic understanding of the derivation, analysis, and use of these numerical methods, along with a rudimentary understanding of finite precision arithmetic and the conditioning and stability of the various problems and methods.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Identify the concept of numerical differentiation and integration.
2. Provide information on methods of iteration.
3. Solve ordinary differential equations by using Euler and modified Euler method.
4. Study in detail the concept of boundary value problems.
5. Attain mastery in the numerical solution of partial differential equations.
6. Apply numerical methods to obtain approximate solutions to mathematical problems.

UNIT I

Solutions of Non Linear Equations: Newton's method-Convergence of Newton's method- Bairstow's method for quadratic factors.

Numerical Differentiation and Integration:

Derivatives from difference tables – Higher order derivatives – divided difference. Trapezoidal rule – Romberg integration – Simpson's rules.

UNIT II

Solutions of system of Equations: The Elimination method: Gauss Elimination and Gauss Jordan Methods – LU decomposition method.

Methods of Iteration: Gauss Jacobi and Gauss seidal iteration-Relaxation method.

UNIT III

Solutions of Ordinary Differential Equations: One step method: Euler and Modified Euler methods –Rungekutta methods. Multistep methods: Adams Moulton method – Milne's method

UNIT IV

Boundary Value Problem and Characteristic value problem : The shooting method : The linear shooting method – The shooting method for non-linear systems.

Characteristic value problems – Eigen values of a matrix by Iteration-The power method.

UNIT V

Numerical Solution of Partial Differential Equations: Classification of Partial Differential Equation of the second order – Elliptic Equations. Parabolic equations: Explicit method – The Crank Nicolson difference method. Hyperbolic equations – solving wave equation by Explicit Formula.

TEXT BOOK

1. Gerald C.F., and P.O.Wheatley., 2006. Applied Numerical Analysis, sixth edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.

REFERENCES

1. Jain. M.K., Iyengar. S.R.K.,and R.K .Jain., 2009. Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi .
2. Burden R.L., and J.Douglas Faires., 2007. Numerical Analysis, Seventh edition, P.W.S.Kent Publishing Company, Boston.
3. Sastry S.S., 2008. Introductory methods of Numerical Analysis, Fourth edition, Prentice Hall of India, New Delhi.

Course Objectives

This course enables the students to learn

- In-depth understanding of functional, logic, and programming paradigms.
- How to implement several programs in languages other than the one emphasized in the core curriculum.
- This course provides an introduction to the basic concepts and techniques of numerical solution of algebraic equation.
- This course is to provide students with an introduction to the field of numerical analysis.
- Develop and apply the appropriate numerical techniques for your problem, interpret the results, and assess accuracy.
- This module are to make the students familiarize with the ways of solving complicated mathematical problems numerically.

Course Outcomes (COs)

On successful completion of this course, the student will be able to

1. Know the concepts for problem solving.
2. Acquire new knowledge in computing, including the ability to learn about new ideas and advances, techniques, tools, and languages, and to use them effectively; and to be motivated to engage in life-long learning
3. Comprehend important issues related to the development of computer-based systems in a professional context using a well-defined process.
4. Be familiar with programming with numerical packages.
5. Be aware of the use of numerical methods in modern scientific computing.
6. To develop the mathematical skills of the students in the Euler method.

List of Practical

1. Solution of non-linear equation-Bairstow's method for quadratic factors.
2. Solution of simultaneous equations-Gauss Elimination.
3. Solution of simultaneous equations-Gauss Jordan.
4. Solution of simultaneous equations-Gauss Jacobi.
5. Solution of simultaneous equations-Gauss Seidal.
6. Solution of simultaneous equations-Triangularisation.
7. Numerical integration-Trapezoidal rule.
8. Numerical integration-Simpson's rules.
9. Solution for ordinary differential equation-Euler method.

10. Solution for ordinary differential equation- Runge Kutta Second order.
11. Solution for parabolic equation - Explicit method.
12. Solution for parabolic equation - The Crank Nicolson method.

Course Objectives

This course enables the students to learn

- The formulation and solutions of second order ordinary differential equations and get exposed to physical problems with applications.
- The concept of solve the system of first order equations.
- Linear homogeneous and non homogeneous equations with constant coefficients.
- Understanding the elementary linear oscillations.
- Understand all of the concepts relating to the order and linearity of ordinary differential equations, analytic and computational solution methods for ordinary differential equations, and the real-world applications of ordinary differential equations.
- Apply your understanding of the concepts, formulas, and problem solving procedures to thoroughly investigate relevant physical models.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Model a simple physical system to obtain a first and second order differential equation.
2. Understand the basic notions of linearity, superposition, existence and uniqueness of solution to differential equations and use these concepts in solving linear differential equations.
3. Identify homogeneous equations, homogeneous equations with constant coefficients and exact linear differential equations.
4. Solve higher order and system of differential equations of Successive approximation.
5. Understand the difficulty of solving problems for elementary linear oscillations.
6. Identify, analyze and subsequently solve physical situations whose behavior can be described by ordinary differential equations.

UNIT I

Second order linear equations with ordinary points – Legendre equation and Legendre polynomial – Second order equations with regular singular points – Bessel equation.

UNIT II

System of first order equations – existence and uniqueness theorems – fundamental matrix.

UNIT III

Non homogeneous linear system – linear systems with constant coefficient – Linear systems with periodic coefficients.

UNIT IV

Successive approximation – Picard's theorem – Non uniqueness of solution – continuation and dependence on initial conditions – existence of solution in the large existence and uniqueness of solution in the system.

UNIT V

Fundamental results – Sturm's comparison theorem – elementary linear oscillations – comparison theorem of Hille-Winter – Oscillations of $x'' + a(t)x = 0$ elementary non linear oscillations.

TEXT BOOK

1. Earl A. Coddington, 2002, An introduction to Ordinary differential Equations, Prentice Hall of India Private limited, New Delhi.

REFERENCES

1. Deo.S.G, V.Lakshmikantham, V. Raghavendra, 2003, Text book of Ordinary differential Equations, Second edition, Tata Mc Graw –Hill Publishing Company limited, New Delhi.
2. Rai.B, D.P.Choudhury, H.I.Freedman, 2004, A course of Ordinary differential Equations, Narosa Publishing House, New Delhi.
3. George F. Simmons, Differential Equations with application and historical notes, 1991. Second edition, McGraw-Hill.

Course Objectives

This course enables the students to learn

- An introduction to the object-oriented programming paradigm in Java.
- Covers software design, implementation, and testing using Java. Introduces object-oriented design techniques and problem solving.
- Emphasizes development of secure, well-designed software projects that solve practical real-world problems.
- Why Java is useful for the design of desktop and web applications.
- How to implement object-oriented designs with Java.
- Identify Java language components and how they work together in applications.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Expose the students to the best object-oriented programming paradigm, java and strengthen their.
2. Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
3. Read and make elementary modifications to collection and Utilities.
4. Know the concept of Input Output Classes.
5. Document a Java program using Javadoc.
6. Use a version control system to track source code in a project.

UNIT I

Introduction to Object Oriented Programming: Object Oriented Paradigm and Concepts-Structured versus Object Oriented Approach. Java Language: Features of Java -Environment-Java Architecture-Java Development Kit-Types of Java Program. Variable Declaration and Arrays: Data Types-Java Tokens –Variable Declaration – Type Casting and Conversion – Arrays, Operators, And Control Statements: Selection Constructs – Iteration Constructs –Jump Statements.

UNIT II

Introduction to classes: Instance variables, Class variables, Instance Methods, Constructors, Class methods, Declaring Objects, Garbage Collection, Method Overloading - Constructor Overloading - This Reference. Inheritance: Super class variables- Method Overriding - final Keyword, Abstract Classes and Interfaces.

UNIT III

Packages and Access Modifiers: Package Declaration – import statement - Access Protection. Strings: Creation – Operation on strings - Character Extraction Methods – Comparison –Searching and Modifying –String Buffer Class. Collection and Utilities: Collection of Objects – Interfaces and Classes –Iterators – List, Set, Map Implementations.

UNIT IV

Input Output Classes: I/O Operations –Hierarchy of Classes – File class – Input Stream, Output Stream, FilterInputStream, FilterOutputStream, Reader and Writer classes – Random Access File class –Stream Tokenizer. Applets: Basics – Life Cycle –Methods –Graphics Class- Color, Font, and Font Metrics Class.

UNIT V

Exception Handling: Fundamentals – Hierarchy of Classes – Types of Exception. Multithreaded Programming: Thread Model – Runnable Interface - Thread Class – Synchronization and Deadlock. AWT Components: AWT Classes – Basic Component and Container Classes – Frame Window in an Applet.

TEXT BOOK

1. ISRD Group. 2007. Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi.

REFERENCES

1. Deitel H.M. and P.J.Deitel . 2005. Java, How to Program, 6th Edition, Pearson Education.
2. Herbert Schildt. 2007. Java Complete Reference, 5th Edition, Tata McGraw Hill, New Delhi.
3. Somasundaram Dr.S. 2004. Java Programming, 1st Edition. Techmedia. New Delhi.

WEB SITES

java.sun.com/docs/books/tutorial/
www.en.wikipedia.org/wiki/Java

Course Objectives

This course enables the students to learn

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.
- Understand the concepts and features of object oriented programming.
- learn java's exception handling mechanism, multithreading, packages and interfaces.
- To develop skills in internet programming using applets and swings.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Identify classes, objects, members of a class and relationships among them needed for a specific problem.
2. Write Java application programs using OOP principles and proper program structuring.
3. Demonstrate the concepts of polymorphism and inheritance.
4. Write Java programs to implement error handling techniques using exception handling.
5. To understand fundamentals of object-oriented programming in Java which includes defining classes, invoking methods, using class libraries.
6. To create Java application programs using sound OOP practices such as interfaces, APIs and error exception handling.

List of Practical

1. Write a program to find the sum of series $1+x+x^2+x^3+\dots$.
2. Write a program to input a number in command line and find its factorial using recursion.
3. Write a program to find maximum and sum of an array.
4. Define a class for Employee with name and date of appointment. Create employee objects and sort them as per their date of appointment.
5. Write a program to perform string operations.
6. Write a program to accept strings using I/O streams and arrange them in alphabetical order.
7. Write a program to add / insert an element to ArrayList using Java ListIterator.
8. Write a program to create a window and draw cross lines.
9. Write an applet program to draw several shapes and name them.
10. Write a program for multiplication tables by multithreading.

11. Write a program to create an exception for marks out of bounds. If mark is greater than 100 throw an exception.
12. Write an applet program to create menus.
13. Write an applet program to perform operations in list box
14. Write a Java Program to design a registration Form using Applet with all the AWT controls.

Course Objectives

This course enables the students to learn

- To learn the concepts of Oriented circles and level curves.
- Fundamental concepts of complex integration.
- To know the concepts of harmonic function.
- To develop the skill of contour integration to evaluate complicated real integrals via residue calculus.
- The development of the complex variable in boundary behaviour.
- Contour integral using parametrization, fundamental theorem of calculus and Cauchy's integral formula.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Explain the role of the Conformal mapping.
2. Evaluate complex contour integrals and some of their consequences.
3. Determine the Taylor series or the Laurent series of an analytic function in a given region
4. Describe the convergence properties of a power series.
5. Know the basic properties of singularities of analytic functions.
6. Demonstrate familiarity with a range of examples of these concepts of conformal mapping.

UNIT I

Conformal mapping-Linear transformations- cross ratio- symmetry- Oriented circles-families of circles-level curves.

UNIT II

Complex integration-rectifiable Arcs- Cauchy's theorem for Rectangle and disc-Cauchy's integral formula-higher derivatives .

UNIT III

Harmonic functions-mean value property-Poisson's formula-Schwarz theorem, Reflection principle-Weierstrass theorem- Taylor series and Laurent series.

UNIT IV

Partial Fractions- Infinite products – Canonical products-The gamma function – Stirling's Formula – Entire functions – Jensen's formula.

UNIT V

Riemann Mapping Theorem – Boundary Behaviour – Use of Reflection Principle – Analytical arcs – Conformal mapping of polygons- The Schwartz - Christoffel formula.

TEXT BOOK

1. Lars V.Ahlfors.,1979. Complex Analysis, Third edition, Mc-Graw Hill Book Company, New Delhi.

REFERENCES

1. Ponnusamy.S, 2005. Foundation of Complex Analysis, Second edition, Narosa publishing house, NewDelhi.
2. Choudhary.B., 2003. The Elements of Complex Analysis ,New Age International Pvt.Ltd , New Delhi.
3. Vasishtha A.R ., 2005. Complex Analysis, Krishna Prakashan Media Pvt. Ltd., Meerut.
4. Walter Rudin., 2012.Real and Complex Analysis ,3rd edition, Mc Graw Hill Book Company, Newyork.

Course Objectives

This course enables the students to learn

- Topological properties of sets.
- The properties of compact spaces and connected spaces.
- To explore the foundations of linear subspace.
- The concepts of metric spaces and topological spaces.
- Metric spaces and metrizability of topological spaces; separation axioms.
- Interior, closure and boundary: applications to geographic information systems

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Know concept of metric spaces.
2. Acquire knowledge about various types of topological spaces and their properties.
3. Know the result of Compactness problems and theorems.
4. Admire the deep mathematical results like Urysohn's lemma.
5. Create examples and counterexamples in the fundamental concepts of separation space.
6. Formulate and analyze topological problems in connected space.

UNIT I

Metric spaces: Definitions and some examples. Open sets - Theorems – Closed sets- Theorems – convergence- Cantor's Intersection Theorems – completeness - Baire's theorem. continuous mappings- Some Theorems.

UNIT II

Spaces of continuous functions: Basic definition for linear subspace- normed linear space- Banach space- Euclidean and unitary spaces.

Topological spaces and continuous functions: Topological spaces: Definitions and examples – Theorems – Open bases and Open sub base.

UNIT III

Compactness: Compact spaces – Heine- Borel Theorem - Product of spaces – Tychonoff's theorem and locally compact spaces - Tychonoff's Generalized Heine-Borel Theorem – Compactness for metric spaces – Lebesgue's covering lemma – Ascoli's theorem.

UNIT IV

Separation: T_i spaces and Hausdorff spaces – Theorems – Complete regular spaces and normal spaces – Urysohn's lemma and the Tietze extension theorem – Urysohn imbedding theorem – Stone-Cech compactification.

UNIT V

Connectedness: Connected spaces – Theorems - components of a space - Theorems – Totally disconnected spaces - Theorems – locally connected spaces - Theorems.

TEXT BOOK

1. Simmons.G.F., 2004. Introduction to Topology and Modern Analysis, Tata Mc Graw Hill, New Delhi.

REFERENCES

1. James R.Munkres., 2008. Topology, Second edition, Pearson Prentice Hall, New Delhi.
2. Deshpande.J.V., 1990. Introduction to topology, Tata Mc Graw Hill, New Delhi.
3. James Dugundji., 2002. Topology, Universal Book Stall, New Delhi.
4. Joshi.K.D., 2004. Introduction to General Topology, New Age International Pvt Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The basic concepts of integer linear programming.
- How to solve quadratic programming problems, dynamic programming problems and non-linear programming problems.
- Classical optimization techniques and numerical methods of optimization.
- Know the basics of different evolutionary algorithms.
- Explain Integer programming techniques and apply different optimization techniques to solve various models.
- Enumerate the fundamental knowledge of Linear Programming and Dynamic Programming problems.

Course Outcomes (COs)

After successful completion of this course the students will be able to

1. Understand the concept of linear programming and integer programming.
2. Develop optimal decision policy skill.
3. Familiarize with real life applications of inventory models.
4. Skill in decision analysis.
5. Mastery in Beale's method and simplex method.
6. Use classical optimization techniques and numerical methods of optimization.

UNIT I

Integer Linear Programming : Types of Integer Linear Programming Problems - Concept of Cutting Plane - Gomory's All Integer Cutting Plane Method - Gomory's mixed Integer Cutting Plane method - Branch and Bound Method. - Zero-One Integer Programming – Real life application in Integer Linear Programming.

UNIT II

Dynamic Programming: Characteristics of Dynamic Programming Problem - Developing Optimal Decision Policy - Dynamic Programming Under Certainty - DP approach to solve LPP.

UNIT III

Probabilistic Inventory Model: Real life application -Continuous review models- Probabilistic Economic order quantity (EOQ) Model. Single-period models – No setup model – setup model. Multi period model.

UNIT IV

Decision Analysis: Real life application - Decision making under certainty- Analytic hierarchy process.. Decisions under Risk- Decision Trees-based expected value criterion, variations of the expected value criterion. Decisions Under Uncertainty Real life application in Decision Analysis

UNIT V

Non-linear Programming Methods: Examples of NLPP - General NLPP - Graphical solution - Quadratic Programming - Wolfe's modified Simplex Methods - Beale's Method.

TEXT BOOK

1. Handy .A. Taha., 2007. Operations Research, Seventh edition, Prentice Hall of India Pvt Ltd, New Delhi .

REFERENCES

1. Kanti swarup., P.K.Gupta., and Manmohan., 2006. Operations Research, Twelfth edition, Sultan Chand & Sons Educational Publishers, New Delhi.
2. Panneerselvam.R ., 2007. Operations Research , Second edition, Prentice Hall of India Private Ltd, New Delhi .
3. Sharma.J.K., 2008. Operations Research Theory and Practice, Third edition ,Macmillan India Ltd.
4. Singiresu.S.Rao., 2006. Engineering Optimization Theory and Practice, Third edition New Age International Pvt.Ltd Publishers, New Delhi.
5. Sivarethina Mohan. R., 2005. Operations Research, First edition, Tata Mc Grawhill Publishing Company Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The basic concepts of solution of first order partial differential equation and its applications.
- About initial and boundary value problems for PDEs of first and second order which includes Laplace Equation, Diffusion Equation and Wave Equation.
- Introduce students to how to solve linear Partial Differential with methods.
- Technique of separation of variables to solve PDEs and analyze the behavior of solutions in terms of eigen function expansions.
- Solutions of PDEs are determined by conditions at the boundary of the spatial domain and initial conditions at time zero.
- Basic questions concerning the existence and uniqueness of solutions, and continuous dependence of initial and boundary data.

Course Outcomes (COs)

After successful completion of this course the students will be able to

1. Classify linear and Nonlinear first order differential equations with constant coefficients.
2. Solve the linear partial differential equations with constant coefficient equations.
3. Describe the method of separable variables and integral transforms.
4. Solve the elementary Laplace equation with symmetry.
5. Acquire the knowledge of wave equation and vibrating membranes.
6. Enrich their knowledge about diffusion equations with sources.

UNIT I

First Order Partial Differential Equations:

Non linear partial differential equation of first order – Cauchy method of characteristics – Compatible systems of first order equations – Charpit's methods – Special type of first order equations – Jacobi method.

UNIT II

Second Order Partial Differential Equations:

Partial differential equations of second order – The origin of second order equations – Linear partial differential equations with constant coefficient equations with variable coefficients.

UNIT III

Method of separation of variables – The method of integral transforms.

UNIT IV

Laplace Equation:

Elementary solutions of Laplace equations-Families of Equi-potential surfaces-Boundary Value problems-separation of variables-problems with axial symmetry.

UNIT V

Elementary solutions of one dimensional wave equation-Vibrating membranes - Applications of calculus of variations-elementary solutions of diffusion equation-Separation of variables.

TEXT BOOK

1. IAN.N.Sneedon, Elementary Partial differential equations,(1988).Tata Mcgraw Hill Ltd.

REFERENCES

1. Sharma.J.N, Kehar singh, 2001, Partial Differential Equations for Engineering and Scientists, Narosa Publishing House, New Delhi.
2. Geraold.B.Folland, 2001, Introduction to Partial Differential Equations, Prentice Hall of India Private limited, New Delhi.
3. Sankara Rao.K, 2005, Introduction to Partial Differential Equations, Prentice Hall of India Private limited, New Delhi.
4. Veerarajan.T, 2004, Partial Differential Equations and Integral Transforms, Tata Mc Graw - Hill Publishing Company limited, New Delhi.
5. John.F, 1979. Partial Differential equations, Third edition, Narosa publication co, New Delhi.

Course Objectives

This course enables the students to learn

- How to use Newton's laws of motion to solve advanced problems involving the dynamic motion of classical mechanical systems.
- Applications of differential equations in advanced mathematical problems.
- To solve dynamics problems such as conservation of energy and linear and angular momentum.
- Parameters defining the motion of mechanical systems and their degrees of freedom.
- The components of a force in rectangular or nonrectangular coordinates. • Determine the resultant of a system of forces.
- Complete and correct free-body diagrams and write the appropriate equilibrium equations from the free-body diagram.

Course Outcomes (COs)

On successful completion of this course students will be able to

1. Understand the concept of the D'Alembert's principle.
2. Derive the Lagrange's equation for holonomic and non holonomic constraints.
3. Classify Scleronomic and Rheonomic systems.
4. Solve the problems of Hamilton equations of motion.
5. Study of the canonical transformations.
6. Know the concept of Hamilton Jacobi Theory.

UNIT I

Survey of Elementary principles: Constraints - Generalized coordinates, Holonomic and non-holonomic systems, Scleronomic and Rheonomic systems. D'Alembert's principle and Lagrange's equations – Velocity – dependent potentials and the dissipation function – some applications of the Lagrange formulation.

UNIT II

Variation principles and Lagrange's equations: Hamilton's principle – Some techniques of calculus of variations – Derivation of Lagrange's Equations from Hamilton's principle – Extension of Hamilton's principle to non-holonomic systems – Conservation theorems and symmetry properties.

UNIT III

Hamilton Equations of motion: Legendre Transformations and the Hamilton Equations of motion- canonical equations of Hamilton – Cyclic coordinates and conservation theorems – Routh's procedure - Derivation of Hamilton's equations from a variational principle – The principle of least action.

UNIT IV

Canonical transformations: The equations of canonical transformation – Examples of Canonical transformations – Poisson Brackets and other Canonical invariants – integral invariants of Poincare, Lagrange brackets.

UNIT V

Hamilton Jacobi Theory: Hamilton Jacobi equations for Hamilton's principle function – Harmonic oscillator problem - Hamilton Jacobi equation for Hamilton's characteristic function – Separation of variables in the Hamilton-Jacobi equation.

TEXT BOOK

1. H. Goldstein, Classical Mechanics (2nd Edition), Narosa Publishing House, New Delhi.

REFERENCES

1. F. Gantmacher, 1975. Lectures in Analytic Mechanics, MIR Publishers, Moscow.
2. I.M. Gelfand and S.V. Fomin, Calculus of Variations, Prentice Hall, New Delhi.
3. S.L. Loney, , 1979. An Elementary Treatise on Statics, Kalyani Publishers, New Delhi.

Course Objectives

This course enables the students to learn

- The concept of algebraic structures, lattices and its special categories which plays an important role in the field of computers.
- The fundamental concepts in graph theory, with a sense of some its modern applications.
- Some fundamental mathematical concepts and terminology.
- Learn some different types of discrete structures.
- Introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures.
- Introduce students to set theory, inductive reasoning, elementary and advanced counting techniques, equivalence relations, recurrence relations, graphs, and trees.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Develop new algebraic structures.
2. Think critically and analytically by modeling problems from social and natural sciences with the help of theory of graphs.
3. Apply discrete mathematics in formal representation of various computing constructs
4. Work effectively in groups on a project that requires an understanding of graph theory.
5. Demonstrate different traversal methods for trees and graphs.
6. Recognize the importance of analytical problem-solving approach.

UNIT I

Algebraic Structures: Introduction- Algebraic Systems : Examples and General Properties : Definition and examples - Some Simple Algebraic Systems and General properties - Homomorphism and isomorphism - congruence relation - Semigroups and Monoids : Definitions and Examples - Homomorphism of Semigroups and Monoids.

UNIT II

Lattices: Lattices as Partially Ordered Sets: Definition and Examples - Principle of duality - Some Properties of Lattices - Lattices as Algebraic Systems – Sublattices - Direct product, and Homomorphism.

UNIT III

Some special Lattices - e.g. Complete, Complemented and Distributive Lattices - Boolean Algebra: Definition and Examples - Subalgebra - Direct product and Homomorphism - join irreducible - atoms and antiatoms.

UNIT IV

Graph Theory: Definition of a graph - applications, Incidence and degree - Isolated and pendant vertices - Null graph, Path and Circuits: Isomorphism - Subgraphs, Walks -Paths and circuits - Connected graphs , disconnected graphs – components - Euler graph.

UNIT V

Trees: Trees and its properties - minimally connected graph - Pendant vertices in a tree - distance and centers in a tree - rooted and binary tree. Levels in binary tree - height of a tree - Spanning trees - rank and nullity.

TEXT BOOKS

1. J .P.Tremblay & R. Manohar, 1997.Discrete Mathematical Structures with Applications to Computer Science, McGraw-Hill Book Co.(for unit I,II,III).
2. N. Deo, 2000. Graph Theory with Applications to Engineering and Computer Sciences, Prentice Hall of India. (for unit IV,V)

REFERENCES

1. C. L. Liu, 2000. Elements of Discrete Mathematics, McGraw-Hill Publishing Company Ltd, New Delhi.
2. S. Wiitala, Discrete Mathematics- A Unified Approach, McGraw-Hill Book Co, New Delhi.
3. Seymour Lipschutz, Discrete Mathematics, Schaum Series, McGraw-Hill Publishing Company Ltd, New Delhi.

Course Objectives

This course enables the students to learn

- The fundamental concepts in Graph Theory and some of its modern applications.
- The use of these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.
- Apply graph-theoretic terminology and notation.
- Analyze new networks using the main concepts of graph theory.
- Central theorems about trees, matching, connectivity, colouring and planar graphs.
- Describe and apply some basic algorithms for graphs.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Understanding the basic concepts of graphs, directed graphs, and weighted graphs and able to present a graph by matrices.
2. Overview of properties of trees and a minimal spanning tree for a given weighted graph.
3. Identify induced subgraphs, cliques, matchings, covers in graphs.
4. Understand Eulerian and Hamiltonian graphs.
5. Know the concept of domination in graphs.
6. Determine whether graphs are Planer and/or non planer.

UNIT-I

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler Graphs – Hamiltonian Paths and Circuits – Trees – Properties of trees – Distance and Centers in Tree – Rooted and Binary Trees - Spanning trees – Fundamental Circuits.

UNIT II

Spanning Trees in a Weighted Graph – Cut Sets – Properties of Cut Set – All Cut Sets – Fundamental Circuits and Cut Sets – Connectivity and Separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and Geometric Graphs – Planer Graphs – Different Representation of a Planer Graph.

UNIT III

Incidence matrix – Submatrices – Circuit Matrix – Path Matrix – Adjacency Matrix – Chromatic Number – Chromatic partitioning – Chromatic polynomial - Matching - Covering – Four Color Problem – Directed Graphs – Types of Directed Graphs.

UNIT IV

Graph Colourings - Vertex Colouring - Edge Colouring - Planar Graphs - Map Colouring Problem - Decompositions and Hamilton Cycles - Circuits and Cycles - Labeling Graphs

UNIT V

Domination in graphs: Introduction – Terminology and concepts – Applications – Dominating set and domination number – Independent set and independence number – History of domination in graphs.

TEXT BOOKS

1. Harary F, 1972. Graph Theory, Addison- Wesley publications. (for unit I, II, III).
2. Deo N, 1974. Graph Theory with Applications to Engineering and Computer Science, Prentice Hall Inc. (for unit IV).
3. Arumugam.S, Ramachandran.S, 2003. Invitation to graph theory, scitech publications, Chennai. (for unit V).

REFERENCES

1. Jonathan L Gross, Jay Yellen, 1998. Handbook of Graph Theory, CRC Press LLC.
2. Teresa W. Haynes, Stephen T. Hedetniemi and Peter J. Slater, Fundamentals of Domination in graphs.
3. Diestel.R Springer-Verlag, 1997. Graph Theory.
4. Jensen.TR and Toft.B Wiley-Interscience 1995. Graph Coloring Problems.
5. Fred Buckley and Frank Harary, 1990. Distance in Graphs, Addison - Wesley Publications.
6. C. R. Flouds, 1994. Graph Theory Applications, Narosa Publishing House.

Course Objectives

This course enables the students to learn

- The theoretical fundamentals of theory of elasticity.
- The ability to use the principles of theory of elasticity in engineering problems.
- To solve advanced solid mechanics problems using classical methods and to characterize materials with elastics constitutive relations.
- To make students understand the principle of strain energy function.
- Be proficient with basic concepts in continuum mechanics of solids, including of strain, internal force, stress and equilibrium in solids.
- Be able to characterize materials with elastic constitutive relations.

Course Outcomes (COs)

On successful completion of this course the student will be able to

1. Know the concept of Tensor Analysis.
2. Analyze solid mechanics problems using classical methods and energy methods.
3. Apply various failure criteria for general stress states at points.
4. Get advanced knowledge about stresses, strains.
5. Understand the theory of elasticity including strain/displacement and Hooke's law relationships.
6. Apply the concept of strain energy function.

UNIT I

Tensor Analysis:

Co-ordinate transformations-contravariant and covariant vectors and tensors-symmetric and anti-symmetric tensors- metric tensor – conjugate tensor-associated tensors –Christoffel's symbols and transformations laws – covariant derivative – permutation symbols and tensors – relative and absolute tensors.

UNIT II

Analysis of strain:

Deformation –Affine transformation – infinitesimal affine deformations – A geometrical interpretation of components of strain – strain quadric of Cauchy – Principal strains and invariants general infinitesimal deformation – examples of strain – saint-Venant's equations of compatibility – finite –deformations.

UNIT III

Analysis of Stress:

Body and surface forces – stress tensor – equations of equilibrium in Cartesian co-ordinates – transformation of co-ordinates –stress quadric of Cauchy principal stresses – invariants of stress tension – maximum normal and shear stresses- Mohr's diagram – examples of stress.

UNIT IV

Equation of elasticity

Generalized Hooke's law- homogeneous isotropic medium – elastic module for isotropic media – simple tension – pure shear – hydrostatic pressure – equilibrium equations for an isotropic elastic solid – Beltrami- Michell compatibility equations.

UNIT V

Dynamical equations of isotropic elastic solid – strain energy function – uniqueness of solution – statement of Saint – Venant's principle.

TEXT BOOKS

1. Dipak Chatterjee, 2003. Vector Analysis, Prentice Hall Of India, New Delhi. (for unit-I, II, III)
2. S.P. Timoshenko, J.N. Goodier, Theory of Elasticity. (for unit-IV, V)

REFERENCES

1. P.D.S. Verma, Theory of Elasticity.
2. Murray Spiegel, 2010. Vector Analysis, Schaum's series.
3. I.S Sokolnikoff, Mathematical Theory of Elasticity.

Course Objectives

This course enables the students to learn

- To understand fundamentals of magnetohydrodynamics which describes the dynamics of electrically conducting fluids
- To figure out the applications of magnetohydrodynamics to the various science and engineering fields
- Basics of electromagnetic theory and vector calculus.
- Able to understand the concept of flow and Stability.
- The basic properties of electrically-conducting fluids.
- The role of the Lorentz force and its relevance to plasma confinement, dynamo theory and the dynamics of magnetic waves.

Course Outcomes (COs)

On successful completion of this course the student will be able to:

1. Provide the details of the derivation of ideal and resistive MHD equations.
2. Demonstrate the basic properties of ideal MHD.
3. Describe electromagnetic boundary conditions.
4. Explain MHD waves.
5. Describe the derivation of fluid equations, energy equation.
6. Describe electromagnetic fields in the energy and momentum fluxes.

UNIT I

Review of equation of motions of viscous compressible fluid flow –Introduction of MHD-Electromagnetic field equations-Maxwell's equations and their Physical significance- Maxwell's equations in the moving frame of reference-Invariance under Galilean Transformation-Electromagnetic effects and the magnetic Reynolds number-induction equation –Alfven's Theorem-Physical Significance-Consequence of Alfven's Theorem-Ferraro's Law of irritation-The magnetic Energy- the mechanical equations and the mechanical effects-Electromagnetic stresses.

UNIT II

Magneto hydrostatics and steady states-Hydro magnetic equilibrium and forces free magnetic fields-boundary conditions – Boundary conditions in the case of force free magnetic fields-free surface of an isolated fluid mass- Chandrasekhar's theorem-General solution of force free magnetic field when is constant-some examples of force free fields.

UNIT III

Hydromagnetics of the laboratory- steady laminar motion-Hartmann flow (MHD Poiseuille's flow)- Domination of viscous forces over magnetic forces and vice versa-physical significance- Important dimensionless of MHD and their physical significance-electromagnetic boundary conditions-tensor

electrical conductivity, Hall current and ion slip – simple flow problems with tensor electrical conductivity.

UNIT IV

Magneto hydrodynamic waves- Waves in an infinite fluid of infinite electrical conductivity- Alfven waves in incompressible fluid in viscid fluid of infinite electrical conductivity-Waves of finite amplitude –propagation of velocity and current density with Alfven velocity-MHD waves in incompressible fluid- Alfven wave and two magneto acoustic waves- the limit of zero magnetic Prandtl number significance.

UNIT V

Stability of hydro magnetic systems- theory and applications-methods of investigation-small perturbations and instability-Energy principle-normal mode analysis-simple illustrative examples-the stability of Hartman layer-Squire's theorem-Orr-Summerfield equation-Instability of linear pinch-methods of stabilize- Flute Instability- A general criterion for stability-Bernstein's method of small oscillations(normal mode analysis) for hydro magnetic stability-jeans criterion for Gravitational stability- Chandrasekhar's generalization for MHD and rotating fluids.

TEXT BOOK

1. Ferraro V.A.C and Plumpton C., 1966. An Introduction to Magneto-Fluid Mechanics., Clarendon press, oxford.

REFERENCES

1. M.R.Crammer and Shi-l pai.,1973. Magneto-Fluid Mechanics for engineers and applied physicists, Scripta publishing company, Washington D.C.
2. P.H.Roberts.,1967. An Introduction to Magneto hydrodynamics., Longmans, Green and Co Ltd., London.
3. G.W.Sutton and A.Sherman.,1965. Engineering Magneto hydrodynamics., McGraw HillBook Co.
4. S.Chandrasekhar.,1961.Hydro dynamic and Hydro dynamic stability Oxford university press.

Course Objectives

This course enables the students to learn

- The fundamental theories of actuarial science as they apply in life insurance, general insurance and superannuation.
- How to assess the suitability of actuarial, financial and economic models in solving actuarial problems
- Interpretation and critically evaluating the articles in the actuarial research literature.
- About the concept of educational annuity plan.
- Understand the Premium Conversion tables for calculation of Policy values.
- The concept of Premiums for Annuity Plans.

Course Outcomes (COs)

On successful completion of this course the student will be able to

1. Explain the basic concepts of accounts and calculations of interest rates in banking / financial institution system.
2. Define Annuity and Summarize / calculate different values Annuities.
3. Leant about how to read Mortality Table and from that how to calculate the Probability of Survival and Death.
4. Describe about Premiums of Life Insurance and Endowment Assurance (Pure, Double and Marriage) and Educational Annuity plan.
5. Find the Annuity values for various Annuities.
6. Calculation of Net Premiums for Assurance Plans.

UNIT I

Accumulated Value – Present Value – Formula for present value- Annuities Certain- present Values- Amounts - Deferred Annuities –Perpetuities - Present Value of an Immediate Annuity Certain – Accumulated Value of Annuity – Relation between S_n and a_n – Present Value of Deferred Annuity Certain – Accumulated Value of a term of n years – Perpetuity – Present Value of an Immediate Perpetuity of 1 p.a. – Present Value of a Perpetuity due of 1 p.a. – Deferred Perpetuity with Deferment Period of m years – Mortality Table – The Probabilities of Survival and Death.

UNIT II

Life Insurance Premiums – General considerations - Assurance Benefits – Pure Endowment Assurance – Endowment Assurance – Temporary Assurance or Term Assurance - Whole Life Assurance – Pure Endowment Assurance – Endowment Assurance – Double Endowment Assurance – Increasing Temporary Assurance – Increasing Whole Life Assurance – Commutation Functions D_x , C_x , M_x and R_x – Expressions for Present Values of Assurance Benefits in terms of Commutation Functions – Fixed Term (Marriage) Endowment – Educational Annuity Plan.

UNIT III

Life Annuities and Temporary Annuities – Commutation Functions N_x – To Find the Present Value of an Annuity Due of Re.1 p.a. for Life – Temporary Immediate Life Annuity – Expression for $a_x : n$ – Deferred Temporary Life Annuity – Variable Life Annuity – Increasing Life Annuity – Commutation Function S_x – Increasing Temporary Life Annuity – Tables of Life Annuity and Temporary Life Annuity – Variations in the Present Values of Annuities – Life Annuities Payable at Frequent Intervals.

UNIT IV

Net Premiums for Assurance Plans – Natural Premiums – Level Annual Premium – Symbols for Level Annual Premium under Various Assurance Plans – Mathematical Expressions for level Annual Premium under Level Annual Premium under Various Plans for Sum Assure of Re. 1 – Net Premiums – Consequences of charging level Premium – Consequences of withdrawals – Net Premiums for Annuity Plans – Immediate Annuities – Deferred Annuities.

UNIT V

Premium Conversion tables – Single Premium Conversion tables – Annual Premium Conversion Tables – Policy Values – Two kinds of Policy values – Policy value in symbols – Calculation of Policy Value for Unit Sum Assure – Numerical Example : Retrospective Method and Comparison with Prospective Value – Derivative of Theoretical Expressions for Policy Value, tV_x by the Retrospective Method and Prospective Method – Other Expressions for Policy Value – Surrender Values – Paid up Policies – Alteration of Policy Contracts.

TEXT BOOK

1. Mathematical Basis of Life Insurance - Insurance Institute of India.

Course Objectives

This course enables the students to learn

- Develop the working knowledge on different numerical techniques.
- Solve algebraic and transcendental equations.
- Appropriate numerical methods to solve differential equations.
- About the concept of solving ordinary differential equations.
- Understand the idea about the basics of numerical methods for the analysis of experimental results.
- Develop practical skills in the use of numerical methods, including using software.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. How to find the concept of newton's method Raphson method.
2. Provide information on methods of iteration.
3. Study in detail the concept of boundary value problems.
4. Identify the concept of numerical differentiation and integration.
5. Attain mastery in the numerical solution of ordinary differential equations.
6. Solve ordinary differential equations by using euler and modified euler method.

UNIT I

Solution of algebraic and transcendental equations: Newton Raphson method- Bairstow method – Illustrations of the methods (case studies).

UNIT II

Solution of simultaneous linear algebraic equations: Gauss elimination method – Gauss Jordan method – Factorization method – Iteration method – Gauss-Jacobi method – Gauss-seidel method. Illustrations of the methods (case studies)

UNIT III

Interpolation: Gregory Newton Forward and Newton Backward interpolation formula –Interpolation with unequal intervals — Lagrange's interpolation formula – Inverse interpolation formula. Illustrations of the methods (case studies)

UNIT IV

Numerical Differentiation and Integration: Newton's Forward and backward differences to compute derivatives – Trapezoidal rule, Simpson's 1/3 & 3/8 rule. Illustrations of the methods (case studies)

UNIT-V

Numerical methods for solving ordinary differential equations – Taylor series (I order) – Euler and Modified Euler method – Runge kutta methods (II order, III order and IV order). Illustrations of the methods (case studies)

TEXT BOOK

1. Venkataraman .M.K., Fifth Edition, 2001. Numerical Methods in Science and Engineering, National publishing Company, Madras.

REFERENCES

1. Jain. M.K., Iyengar. S.R.K.,and R.K .Jain., 2004. Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi .
2. Sastry .S.S,2009, Engineering mathematics, PHI learning Pvt. Ltd, New Delhi.
3. Balagurusamy.E.,2000, Numerical Methods, Tata McGraw-Hill Education, New Delhi.

Course Objectives

This course enables the students to learn

- The concept of Banach spaces and related theorems
- The specific techniques for bounded operators over normed and Hilbert spaces.
- The demonstrate significant applications of the theory of functional analysis.
- The ideas and some of the fundamental theorems of functional analysis.
- Understand how to use the main properties of compact operators.
- Apply the spectral analysis of compact self-adjoint operators to the resolution of integral equations.

Course Outcomes (COs)

After successful completion of this course the students will be able to

1. Develop Banach spaces from vector spaces.
2. Describe the open mapping theorem.
3. Discuss Hilbert spaces and its properties.
4. Study in detail about the adjoint of an operator.
5. Handle complex problems concerning topics within the area of Functional Analysis.
6. Understand and apply fundamental theorems from the theory of normed and Banach spaces.

UNIT I

Banach Spaces- Normed linear space – Definitions and Examples-Theorems. Continuous Linear Transformations – Some theorems- Problems. The Hahn- Banach Theorem –Lemma and Theorems. The Natural imbedding of N in N^{**} -Definitions and Theorems.

UNIT II

The Open Mapping Theorem- Theorem and Examples –Problems. The closed graph theorem. The conjugate of an operation- The uniform boundedness theorem- Problems.

UNIT III

Hilbert Spaces- The Definition and Some Simple Properties – Examples and Problems. Orthogonal Complements - Some theorems .Ortho-normal sets – Definitions and Examples- Bessel's inequality- The conjugate space H^* .

UNIT IV

The Adjoint of an operator – Definitions and Some Properties-Problems. Self- adjoint operators – Some Theorems and Problems. Normal and Unitary operators –Theorems and Problems. Projections - Theorems and Problems .

UNIT V

Banach algebras: The definition and some examples of Banach algebra – Regular and singular elements – Topological divisors of zero – The spectrum – The formula for the spectral radius.

TEXT BOOK

1. Balmohan V., and Limaye., 2004. Functional Analysis, New Age International Pvt. Ltd, Chennai.

REFERENCES

1. Simmons. G.F., 1963. Introduction to Topology & Modern Analysis, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
2. Chandrasekhara Rao.K., 2006. Functional Analysis, Narosa Publishing House, Chennai.
3. Choudhary .B, and Sundarsan Nanda., 2003. Functional Analysis with Applications, New Age International Pvt. Ltd, Chennai.
4. Ponnusamy.S., 2002. Foundations of functional analysis, Narosa Publishing House, Chennai.

Course Objectives

This course enables the students to learn

- The concepts of fluid, its properties and behavior under various conditions of internal and external flows.
- The fundamentals of Fluid Dynamics, which is used in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics etc.
- To imbibe basic laws and equations used for analysis of static and dynamic fluids
- About the Two-Dimensional Motion of the fluid.
- Identify the fundamental kinematics of a fluid element.
- State the conservation principles of mass, linear momentum, and energy for fluid flow.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Classify and exploit fluids based on the physical properties of a fluid.
2. Compute correctly the kinematical properties of a fluid element.
3. Apply the concept of Bernoulli's theorem in steady motion.
4. Understand both flow physics and mathematical properties of governing Navier-Stokes equations and define proper boundary conditions for solution.
5. Provide the student with the basic mathematical background and tools to model fluid motion.
6. Develop a physical understanding of the important aspects that govern incompressible flow that can be observed in a variety of situations in everyday life.

UNIT I

Introductory Notions – Velocity – Stream Lines and Path Lines – Stream Tubes and Filaments – Fluid Body – Density – Pressure. Differentiation following the Fluid – Equation of continuity – Boundary conditions – Kinematical and physical – Rate of change of linear momentum – Equation of motion of an in viscid fluid.

UNIT II

Euler's momentum Theorem – Conservative forces – Bernoulli's theorem in steady motion – energy equation for in viscid fluid – circulation – Kelvin's theorem – vortex motion – Helmholtz equation.

UNIT III

Two Dimensional Motion – Two Dimensional Functions – Complex Potential – basic singularities – source – sink – Vortex – doublet – Circle theorem. Flow past a circular cylinder with circulation – Blasius Theorem – Lift force. (Magnus effect)

UNIT IV

Viscous flows – Navier-Stokes equations – Vorticity and circulation in a viscous fluid – Steady flow through an arbitrary cylinder under pressure – Steady Couette flow between cylinders in relative motion – Steady flow between parallel planes.

UNIT V

Laminar Boundary Layer in incompressible flow: Boundary Layer concept – Boundary Layer equations – Displacement thickness, Momentum thickness – Kinetic energy thickness – integral equation of boundary layer – flow parallel to semi infinite flat plate – Blasius equation and its solution in series.

TEXT BOOKS

1. Milne Thomson .L.M., 1968. Theoretical Hydrodynamics , Fifth edition, Dover Publications INC, NewYork.(for unit I,II)
2. Curle.N., and H.J.Davies, Modern Fluid Dynamics Volume-I , D Van Nostrand Company Ltd., London. (for unit III,IV,V)

REFERENCES

1. Yuan.S.W, 1976. Foundations of Fluid Mechanics, Prentice- Hall ,India.
2. Shanthi swarup,2003,"Fluid dynamics" Krishna prakasan media Pvt Ltd,Meerut.

Course Objectives

This course enables the students to learn

- Range of mathematics tools with emphasis on engineering applications.
- To think quantitatively and analyse problems critically.
- How to apply integral equations to the ordinary differential equation.
- Converting the IVPs and BVPs to the corresponding integral equations and Fredholm and Volterra integro-differential equations.
- Equip with the methods of finding Laplace transform and Fourier Transforms of different functions.
- Fundamental concepts of Fourier series, Fourier transforms and Laplace transforms and their applications to differential equations.

Course Outcomes (COs)

On successful completion of this course the students will be able to,

1. Calculate the Laplace equation in half plane of standard functions both from the definition and by using tables.
2. Equation with separable kernel and Fredholm alternative approximation Method.
3. Select and combine the necessary Laplace transform techniques to solve second-order ordinary differential equations.
4. Calculate both real and complex forms of the Fourier series.
5. Calculate the Fourier transform of elementary functions from the definition.
6. Calculate the variational problem in parametric form.

UNIT I

Fourier transforms: Fourier Transforms – Definition of Inversion theorem –Fourier cosine transforms - Fourier sine transforms – Fourier transforms of derivatives -Fourier transforms of some simple functions - **Fourier transforms of rational function.**

UNIT II

The convolution integral – convolution theorem – Parseval's relation for Fourier transforms – solution of PDE by Fourier transform – Laplace's Equation in Half plane – Laplace's Equation in an infinite strip - **The Linear diffusion equation on a semi-infinite line** - The two-dimensional diffusion equation.

UNIT III

Integral equations: Types of Integral equations–Equation with separable kernel- Fredholm Alternative Approximate method – Volterra integral equations–Classical Fredholm theory – Fredholm's First, Second, Third theorems.

UNIT- IV

Application of Integral equation to ordinary differential equation – initial value problems – Boundary value problems – singular integral equations – Abel Integral equation .

UNIT V

Calculus of variations: Variation and its properties – Euler’s equation – Functionals of the integral forms - Functional dependent on higher order derivatives – functionals dependent on the functions of several independent variables – variational problems in parametric form.

TEXT BOOKS

1. Sneedon.I.N,1974. The Use of Integral Transforms, Tata Mc Graw Hill, New Delhi.
(For Unit –I & II)
2. Kanwal.R.P, 1971. Linear integral Equations Theory and Technique, Academic press, New York.
(For Unit –III & IV)
- 3.Elsogots.L., 1970. Differential Equations and Calculus of Variation, Mir Publication Moscow.
(For Unit –V)

REFERENCES

1. Gelfand.I.M and S.V.Francis, 1991. Calculus of Variation, Prentice Hall, India. Tricomi.F.G, 1985. Integral Equations, Dover.
2. Larry C. Andrews and Bhimson K. Shivamoggi,1999. The Integral transforms for Engineers , Spie Press, Washington.

Course Objectives

This course enables the students to learn

- To understand the basic concepts in probability generating functions, sample moments and their functions, sampling, significance tests and statistical measures
- Probability distributions, significance of testing hypothesis and its interpretation,
- Estimation, ANOVA and their applications in various disciplines.
- Understand the concept of estimation.
- The knowledge of fixed-sample and large-sample statistical properties of point and interval estimators.
- Understanding of how to design experiments and surveys for efficiency.

Course Outcomes (COs)

After successfully completed this module the students will be able to

1. Explain the concepts of probability, including conditional probability.
2. Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.
3. Summarize the main features of a data set and test statistical hypotheses.
4. Define basic discrete and continuous distributions, be able to apply them and simulate them in simple cases.
5. Explain the concepts of analysis of variance and use them to investigate factorial dependence.
6. Describe the main methods of estimation and the main properties of estimators, and apply them.

UNIT I

Probability: Random Events – Preliminary remarks – random events and operations performed on them – the system of axioms of the theory of probability – conditional probability – Bayes theorem – Independent Events – functions of random variables – Multidimensional random variables – Some probability distributions – the binomial distribution – the Poisson distribution - the uniform distribution - the normal distribution.

UNIT II

Sample moments and their functions: Notion of a sample and a statistic - Distribution functions of X , S^2 and (X, S^2) - Chi-square distribution - Student t-distribution - Fisher's Z-distribution - Snedecor's F-distribution - Distribution of sample mean from non-normal populations.

UNIT III

Significance test: Concept of a statistical test - Parametric tests for small samples and large samples Chi-square test - Kolmogorov Theorem-Smirnov Theorem-Tests of Kolmogorov and Smirnov type The Wald-Wolfovitz and Wilcoxon-Mann-Whitney tests - Independence Tests by contingency tables.

UNIT IV

Estimation: Preliminary notion -Consistency estimation -Unbiased estimates -Sufficiency -Efficiency -Asymptotically most efficient estimates -methods of finding estimates -confidence Interval.

UNIT V

Analysis of Variance: One way classification and two-way classification. Hypotheses Testing: Poser functions -OC function-Most Powerful test -Uniformly most powerful test -unbiased test.

TEXT BOOK

1. Marek Fisz, 1980. Probability Theory and Mathematical Statistics, John Wiley and Sons, New York.

REFERENCES

1. Meyer, 1969. Introduction to Probability and Statistical applications, Oxford and IBH Publishing Co.Pvt Ltd. New Delhi.
2. Sheldon M. Ross, 1995. Introduction to probability and statistics for engineers and scientists, Third edition, Academic press.
3. Heinz Bauer, 1995.Probability Theory, Narosa Publishing House, London.
4. Parimal Mukhopadhyay, 1991. Theory of Probability, New central book agency, Calcutta.

Course Objectives

This course enables the students to learn

- Perspective on the broader impact of measure theory in ergodic theory.
- To apply the general principles of measure theory and integration.
- About the concept of Measurable spaces.
- To understand the basic concepts Riemann integral and Lebesgue integral.
- Basic knowledge of measure theory needed to understand probability theory, statistics and functional analysis.
- Develop the ideas of Lebesgue integration and its properties.

Course Outcomes (COs)

After successful completion of this course the students will be able to:

1. Get a clear view of the fundamentals of measure theory.
2. Acquaint with the proofs of the fundamental theorems underlying the theory of Lebesgue integration.
3. Identify the broader impact of measure theory in ergodic theory and ability to pursue further studies in this area.
4. Mastery in the measure spaces and its properties.
5. Apply the theorems of monotone and dominated convergence and Fatou's lemma.
6. Apply Lebesgue decomposition and the Radon-Nikodym theorem.

UNIT I

Lebesgue Measure: Introduction – Outer measure – Measurable sets and Lebesgue Measure – A non measurable set – Measurable set – Measurable functions – Littlewood's three principles.

UNIT II

The Lebesgue Integral: The Riemann integral – The Lebesgue integral of a bounded function over a set finite measure – The integral of a non negative function – The general Lebesgue integral – Convergence in measure.

UNIT III

Differentiation of monotone function, Functions of bounded variation-differentiation of an integral-Absolute continuity.

UNIT IV

Measure spaces-Measurable functions-Integration-General convergence Theorems.

UNIT V

Signed measures-The Radon-Nikodym theorem-the L^p spaces.

TEXT BOOK

1. Royden H.L, 2004. Real Analysis, Third Edition, Prentice – Hall of India Pvt.Ltd, New Delhi.

REFERENCES

1. Keshwa Prasad Gupta, 2005. Measure Theory, Krishna Prakashan Ltd, Meerut.
2. Donald L. Cohn, 1994. Measure Theory, United States.
3. Paul R. Halmos, 1955. Measure Theory, Princeton University Press Dover Publications.
4. Rudin W, 1986. Real and Complex Analysis, 3rd Edition, Mcgraw – Hill, New Delhi.

Course Objectives

This course enables the students to learn

- Enrich the fundamental of mathematical modeling skills.
- The construction and analysis of mathematical models inspired by real life problems
- Several modeling techniques and the means to analyze the resulting systems.
- To analyze a model and to apply an appropriate method to calculate a solution in order to predict the behavior of the system.
- Assess and articulate what type of modeling techniques are appropriate for a given physical system.
- Make predictions of the behavior of a given physical system based on the analysis of its mathematical model.

Course Outcomes (COs)

On successful completion of this course the student will be able to

1. Solve problems involving dynamic models, and probabilistic models.
2. Understand the use of modern technology in solving real-world to Epidemic models.
3. Problems through ordinary differential equations, probability theory, graphs.
4. Formulate a mathematical model given a clear statement of the underlying scientific principles.
5. Solve basic linear difference equations and solve application problems.
6. Know the concept of mathematical modeling through Graphs.

UNIT I

Mathematical Modeling through Ordinary Differential Equations of First order: Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models – Dynamics problems – Geometrical problems.

UNIT II

Mathematical Modeling through Systems of Ordinary Differential Equations of First Order: Population Dynamics – Epidemics – Compartment Models – Economics – Medicine, Arms Race, Battles and International Trade – Dynamics.

UNIT III

Mathematical Modeling through Ordinary Differential Equations of Second Order: Planetary Motions – Circular Motion and Motion of Satellites – Mathematical Modelling through Linear Differential Equations of Second Order – Miscellaneous Mathematical Models.

UNIT IV

Mathematical Modeling through Difference Equations : Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics – Probability Theory.

UNIT V

Mathematical Modeling through Graphs: Solutions that can be Modeled through Graphs – Mathematical Modeling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Un oriented Graphs.

TEXT BOOK

1. J.N. Kapur, 1988. Mathematical Modeling, Wiley Eastern Limited, New Delhi,.

REFERENCES

1. J. N. Kapur, 1981. Mathematical Models in Biology and Medicine Affiliated East –West Press Pvt Limited, New Delhi.
2. Brain Albright, 2010. Mathematical Mogeling with Excel, Jones and Bartlett Publishers, New Delhi.
3. Frank.R.Giordano, Maurice. D.Weir, WilliamP. Fox, 2003, A first course in Mathematical Modelling, Vikash Publishing House, UK.

Course Objectives

This course enables the students to learn

- To enable the students to enrich the fundamental of angle between two lines.
- The construction and analysis of rectangular Cartesian co-ordinates, straight lines
- The geometrical structures such as sphere, cone etc which are all have a wide application in the field of engineering.
- The properties of four basic three-dimensional shapes.
- Identify the number of parameters necessary to express a point in the three-dimensional coordinate system.
- Understand the concept concept of three dimensional analytical geometry.

Course Outcomes (COs)

On successful completion of the course, students will be able to:

1. Expertise on rectangular cartesian co-ordinates in space.
2. Know about equation of plane.
3. Understand the concept of straight line in space.
4. Acquire the knowledge on basic concepts of sphere, cone, cylinder.
5. Understand the concept of transformation of rectangular axes.
6. Recognize three-dimensional shapes in the world around them.

UNIT I

Rectangular Cartesian co-ordinates in space, Concept of a geometric vector (directed lines segment). Projection of a vector on a co-ordinate axis, inclination of a vector with an axis, co-ordinates of a vector, direction cosines of a vector, distance between two points. Division of a directed line segment in a given ratio, the equation of a surface and the equation of a curve.

UNIT II

Equation of plane: General, intercept and normal form. The sides of a plane, signed distance of a point from a plane. Equation of a plane passing through the intersection of two planes. Angle between two intersecting planes, bi-sectors of angle between two intersecting planes, Parallelism and perpendicularity of two planes.

UNIT III

Straight line in space: Its equation in symmetrical (canonical) and parametric forms. Direction ratio and direction cosines, canonical equation of the line of intersection of two intersecting planes. Angle between two lines. Condition for Parallelism and perpendicularity of two straight lines, of a straight

line and a plane, Equations of skew lines, Distance of a point from a straight line. Shortest distance between two skew lines.

UNIT IV

Sphere, Cone, Cylinder: Surface of revolution, Ruled surface: study of their shapes and canonical equations. Enveloping cone and enveloping cylinder. Tangents, tangent planes, normals and generating lines of quadrics.

UNIT V

Transformation of rectangular axes: Translation, rotation and their combinations. General equation of second degree in three variables: reduction to canonical (normal) forms. Classification of quadrics and their equation in canonical forms.

TEXTBOOK

1. Arup Mukherjee, Naba Kumar Bej, 2010. Analytical Geometry of Two & Three dimensions (Advanced Level), Books and allied (P) Ltd. Kolkata.

REFERENCES

1. M.C. Chaki: A Text Book of Analytic Geometry.
2. S.L. Loney: Co-ordinate Geometry.
3. J.T. Bell: Co-ordinate: Geometry of Three Dimensions.

Course Objectives

This course enables the students to learn

- The fundamental concepts of the theory of the finite element method:
- To enrich the global interpolation and the solution of one dimensional heat and wave equations.
- The purpose of Galerkin method, global & local finite element models in one dimension.
- This course provides an introduction to finite elements method with a focus on one and two dimensional problems in structures, heat transfer, static and dynamics.
- Basic principles of finite element analysis procedure.
- The design and heat transfer problems with application of FEM.

Course Outcomes (COs)

On successful completion of this course the student will be able to

1. Develop the ability to generate the governing FE equations for systems governed by partial differential equations.
2. Understand the application and use of the FE method for heat transfer problem.
3. Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements.
4. Comprehend quantitative and analytical methods.
5. Understand the concepts Lagrangian and Hermit elements methods in FEM.
6. Recognize the need for, and engage in life long learning.

UNIT I

Finite Element Method: Variation formulation–Raayleigh- ritz minimization- weighted residuals- Galerkin method applied to boundary value problems.

UNIT II

Global and local finite element models in one dimension-derivation of finite element equation.

UNIT III

Finite element interpolation-polynomial elements in one dimension, two dimensional elements-natural coordinates-triangular elements-rectangular elements.

UNIT IV

Lagrangian and Hermit elements for rectangular elements-global interpolation functions.

UNIT V

Local and global forms of finite element equations-boundary conditions-methods of solutions for a steady state problems –Newton-Raphson continuation-one dimensional heat and wave equations.

TEXT BOOK

1. J.N.Reddy, 2009, An Introduction to the Finite element Method. McGraw Hill, NY.,

REFERENCES

1. Chung.,Finite element Analysis in Fluid Dynamics., McGraw Hill,Inc.,
2. Singiresu S. Rao , 2004. The Finite Element Method in Engineering, Fourth edition, Elsevier Inc.,
3. Chennakesava.R,Alavala,2010.Finite element Method,PHI,NewDelhi.
- 4.O.C.Zienkiewicz.R,R.L,Talor,2010.Finite Element Method its Basis and Fundamentals,Elsevier, New Delhi.

Course Objectives

This course enables the students to learn

- Improve mathematical proof writing skills.
- Cater mathematical verbal communication skills.
- Afford problem-solving skills.
- Combinatorial proofs of identities and inequalities.
- Model and analyze computational processes using analytic and combinatorial methods.
- Structures to represent mathematical and applied questions, and they will become comfortable with the combinatorial tools commonly used to analyze such structures.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Cognition in various combinatorial methods.
2. Solve recurrence relations through computational skills.
3. Apply the inclusion/exclusion principle.
4. Develop fundamental knowledge of combinatorics and Euler function.
5. Analyze combinatorial objects satisfying certain properties and answer questions related to Necklace problem.
6. Know the concept of Burnside's lemma.

UNIT I

Basic Combinatorial Numbers – Stirling numbers of the second kind – Recurrence formula for P_{nm} .

UNIT II

Generating functions – Recurrence relations- Bell's formula.

UNIT III

Multinomial – Multinomial theorem- Inclusion and Exclusion principle.

UNIT IV

Euler function –Permutations with forbidden positions –the Menage Problem.

UNIT V

Problem of Fibonacci –Necklace problem – Burnside's lemma.

TEXTBOOK

1. V. Krishnamurthy, 2002, Combinatorics: Theory and Applications, East West Press Pvt. Ltd.

REFERENCES

1. V.K. Balakrishnan, 1995 Theory and problems of Combinatorics, Schaums outline series, McGraw Hill Professional.

2. Alan tucker, 2002, Applied Combinatorics, Fourth edition, John wiley & Sons, New York.

Course Objectives

This course enables the students to learn

- The basic concepts in automata theory and theory of computation.
- To identify different formal language classes and their relationships.
- This course focuses on the basic theory of Computer Science and formal methods of computation like automata theory, formal languages, grammars.
- Design automata, regular expressions and context free grammars for accepting or generating a certain language.
- Design grammars and recognizers for different formal languages
- Determine the decidability and intractability of computational problems.

Course Outcomes (COs)

On successful completion of this course the students will be able to:

1. Understand the definition of Automata.
2. Know about the different concepts in automata theory and formal languages such as formal proofs, non-deterministic automata, regular expressions, regular languages context-free grammars, context-free languages.
3. Discuss the acceptability of a string by finite automation.
4. Applications of Pumping Lemma.
5. Design automata, regular expressions and context-free grammars accepting or generating certain languages.
6. Acquire concepts relating to the theory of computation and computational models including decidability and intractability.

UNIT I

Definition of an Automation - Description of Finite Automaton – Transition systems - Property of transition functions - Acceptability of a string by a finite Automaton - Non deterministic finite automaton - The equivalence of DFA and NDFA.

UNIT II

Formal Languages - Basic Definitions and examples - Chomsky classification of Languages - Languages and their relation - Recursive and Recursively Enumerable sets- Operations on Languages.

UNIT III

Regular expressions - Finite Automata and Regular expressions.

UNIT IV

Pumping Lemma for Regular sets - Applications of Pumping Lemma - Closure Property of Regular sets - Regular sets and Regular grammars.

UNIT V

Context free Languages and Derivation trees - Ambiguity in Context free grammars - Simplification of Context free grammars (examples only).

TEXTBOOK

1. K L P Mishra and N Chandrasekaran, 1999. Theory of Computer Science, Prentice Hall of India, New Delhi.

REFERENCES

1. John E. Hopcroft and J.D. Ullman, , 2006. Introduction to Automata theory, Languages and Computation, Third Edition, Prentice Hall.
2. A.V. Aho and J.D. Ullman, 1999. Principles of compiler design, Narosa Publishing Company, London.
3. Rakesh Duke, Adesh Pandey and RiTu Gupta, 2007. Discrete Structures and Automata theory. Narosa Publishing Company, New Delhi.

Course Objectives

This course enables the students to learn

- To understand the basic concepts in probability generating functions, sample moments and their functions, sampling, significance tests and statistical measures
- Probability distribution and their applications in various disciplines.
- This course introduces the key concepts in probability and distribution theory, including probability laws, random variables, expectation and variance, conditional probabilities, functions of random variables and multivariate probability distributions.
- Analyze statistical data graphically using frequency distributions and cumulative frequency distributions.
- Providing students with a formal treatment of probability theory.
- Equipping students with essential tools for statistical analyses at the graduate level.

Course Outcomes (COs)

After successfully completed this module the students will be able to

1. Explain the concepts of probability, including conditional probability.
2. Explain the concepts of random variable, probability distribution, distribution function, expected value, variance and higher moments, and calculate expected values and probabilities associated with the distributions of random variables.
3. Know the concept of conditional distributions.
4. Explain the concepts of various types of distributions.
5. Understand the concept of Bernoulli's law of large numbers.
6. Apply the concept of the gamma distribution.

UNIT I

Random Events – Preliminary remarks – random events and operations performed on them – the system of axioms of the theory of probability – conditional probability – Bayes theorem. Independent Events – Random variables – the concept of random variable – the distribution function – random variables of the discrete type and the continuous type – functions of random variables.

UNIT II

Multidimensional random variables – marginal distributions – conditional distributions – Independent random variables – Parameters of the distributions of a random variable. Expectation, moments moment generating functions and characteristic functions.

UNIT III

Conditional expectation and distribution, Chebyshev inequality – absolute moments. Modes of convergence, Weak and strong laws of large numbers, Central limit theorem.

Probability generating functions – some probability distributions - One point and two point distributions – the Bernoulli scheme.

UNIT IV

The binomial distribution – the Poisson scheme. The generalized binomial distribution – the Poisson scheme. The generalized binomial distributions and the Poisson distributions, uniform distribution - the normal distribution.

UNIT V

The gamma distribution – the Cauchy and Laplace distributions – Limit theorems – preliminary remarks – Stochastic convergence – Bernoulli's law of large numbers - the convergence of a sequence of distribution functions – the Levy-Cramer theorem – The de Moivre Laplace theorem – the Lindeberg-Levy theorem.

TEXT BOOK:

1. Kandaswamy. P., K. Thilagavathy., and K. Gunavathy., 2004 . Probability statistics and Queuing theory, S. Chand & Company Ltd., New Delhi.

REFERENCES:

1. Marek Fisz, 1980. Probability Theory and Mathematical Statistics, John Wiley and Sons, New York.
2. Kishor S. Trivedi., 2001. Probability and Statistics with reliability, Queuing and Computer science Applications, Prentice – Hall of India, New Delhi.
3. Hein Bauer, 1995. Probability Theory, Narosa Publishing House, London.
4. D.N. Elhance, Veena Elhance and B.M Agarwal, 1956, Fundamental of Statistics, Kitab Mahal, \ Allahabad.
5. Gupta. S.C. and V.K. Kapoor, 2006. Fundamentals Of Mathematical Statistics, Sultan chand & Sons, New Delhi.

Course Objectives

This course enables the students to learn

- The introduction and different architectures of fuzzy sets.
- The applications of fuzzy networks.
- To cater the knowledge of fuzzy Logic Control and use these for controlling real time systems.
- Solve problems that are appropriately solved by neural networks, fuzzy logic, and genetic algorithms.
- The concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.
- The importance of tolerance of imprecision and uncertainty for design of robust & low cost intelligent machines.

Course Outcomes (COs)

On successful completion of this course, students will be able to

1. Obtain the fundamentals and types of fuzzy networks.
2. Have a broad knowledge in developing the different algorithms for fuzzy Logic.
3. Analyze constructing Fuzzy sets and operations.
4. Acquire a broad knowledge in Fuzzy relation equation.
5. The basic mathematical elements of the theory of Fuzzy systems and neural networks.
6. Explain the concepts of neural networks, fuzzy logic, and genetic algorithms.

UNIT I

Classical logic: An overview-Multivalued logics-Fuzzy Propositions-Fuzzy quantifiers-linguistic hedges-Inference from conditional fuzzy propositions-Inference from conditional and qualified propositions-Inference from qualified propositions.

UNIT II

Uncertainty based in formations-Information and uncertainty-Non specificity of crisp sets- Non specificity of Fuzzy sets-Fuzziness of fuzzy sets- Uncertainty in evidence theory-Summary of Uncertainty measures-Principles of Uncertainty.

UNIT III

Constructing Fuzzy sets and operations- General discussion-Method of construction: An overview-Direct method with one expert- Direct method with multiple experts- Indirect method with one expert- Indirect method with multiple experts-Constructions from sample data.

UNIT IV

Fuzzy expert systems: An overview-Fuzzy implications-selection of Fuzzy implications-Multi conditional approximate reasoning-The role of Fuzzy relation equation-Interval-valued approximate reasoning.

UNIT V

Fuzzy systems-General discussion-Fuzzy controllers: An overview and examples-Fuzzy systems and neural networks- Fuzzy neural networks- Fuzzy Automata-Fuzzy dynamic systems.

TEXTBOOKS

1. George J.Klir, Tina.A Folger, 2008. Fuzzy sets, uncertainty and information, Prentice Hall of India Pvt. Ltd, New Delhi, (For Unit I, II, III)
2. George J. Klir and Bo Yuan, , 1995.Fuzzy sets and fuzzy logic theory and applications, Prentice-Hall of India private limited, New Delhi. (For Unit IV, V)

REFERENCES

1. Timothy J. Ross, 2000. Fuzzy logic with Engineering Applications, McGraw Hill, Inc. New Delhi.
2. H.J. Zimmermann, 2006. Fuzzy set theory and its applications, Second Edition, Springer New Delhi,.

Course Objectives

This course enables the students to learn

- Understand the basic concepts Hille-Yosida theorem.
- Regularity of mild solutions for analytical semi groups and their applications in various disciplines.
- Able to understand the concept of semi groups.
- Understanding of classical control theory.
- Development of the bounded linear operators in semigroups.
- Use of the inhomogeneous initial value problem.

Course Outcomes (COs)

After successfully completed this module the students will be able to

1. Explain the concepts of control theory such as bounded linear operators.
2. Explain the concepts of semi groups of compact operators etc which is a powerful tool in solving the differential systems.
3. Familiar with controllability, exponential stability.
4. Understand the concept of basic concepts in control theory.
5. Analysis of linear and nonlinear systems.
6. Analyze the concept of stability for controllability.

UNIT I

Bounded Linear Operators:

Uniformly continuous semi groups of bounded linear operators – Strongly continuous semi groups of bounded linear operators – The Hille-Yosida theorem – The Lumer Phillips theorem.

UNIT II

Semi groups of Compact operators:

Semi groups of Compact operators – Differentiability – Analytic semigroups – Fractional powers of closed operators.

UNIT III

Abstract Cauchy Problem:

The Homogeneous Initial value problem – The inhomogeneous initial value problem – Regularity of mild solutions for Analytical semi groups.

UNIT IV

Basic Concepts in Control Theory:

Introduction- Fixed point methods- Observability of linear and nonlinear systems.

UNIT V

Controllability and exponential stability.

TEXT BOOKS:

1. A. Pazy, , 1983, Semigroups of Linear Operators and Applications to Partial Differential Equations, Springer-Verlag, New York.
2. R.F. Curtain and H. Zwart, 1995, Introduction to infinite dimensional linear systems theory, Springer-Verlag, New York.

REFERENCES:

1. A.V. Balakrishnan, , 1976. Applied Functional Analysis, Springer-Verlag, New York.
2. J.A. Goldstein, 1985. Semigroups of Linear Operators and Applications, Oxford University Press, New York.
3. K. Balachandran and J.P. Dauer, 1999. Elements of Control Theory, Narosa Publishing, New Delhi.

15MMP491

PROJECT

Semester – IV

L T P C

0 0 0 12

KARPAGAM ACADEMY OF HIGHER EDUCATION
DEPARTMENT OF MICROBIOLOGY
B.Sc. MICROBIOLOGY CURRICULUM (CBCS)
(2015 – 2016 Batch)

Course code	Name of the course	Objective & outcomes		L	T	P	Marks			Exam (h)	Credit
		PEO _s	POs				CIA	ESE	Total		
SEMESTER – I											
15LAU101	Language – I	VII	e	05	-	-	40	60	100	3	05
15ENU101	English – I	VII	e	04	-	-	40	60	100	3	04
15MBU101	Introductory Microbiology	II	a	04	01	-	40	60	100	3	05
15MBU111	Basic Microbiology Practical – I	VI	b	-	-	05	40	60	100	3	03
15MBU102	Allied Chemistry – I	VI	h	04	-	-	40	60	100	3	04
15MBU112	Allied Chemistry Practical – I	VI	h	-	-	03	40	60	100	3	02
15FCA101*	Foundation course A - Value education	VII	f	02	-	-	100	-	100	-	01
15SSD101*	Soft skill development – I	VII	e	02	-	-	-	-	-	-	-
	Semester total			21	01	08	340	360	700	-	24
SEMESTER – II											
15LAU201	Language –II	VII	e	05	-	-	40	60	100	3	05
15ENU201	English –II	VII	e	04	-	-	40	60	100	3	04
15MBU201	Microbial Diversity and Classification	II	a	04	01	-	40	60	100	3	05
15MBU211	Basic Microbiology Practical – II	VI	b	-	-	05	40	60	100	3	03
15MBU202	Allied Chemistry – II	VI	h	04	-	-	40	60	100	3	04
15MBU212	Allied Chemistry Practical – II	VI	h	-	-	03	40	60	100	3	02
15FCB201*	Foundation course B – Environmental studies	VII	f	02	-	-	100	-	100	-	01
15SSD201*	Soft skill development – I	VII	e	02	-	-	100	-	100	-	01
	Semester total			21	01	08	440	360	800	-	25
SEMESTER – III											
15ENU301	English – III	VII	e	04	-	-	40	60	100	3	04
15MBU301	Microbial Physiology	II	a	03	01	-	40	60	100	3	04
15MBU302	Bioinstrumentation	IV	a,j	04	-	-	40	60	100	3	04
15MBU311	Advanced Microbiology Practical – III	IV	c,g	-	-	05	40	60	100	6	02
15MBU303	Allied Elective –I	IV	b, g	04	-	-	40	60	100	3	04
15MBU312	Allied Elective Practical – I	IV	b, g	-	-	03	40	60	100	3	02
15FCC301*	Computer course	VII	D	04	-	-	100	-	100	-	02
15SSD301*	Soft skill development – II	VII	E	02	-	-	-	-	-	-	-
	Semester total			21	01	08	340	360	700	-	22
SEMESTER – IV											
15ENU401	English – IV	VII	E	04	-	-	40	60	100	3	04
15MBU401	Microbial Genetics	II	A	05	01	-	40	60	100	3	05
15MBU402	Medical bacteriology	IV	B	05	01	-	40	60	100	3	05
15MBU411	Advanced Microbiology Practical – IV	IV	d,h	-	-	05	40	60	100	6	03

15MBU403	Allied Elective -II	IV	b, g	04	-	-	40	60	100	3	03
15MBU412	Allied Elective Practical – II	IV	b, g	-	-	03	40	60	100	3	02
15SSD401*	Soft skill development – II	VII	E	02	-	-	100	-	100	-	01
Semester total				20	02	08	340	360	700	-	23

SEMESTER – V											
15MBU501	Basic and Clinical Immunology	IV	J	05	-	-	40	60	100	3	05
15MBU502	Virology	IV	b	04	01	-	40	60	100	3	05
15MBU503	Food and Agricultural Microbiology	IV	h	05	-	-	40	60	100	3	05
15MBU504	Environmental Microbiology	IV	h	04	01	-	40	60	100	3	05
15MBU505	Core Elective – I	IV	g	05	-	-	40	60	100	3	05
15OEU501	Open elective – I	I	a	-	-	-	-	100	100	3	03
15MBU511	Application Oriented Practical – V	IV	b,h	-	-	05	40	60	100	9	03
15MBU521	Internship Programme	VII	f	-	-	-	50	-	50	-	02
Semester total				23	02	05	290	460	750	-	33
SEMESTER – VI											
15MBU601	Industrial Microbiology	III	h	04	01	-	40	60	100	3	05
15MBU602	Microbial Technology and Intellectual Property Rights	V	i	04	01	-	40	60	100	3	05
15MBU603	Core Elective – II	IV	G	05	-	-	40	60	100	3	04
15MBU611	Application Oriented Practical – VI	III	H	-	-	05	40	60	100	9	03
15MBU691	Project and Viva Voce	VII	H	10	-	-	60	90	150	-	06
15EAU601	NCC/NSS/Sports/Club activity etc			-	-	-	-	-	-	-	-
Semester total				23	02	05	220	330	550	-	23
G. Total				129	09	42	1970	2230	4200	-	150

*Colour fonts highlights

Red colour : Entrepreneurship course
Green colour : Employability courses
Blue colour : Skill development courses

*** Internal Tests only**

Foundation course (FCC)

Course code	Name of the Course
15FCC301A	Introduction to Computers
15FCC301B	Introduction to Multimedia

Allied Elective – I

Allied Elective – I (Theory)		Allied Elective –I (Practical)	
Course code	Name of the Course	Course code	Name of the Course
15MBU303A	Biopharmacy – I	15MBU312A	Biopharmacy Practical –I
15MBU303B	Biochemistry-I	15MBU312B	Biochemistry Practical-I
15MBU303C	Plant Biotechnology	15MBU312C	Plant Biotechnology Practical

Allied Elective - II

Allied Elective – II (Theory)		Allied Elective – II (Practical)	
Course code	Name of the Course	Course code	Name of the Course
15MBU403A	Biopharmacy – II	15MBU412A	Biopharmacy Practical –II
15MBU403B	Biochemistry-II	15MBU412B	Biochemistry Practical-II
15MBU403C	Animal Biotechnology	15MBU412C	Animal Biotechnology Practical

Electives courses

Elective – I (Theory)		Elective – II (Theory)	
Course code	Name of the Course	Course code	Name of the Course
15MBU505A	Medical Laboratory Technology	15MBU603A	Mycology and Parasitology
15MBU505B	Biofertilizer	15MBU603B	Bioremediation
15MBU505C	Herbal technology	15MBU603C	Pharmaceutical Microbiology

Open elective course

Course code	Name of the Course
15OEUE501	Personal Health Care

Additional courses

Course code	Name of the Course	Hrs/ Week	Marks			Exam (h)	Credit(s)
			CIA	ESE	Total		
15MBU506	Bioinformatics and Computational Methods	-	-	100	100	3	04
15MBU604	Entrepreneurial microbiology	-	-	100	100	3	04

For B.Sc. (Hons.) in Microbiology

Course code	Name of the Course	Hrs / Week	Marks			Exam (h)	Credit(s)
			CIA	ESE	Total		
15MBU507	Genomics	-	-	100	100	3	05
15MBU605	Food process technology	-	-	100	100	3	05

Undergraduate Programme – B.Sc Microbiology Programme Outcomes

Programme Outcomes of UG Microbiology: Students of all undergraduate microbiology degree Programmes at the time of graduation will be able to

- a. Scientific Knowledge: Microbiology majors able to make observations, develop hypotheses, and design and execute experiments using advanced methods. Able to discuss science and scientific methodology. They will have a good knowledge of Intellectual Property Rights.
- b. Laboratory Skills: Microbiology students will master the following laboratory skills: aseptic culture techniques, microscopy, use of appropriate methods to identify microorganisms and to use high laboratory equipments. They are able to practice safe microbiology, using appropriate protective and emergency procedures. Student able to gain the good knowledge of the development process and the planning process involved in the microbial products and enhance the entrepreneurship.
- c. Data analysis skills: Systematically collect, record, and analyze data, identify sources of error, interpret the results, and reach logical conclusions.
- d. Problem-Solving Skills: Microbiology students will be able to analyze and interpret results from a variety of microbiological methods, and apply these methods to analogous situations. Use mathematical and graphing skills and reasoning to solve problems in microbiology.
- e. Communication Skills: Microbiology majors will demonstrate competence in written and oral communication.
- f. Cooperation/Social Responsibility: Microbiology majors able to understand and appreciate the value of cooperating and working effectively with peers and be able to demonstrate a commitment to the process of developing such skills.
- g. Able to understand the importance of microorganisms in various industries such as pharmaceuticals, food, biofertilizers and biopesticides etc, Students will have a major knowledge on concepts of immunology, biotechnology, molecular biology, biochemistry, genetics. Able to explain the beneficial and harmful role of microorganisms in environment.

Programme Specific Outcomes (PSOs)

- h. Students will have a major knowledge on concepts of immunology, biotechnology, molecular biology, biochemistry, chemistry, genetics. Able to explain the beneficial and harmful role of microorganisms in environment. Able to understand the importance of microorganisms in various industries such as pharmaceuticals, food, biofertilizers and biopesticides etc,
- i Describe how microorganisms are used as *model systems* to study basic biology, genetics, metabolism and ecology.
- j. Identify ways microorganisms play an *integral role* in disease, and microbial and immunological methodologies are used in disease treatment and prevention.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Programme Educational Objectives of UG Microbiology: The major objectives of the undergraduate course is

PEO-I: To impart knowledge on basic concepts of microbiology. To understand the beneficial and harmful role of microorganisms in the environment.

PEO-II: To understand the fundamentals of physiological reactions including metabolic pathways and biochemical reactions in microorganisms.

PEO-III: To develop human resource and entrepreneurs in Microbiology with the ability to independently start their own ventures or small biotech units in the field of biotechnology.

PEO-IV: Understand modern microbiology - practices and approaches with an emphasis in technology application in pharmaceutical, medical, industrial, environmental and agricultural areas.

PEO-V: Become familiar with public policy, bio-safety, and intellectual property rights issues related to microbiology applications nationally and globally

PEO-VI: Gain experience with standard bioinstrumentations and molecular tools and approaches utilized: manipulate genes, gene products and organisms.

PEO-VII: To demonstrate the written and oral communication skill .To develop the problem solving and data interpretation skills. To develop leadership skills and competitive spirit

POs	a	B	C	D	E	f	g	H	I	J
PEO I	X	X						X		X
PEO II	X	X						X	X	
PEO III	X	X		X			X	X		
PEO IV	X	X		X			X		X	
PEO V	X					X				X
PEO VI		X	X	X				X	X	X
PEO VII	X		X	X	X	X				

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

பகுதி – I, தமிழ்

15LAU101 :

தமிழ் முதல் தாள்

பருவம் I

5-H,5-C

அலகு – I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் – பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி – கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் – அழகின் சிரிப்பு – ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் – இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் – காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி – வையகத்தை வெற்றிகொள்ள

குழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு – II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு – III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு – IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு- V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை – தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore – 21.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

COURSE OUTCOME:

- Develop the four types of skills
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT - I

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT - II

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT - III

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT - IV

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT - V

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

TEXT BOOK

Rao, G. Chandralekha and *et al.* Spring 2013. Emerald Publishers: Chennai.

REFERENCE

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

1. To provide a strong, fundamental foundation in microorganisms for advanced studies in biological sciences, particularly to improve their **skills** in microbiology field.
2. To identify and understand the principle components of a light microscope
3. To provide an overview of culture preservation techniques
4. To explain why the study of fungi such as yeast and molds is within the discipline of microbiology
5. To demonstrate the microscope application
6. To explain different sterilization techniques followed in microbiology field

COURSE OUTCOMES

1. After completion of this course paper, the students clearly understand the contributions of various scientists for development of microbiology field and **skills** associated with it.
2. This course will demonstrate the diversity of microbes and their applications.
3. Students will know about the various field of Microbiology
4. Students will know how to utilize the microscope for bacterial specialized structure analysis
5. Able to understand the ultra structure of the bacteria
6. Familiarize with sterilization techniques

UNIT – I

History and scope of Microbiology – Discovery of microorganisms, Theory of Spontaneous generation - Recent developments and Golden age of microbiology. Modern microbiology.

UNIT – II

Origin and evolution of cell – cell structure - basic properties of cells – Ultra structure of prokaryotic cell- Bacteria - Capsule, Slime layer, Cell wall- Plasma membrane, Flagella- pili, Mesosome, Spores.

UNIT – III

Microscopy Principles working and application of Simple, compound, dark-field, phase contrast, fluorescent and electron microscopes – Scanning electron microscopy (SEM), Confocal and Scanning Transmission electron microscopy (STEM), Transmission electron microscopy (TEM).

UNIT – IV

Sterilization and disinfection, Principles, Methods of sterilization - Physical methods - Hot air sterilizer - Arnold sterilizer – Autoclave – Filtration – Radiation, Chemical sterilization. Phenol coefficient test, Quality control and Sterility testing. Estimation of microorganisms - Dilution techniques, Plate count, cell mass, direct count, MPN count.

UNIT –V

Observation of living microorganisms- Wet mount, motility. Stains and staining reactions - Simple and differential staining - Gram, Spore, Capsule, Acid fast and Haemocytometer. Culture techniques - Agar slants, Agar deeps, broth culture. Types of media - Solid media, assay media. Preparation of auxenic culture and pure culture techniques. Maintenance and preservation of cultures – Slants – Lyophilization - Glycerol storage - Cryopreservation. Culture collection centers in India and International levels.

TEXT BOOKS

1. Dubey, R.C. and D.K. Maheswari, 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
2. Modi, H. A., 1996. Elementary Microbiology. Vol.2, AKTA Prakashan Nadiad. Gujarat
3. Powar, C.B. and H.F. Dagainawala, 2008 .General Microbiology. Volume: II. Himalaya Publishing House.
4. Singh, R.P. 2007. General Microbiology. Kalyani Publishers, New Delhi.
5. Frobisher, H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. 2005. Fundamentals of Microbiology, Saunder and Company, London.

REFERENCES

1. Holt, J.G., N.R. Krieg, P.H.A. Sneath, J.T. Staley and S.T. Williams, 2000. Bergey's Manual of Determinative Bacteriology. 9th Edition, Lippincott Williams and Wilkins Publishers. Baltimore.
2. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2004. Microbiology. 5th Edition. Tata McGraw-Hill Publishing Company. New Delhi.
3. Prescott, L.M., J.P. Harley and C.A. Klein, 2006. Microbiology, 7th Edition McGraw Hill Publishing Company Limited. New York.
4. Salle, A.J., 2007. Fundamental Principles of Bacteriology. 7th Edition, Envins Press, New York.
5. Tortora, G.J., Funke, B.R. and Case, C.L. 2004. Microbiology: An Introduction. Pearson Education, Singapore.
6. Alcomo, I.E. 2006. Fundamentals of Microbiology. 8th Edition, Jones and Bartlett Publishers, Sudbury. Massachusetts.
7. Alcamo, 2014. Fundamentals of Microbiology. 9th Edition, Jones and Bartlett Publishers, Sudbury, Massachusetts.
8. Sharma, P.D, 2014. Microbiology, Rastogi Publications India.
9. Naveen Kango, M.B, 2010. Textbook of Microbiology. IK International Publishing Housing.
10. Ananthanarayan and Paniker's 2013. Textbook of Microbiology. 9th Edition Universities Press, Hyderabad, India
11. Prescott, L.M., J.P. Harley and C.A. Klein 2006. Microbiology. 7th Edition McGraw - Hill Publishing Company Limited. New York.

15MBU111

BASIC MICROBIOLOGY PRACTICAL – I

**Semester – I
5H – 3C**

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

To develop **skills** related to

- Isolation and culture techniques of bacteria
- The external feature of bacteria and colony characteristics. Various staining techniques
- Measurement of pH
- Counting of microorganism in the environment
- Sterilization and phenol coefficient test and antibiotic usage
- Laboratory precautions and Biosafety measures.

COURSE OUTCOME (CO'S)

1. This practical paper will build the student to describe and distinguish the bacterial colonies.
2. They will gain the knowledge on microscope and its handling
3. Students will able to analyze the morphology of bacterial
4. Students able to handle the pathogens safely.
5. Students able to describe size of the bacteria
6. Students able to handle the instruments in the microbiology laboratory

EXPERIMENTS

1. Laboratory Precautions
2. Microscope – Bright field and Dark field
3. Micrometry
4. Measurement of pH
5. Preparation of cleaning solutions
6. Usage of Antibiotics and disinfectants in microbiology laboratory
7. Phenol coefficient test
8. Culture media preparation – liquid and solid medium
9. Selective and Differential media
10. Staining of bacteria- Gram, spore, capsule, flagella

REFERENCES

1. Benson, H.J., 2002. Microbiological Applications: Laboratory Manual in General Microbiology, 8th Ed. New York, NY: McGraw-Hill.
2. Cappucino, J.G. and N. Sherman, 2004. Microbiology - A Laboratory Manual. Benjamin Cummings, New York.
3. Jayaraman, J., 2006. Laboratory Manual in Biochemistry, 1st Edition, New Age International P Ltd, Publishers New Delhi.
4. Colomé, J.S., Kubinski, A.M., Cano, R.J. & Grady, D.V. 1986. Laboratory Exercises in Microbiology. St. Paul, MN: West Publishing.
5. John Grainger, Janet Hurst, Dariel Burdass, 2001. Basic practical Microbiology: A manual Society for General Microbiology.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

To make the student acquire sound knowledge with the

1. Principles of Chemical bonding
2. Stereoisomerism, Inter halogen compounds,
3. Chemistry of Silicones and awareness to Pollution.
4. To learn the concept of Dyes, mechanism of action Sulpha drugs,
5. To learn the Photochemical laws, Chemical kinetic law
6. To know the applications of Chromatography which that helps students in their employability.

COURSE OUTCOMES

This paper presents the basic Principles of Chemistry. So it enables the students to learn about

1. The fundamental aspects of Chemistry that helps students in their employability.
2. concept of Dyes, mechanism of action Sulpha drugs,
3. Photochemical laws, Chemical kinetic law
4. Students able to perform Chromatography
5. Separate the compounds from natural sources
6. Chemical bonding

UNIT - I

Chemical Bonding: Molecular orbital theory-linear combination of atomic orbitals-bonding and antibonding molecular orbitals-energy level diagram-bond order- M.O. configuration of H_2 , N_2 and F_2 molecules. Diborane: Preparation, properties and structure. $NaBH_4$: Preparation and uses. Borazole: Preparation and properties. Interhalogen compounds: ICl , BrF_3 , IF_5 - preparation, properties, uses and structure. Basic properties of iodine. Compounds of sulphur: Sodium hydrosulphite- preparation, properties, uses and structure. Per acids of sulphur: Preparation, properties, uses and structure.

UNIT - II

Industrial Chemistry: Silicones: Synthesis, properties and uses. Fuels gases: Natural gas-water gas-semi water gas-carbureted water gas-producer gas- oil gas (Manufacturing details not required). Fertilizers: NPK fertilizer-ammonium sulphate-urea-superphosphate of lime-triple superphosphate-potassium nitrate-ammonium nitrate. Pollution: Water, air and soil pollution-sources and remedies-acid rain-ozone hole-greenhouse effect.

UNIT - III

Covalent Bond and Stereoisomerism: Covalent Bond: Orbital overlap, hybridization and geometry of CH_4 , C_2H_4 and C_2H_2 . Polar effects: Inductive effect-electromeric effect- mesomeric effect- steric effect- hyperconjugation. **Stereoisomerism:** Elements of symmetry-polarised light and optical activity-isomerism in tartaric acid-racemisation- resolution- geometrical isomerism of maleic and fumaric acids-keto-enol tautomerism of acetoacetic esters.

UNIT - IV

Dyes, Chemotherapy and Vitamins: Dyes: Terms used chromophore, auxochrome, bathochromic shift and hypsochromic shift- classification of dyes – based on chemical structure and application- one example each for azo, triphenylmethane, vat and mordant dyes- preparation. **Chemotherapy:** Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of penicillins and chloromycetin. **Vitamins:** Diseases caused by the deficiency of vitamins A, B₁, B₂, C and D-sources of these vitamins.

UNIT - V

Elements of Photochemistry, Chemical Kinetics and Chromatography: Elements of Photochemistry: Photochemical laws-Beer Lambert's law-Grotthuss-Draper law-Stark-Einstein law (statement only). **Chemical Kinetics:** Rate-order-molecularity-pseudo first order reactions-zero order reactions-determination of order of reaction-measurement of order and rates of reactions-effect of temperature on reaction rate-energy of activation. **Chromatography:** Principles and applications of Column, Paper and Thin Layer Chromatography.

TEXT BOOKS

1. V.Veeraiyan and A.N.S. Vasudevan, 2005. Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai.
2. B.R.Puri and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Company Ltd., Jalandar
3. B.S.Bahl and Arun Bahl 2005. Advanced Organic Chemistry, S.Chand & Company Ltd., New Delhi
4. Puri, Sharma and Pathania 2003. Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar

REFERENCE

1. R.Gopalan and S.Sundaram,2003.Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

On successful completion of the course the students should have **skills** associated with

- Qualitative analysis.
- Elements and functional groups of a mixture by systematic analysis.
- Stereoisomerism, Inter halogen compounds,
- Chemistry of Silicones and Pollution.
- To learn the concept of Dyes,
- mechanism of action Sulpha drugs

COURSE OUTCOMES

This paper presents the basic Principles of qualitative analysis in Chemistry. So it enable the students to learn about

- The fundamental aspects of Chemistry that helps students in their **employability**.
- concept of Dyes, mechanism of action Sulpha drugs,
- Photochemical laws, Chemical kinetic law
- Students able to perform Chromatography
- Separate the compounds from natural sources
- Organic compounds and elements

COURSE OUTCOMES

Contents

Systematic analysis of an organic compound, preliminary tests, detection of elements present, aromatic or aliphatic, saturated or unsaturated, nature of the functional group, confirmatory tests—aldehydes, ketones, amines, diamide, carbohydrates, phenols, acids, esters & nitro compounds.

Note: Each student should analyse minimum 6 compounds.

REFERENCES

1. R. Ramasamy, 2008. Allied Chemistry Practical Book, Priya Publications, Karur.
2. A.O. Thomas, 2010. Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala.
3. V.Venkateswaran, R.Veerawamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S. Chand Publications, New Delhi.

Instruction Hours/week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

COURSE OBJECTIVES

- To improve the integral development as human begins
- To train the students towards sustainable lifestyle
- To improve their confidence as an **entrepreneur**
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom
- To motivate the students about the roles and responsibility

COURSE OUTCOME (CO'S)

Upon completion of this course

1. The students fit for the future.
2. develop a sense of competitive spirit, co-operation, leadership, diligence, punctuality, **entrepreneurship**.
3. Team-spirit as well as to provide a backdrop for the development of their creative talents
4. Able to manage the time in the all condition
5. They will apply positive thinking always
6. Able to develop their personality

UNIT – I

Concept of Self, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spirituality – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam Academy of Higher Education, Study Material, 2015.

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100**COURSE OBJECTIVES**

- To gain the Soft skills that helps in the student's employability
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- To adopt new and faster methods of calculations.
- Reinforcing competencies in soft skills which are crucial in a social setting
- To know about quantitative aptitude and profit and loss
- To know the parts of speech in higher level

COURSE OUTCOME (CO'S)

- Students able to achieve the analytical and reasoning competencies
- Able to improve their communication and presentation skills helps in their employability
- Students will be able to set their future goal
- Can improve the Interpersonal skill
- Students able to understand the problems on age
- They will be able to interpret the data

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

பகுதி – I, தமிழ்

15LAU201 :

தமிழ் இரண்டாம் தாள்

பருவம் II

5-H,5-C

அலகு – I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு – II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை: 1. இலை இல பிடவம், திணை – முல்லை,

ஆசிரியர் – விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை – குறிஞ்சி, ஆசிரியர் – மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை: 1. உள்ளார் கொல்லேர, திணை – பாலை, ஆசிரியர் – பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை – மருதம், ஆசிரியர் – வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு: 1. நுண்ணோர் புருவத்த, திணை – குறிஞ்சி, ஆசிரியர் – கபிலர்.

2. அவறொறுந் தேரை, திணை – முல்லை, ஆசிரியர் – பேயனார்.

பதிற்றுப்பத்து – ததைந்த காஞ்சி, ஆசிரியர் – பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

COURSE OBJECTIVE:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

COURSE OUTCOME:

- Develop the four types of skills
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT - I

Prose: The Unexpected- Robert Lynd

Poetry: The Village Schoolmaster – Oliver Goldsmith

Short Story: The Lion's Share – Arnold Bennett

Vocabulary: Homonyms

Grammar: Irregular Verbs

UNIT - II

Prose: Travel by Train – J. B. Priestly

Poetry: The Gift of India – Sarojini Naidu

Grammar: Sentence patterns

Composition: Reading Comprehension

UNIT - III

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi

Short Story: The Necklace – Guy De Maupassant

One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer

Vocabulary: Similes

Grammar: Discourse Markers

Composition: Report Writing

UNIT - IV

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns
Grammar: Correction of Sentences
Composition: Picture Reading

UNIT - V

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

TEXT BOOK

Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

REFERENCE

Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Instruction Hours / week: L: 5 T: 0 P: 0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- It gives brief description on the microbial metabolism and its energetic
- It deals with the various aerobic and an aerobic processes through which the organisms obtain and utilize the energy for their growth and to produce industrially important products that helps the students to become better **entrepreneurs**
- Explains photosynthesis and photosynthetic bacteria
- To study the structure, function, energy metabolism, growth and regulatory mechanisms of microorganisms.
- The students will learn about the metabolic diversity exhibited by microorganisms
- The students will learn about regulatory networks that support their survival and growth of the microorganism.

COURSE OUTCOME (CO'S)

1. The students will be able to understand and predict the various metabolic reactions in microbial cell.
2. This will make them predict the intermediate products which can be employed in industrial production processes.
3. Students will understand the growth, nutrition and environmental factors
4. Students able to assess the prokaryotes by observing the biochemical reaction
5. This course will support them to interpret the fermentation using microbes
6. Able to summarize the nutrients uptake system in the prokaryotes

UNIT – I

Microbial evolution and Diversity – Taxonomic ranks - Classification system – phenetic and Phylogenetic – Major characteristics – Classical, Molecular – Assessing microbial phylogeny- The Major divisions of Life.

UNIT – II

Classification of bacteria - Bergey's manual and its importance. Photosynthetic bacteria- Cyanobacteria – Archaeobacteria.

UNIT – III

Eukaryotic algae – classification of algae, growth and reproduction of Chlamydomonas, volvox, Red algae and diatoms – brown algae. Actinomycetes.

UNIT – IV

Classification and Taxonomy of fungi – Alexopolous – Distribution – general characteristics of divisions – Economical importance of Fungi.

UNIT – V

Classification, nutrition, reproduction, characteristics and importance of Protozoa – *Entamoeba histolytica*, *Giardia*, *Trichomonas*, *Plasmodium*. Classification of Virus – DNA, RNA viruses

TEXT BOOKS

1. Dubey, R.C. and D.K. Maheswari, 2004. A Text book of Microbiology 1st Edition, S. Chand and Company Ltd.
2. Modi, H. A., 1995. Fundamentals of Microbiology. Vol.7. AKTA Prakashan Nadiad. Gujarat.
3. Powar, C.B. and H. F. Dagainawala, 2003. General Microbiology. Volume: II, Himalaya Publishers, New Delhi.

REFERENCES

1. Alcom, I.E. 2006. Fundamentals of Microbiology. VIII Edition, Jones and Bartlett Publishers, Sudbury, Massachusetts.
2. Black, J.G--. 2008. Microbiology. 5th Edition, John Wiley and Sons, Inc, New York.
3. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2003. Microbiology. 5th Edition, Tata McGraw-Hill Publishing Company. New Delhi.
4. Prescott, L.M., J.P. Harley and C.A. Klein, 2006. Microbiology, 7th Edition. McGraw - Hill Publishing Company Limited. New York.
5. Salle, A.J. 2007. Fundamental Principles of Bacteriology. 6th Edition, McGraw - Hill Publishing Company Limited. New York.
6. Stanier, R.Y., J.L. Ingraham, M.L. Wheelis and P.R. Painter, 2009. General Microbiology. Macmillan Press Ltd. London.
7. Perry, J.J., Staley, J.T. and Lory, S. 2002. Microbial Life. Sinauer Associates, Publishers, Sunderland, Massachusetts.
8. Schaechter, M. Ingraham, J.L. and Neidhardt, F.C. 2006. Microbe. ASM Press, Washington, D.C.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 6 Hours

COURSE OBJECTIVES

- To provide a strong base in the fundamentals of bacteria.
- To learn techniques and methods used in the cultivation and isolation of bacteria.
- To develop **skills** related to preservation of bacterial cultures.
- To learn about bacterial specialized structure using staining methods
- To learn the bacterial special structure capsule and spore
- To measure the bacterial size

COURSE OUTCOME

After Completion of this course candidate can able to demonstrate:

1. Theory and practical skills in staining procedures
2. Various Culture media and their applications
3. Various microbial culture techniques to obtain isolation of pure cultures
4. Bacterial endospore and capsule
5. Able to analyze the Bacterial size
6. Able explain the bacterial motility and flagella

EXPERIMENTS

1. Nutrient agar slant, nutrient broth
2. Pure culture techniques - Pour plate, spread plate and looping method
3. Enumeration of bacteria, fungi and actinomycetes from soil
4. Cultural characteristics of microorganisms - Colony morphology on solid media
5. Maintenance of cultures - Agar slants, agar deep
6. Motility test – Hanging drop method
7. Fungal wet mount – Lactophenol cotton blue mount
8. Observation of representative forms of algae and fungi
9. Methods of sterilization Physical (heat, filtration and UV) and chemical (alcohol)

REFERENCES

1. Aneja, K.R., 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology. 3rd Edition. New Age International (P) Limited Publishers, New Delhi.
2. Dubey, R.C. and D.K. Maheshwari, 2002. Practical Microbiology, 1st Edition, S. Chand and Company Ltd, New Delhi.
3. Kannan, N., 2003. Handbook of Laboratory Culture media, Reagents, Stains and Buffers, Panima Publishing Corporation, New Delhi.
4. Palanivelu, P., 2004. Analytical Biochemistry and Separation Techniques, 3rd Edition, Twenty First Century Publication, Madurai.

5. Singh, S.P., 2004. Practical Manual of Biochemistry. 5th Edition CBS Publishers and Distributors, New Delhi.
6. William Claus, G., 2000. Understanding Microbes - A Laboratory Textbook for Microbiology. W.H. Freeman and Co., New York.
7. Alexopoulos C.J. and Mims C.W. 2010. Introductory Mycology, New Age International, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

1. To make the student to be conversant with the extraction of Metals
2. To learn about Coordination Chemistry, Preparation, Properties Uses and Structure of Naphthalene
3. To acquire sound knowledge on Heterocyclic Compounds.
4. To make the student acquire sound knowledge of Electrochemistry, Biological functions of Amino acids and Proteins,
5. To acquire sound knowledge on Thermodynamic laws, Entropy, Enthalpy change
6. To familiarize with Principles of Electroplating that improve their skills in the Chemistry

COURSE OUTCOMES

This paper presents the basic principles of Chemistry. So it enables the students to learn about the fundamental aspects of Chemistry that improve their skills in the Chemistry and familiarize with

1. The extraction of Metals
2. Coordination Chemistry, Preparation, Properties
3. Structure of Naphthalene
4. Heterocyclic Compounds.
5. Electrochemistry, Biological functions of Amino acids and Proteins,
6. Thermodynamic laws, Entropy, Enthalpy change that improve their skills in the Chemistry

UNIT-I

Metals and Coordination Chemistry: Metals: General methods of extraction of metals-methods of ore dressing-types of furnaces-reduction methods-electrical methods-types of refining-Van Arkel process-Zone refining. **Coordination Chemistry:** Nomenclature-theories of Werner, Sidgwick and Pauling-chelation and its industrial importance-EDTA-haemoglobin-chlorophyll-applications in qualitative and quantitative analysis.

UNIT-II

Aromatic Compounds and Heterocyclic Compounds: Aromatic Compounds: Aromaticity-Huckel's $(4n+2)$ rule- aromatic electrophilic substitution in benzene- mechanism of nitration, halogenation, alkylation, acylation and sulphonation. Naphthalene: Isolation, preparation, properties and structure. **Heterocyclic Compounds:** Preparation and properties of pyrrole, furan, thiophene and pyridine.

UNIT-III

Amino acids, Proteins and Carbohydrates: Amino acids: Classification, preparation and properties. Peptides-preparation of peptides (Bergmann method only). **Proteins:** Classification, properties, biological functions and structure. **Carbohydrates:** Classification, preparation and properties of glucose and fructose- discussion of open chain and ring structures of glucose and fructose-glucose-fructose interconversion.

UNIT-IV

Energetics: Type of systems-processes and their types - isothermal, adiabatic, reversible, irreversible and spontaneous processes-statement of first law of thermodynamics-need for the second law of thermodynamics-heat engine-Carnot cycle-efficiency-Carnot theorem-thermodynamics scale of temperature-Joule-Thomson effect- Enthalpy- Entropy and its significance-Free energy change.

UNIT-V

Electrochemistry: Kohlrausch law-conductometric titrations-hydrolysis of salts-galvanic cells-E.M.F.-standard electrode potentials-reference electrodes- electrochemical series and its applications-buffer solution-buffer solution in the biological systems-pH and its determination-principles of electroplating.

TEXT BOOKS

1. V.Veeraiyan and A.N.S. Vasudevan, 2005. Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai.
2. B.R.Puri and L.R.Sharma, 2002. Principles of Inorganic Chemistry, Shoban lal & Company Ltd., Jalandar.
3. B.S.Bahl and Arun Bahl, 2005. Advanced Organic Chemistry, S.Chand & Company Ltd., New Delhi.
4. Puri, Sharma and Pathania, 2003. Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar.

REFERENCES

1. R.Gopalan and S.Sundaram, 2003. Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

On successful completion of the course the students should have **skills** associated with

1. About the quantitative analysis.
2. estimation of sample present in a solution by volumetric analysis
3. To make the student to be conversant with the extraction of Metals
4. To acquire sound knowledge on Heterocyclic Compounds.
5. To make the student acquire sound knowledge of Electrochemistry, Biological functions of Amino acids and Proteins,
6. To familiarize with Principles of Electroplating that improve their **skills** in the Chemistry

COURSE OUTCOMES

This paper presents the basic Principles of quantitative analysis in Chemistry. So it enables the students to improve their **skills** in Practical Chemistry and conversant with

1. The extraction of Metals
2. Coordination Chemistry, Preparation, Properties
3. Structure of Naphthalene
4. Heterocyclic Compounds.
5. Electrochemistry, Biological functions of Amino acids and Proteins,
6. Thermodynamic laws, Entropy, Enthalpy change that improve their **skills** in the Chemistry

Contents

I. VOLUMETRIC ANALYSIS

A. Acidimetry & Alkalimetry

1. Estimation of sodium carbonate using standard sodium hydroxide.
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of sulphuric acid using standard oxalic acid.
4. Estimation of potassium permanganate using standard sodium hydroxide.

B. Permanganometry

1. Estimation of ferrous sulphate using standard Mohr's salt.
2. Estimation of oxalic acid using standard ferrous sulphate.
3. Estimation of calcium-direct method.

REFERENCES

1. R. Ramasamy, 2008. Allied Chemistry Practical Book, Priya Publications, Karur.
2. A.O. Thomas, 2010. Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala.
3. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, 2004. Basic Principles of Practical Chemistry, 2nd Edition, S. Chand Publications, New Delhi.

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100

Total: 100

Course Objectives

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.
- To create awareness among the students to know about various renewable and nonrenewable resources of the region, enables environmentally literate citizens (by knowing the environmental acts, rights, rules, legislation, etc.)
- To make appropriate judgments and decisions for the protection and **skills** associated with improvement of the earth.

Course Outcomes (COs)

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

UNIT - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

UNIT - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and

Rehabilitisaion. Natural resources and associated problems and sustainable utilization. Environmental Education.

UNIT - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

TEXT BOOKS

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.

REFERENCES

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
3. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton
5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

COURSE OUTCOME:

- Develop the four types of skills
- Reading and comprehending literary works
- Genres of literature to provide moral education
- Develop communication skills in business environment
- Interpersonal skills will be developed.
- Betterment of language competence

UNIT - I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT - II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions.
(Completing dialogues)

UNIT - III

Reading: Reading – Reading with a purpose –Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT - IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT - V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based).

REFERENCES

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr.Francis M.Peter S.J. “Lets Communicate – Basic English for Everyone”, Vaigarai Publications, 1st Edition, Dindigul 2007.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- It develops the **skills** on the microbial metabolism and its energetic
- It describes the groups of microorganisms based on nutritional characteristics
- It explains the biosynthesis of microorganisms.
- It deals with the various aerobic and an aerobic processes through which the organisms obtain and
- Utilize the energy for their growth.
- Explains photosynthesis and photosynthetic bacteria.

COURSE OUTCOME (CO'S)

1. The students will be able to understand and predict the various metabolic reactions in microbial cell.
2. This will make them predict the intermediate products which can be employed in industrial production processes.
3. This will help the students to understand the basics in metabolism to develop the basic skills on metabolism.
4. The students can able to understand the physiological characteristics of microorganisms.
5. The students can able to explore the microorganism's biochemical pathways.
6. Students can understand the nutritional cycle of the microorganisms in various conditions.

UNIT – I

Microbial nutrition – common nutrient requirements, Nutritional groups of microorganisms- Growth factors – Uptake of nutrients by cell – Passive, Facilitated diffusion, Active transport, Group translocation , and Iron uptake.

UNIT – II

Different phases of growth - Growth curve - generation time - Measurement of microbial growth. Batch, Continuous and Synchronous culture, Diauxic growth, Influence of environmental factors on growth.

UNIT – III

Carbohydrate metabolism – EMP, ED pathway, TCA cycle, Aerobic respiration, oxidative phosphorylation, electron transport chain, substrate level phosphorylation, ATP generation. Anaerobic respiration and carbon dioxide as electron acceptors.

UNIT – IV

Biosynthesis of cell wall of Gram positive and Gram negative bacteria. Nucleotide biosynthesis – Biosynthesis of purine, pyrimidine. Biosynthesis of amino acids – Glutamate family of amino acids.

UNIT – V

Photosynthesis – bacteria and cyanobacteria, photosynthetic pigments – oxygenic (cyanobacterial) and Anoxygenic (Purple, green sulphur and purple non sulphur) photosynthesis. Fixation of carbon dioxide - C₃ cycle.

TEXT BOOKS

1. Doelle, H.W., 2005. Bacterial Metabolism. Elsevier India Pvt. Ltd., New Delhi.
2. Berg J.M, Tymoczko J.L, Stryer L and Clarke N.D 2001. Biochemistry. 5th Ed. WH Freeman & Co.
3. Moat A.G and Foster J. W 2003. Microbial Physiology. John Wiley and Sons, New York.
4. Nelson D and Cox M.M. 2009. Principles of Biochemistry. W.H. Freeman and Company, New York.

REFERENCES

1. Atlas, R.M., 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown Publishers, Iowa, US
2. Caldwell, D.R., 2008. Microbial Physiology and Metabolism. Wm C Brown Publishers, England.
3. Rose, A.H., 2008. Chemical Microbiology – An Introduction to Microbial Physiology. International Edition, Plenum Publishing Corporation.
4. White, D., 2003. Physiology and Biochemistry of Prokaryotes. 2nd Edition. Oxford University Press. New York.
5. Voet D and Voet JG. 2003. Biochemistry. John Wiley and sons New York.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

To develop skills related to

- Understand the principles of various instruments used in the life sciences
- Ability to operate the instruments in order to develop their employment opportunities.
- Data analysis and interpretations
- It explains the Biosafety level on handling different bioinstrumentation techniques.
- It describes the principles and applications of centrifugation and chromatographic techniques in detail.
- Develops clear understanding on laboratory techniques and methodologies.

COURSE OUTCOME

1. It offers the students with an opportunity to gain basic **skills** on the bioinstrumentation and concepts of principles
2. It will help to understand the advanced technologies in Bioinstrumentation.
3. It will make the students to understand the principles of all bioinstrumentation in life science.
4. Students can able to apply the concept in their research and activities.
5. Better understanding on biomedical research and laboratory techniques.
6. Application in medical, Industry and environmental field

UNIT – I

Basic instruments and Spectroscopy: Principles and instrumentation of pH Meter, incubator, hot air oven, autoclave, colony counter and biological safety cabinet. Properties of electromagnetic radiations. Principles, instrumentation and applications of colorimeter and UV-Visible light spectrophotometer.

UNIT – II

Chromatographic techniques: Introduction, principles of chromatography. Instrumentation of paper and thin layer chromatography (TLC). Principles of column chromatography, Low pressure liquid chromatography (LPLC) and High performance liquid chromatography (HPLC).

UNIT – III

Centrifugation techniques: Introduction, principles of sedimentation, types and safety aspects of centrifuges. Principles and applications of differential centrifugation, density gradient centrifugation. Instrumentation of low speed, high speed and ultra speed centrifuges.

UNIT – IV

Electrophoretic techniques: Principles, instrumentation and applications of agarose gel electrophoresis, Sodium doecyl sulphate – polyacrylamide gel electrophoresis (PAGE). Factors affecting electrophoresis system.

UNIT – V

Radioisotope techniques: Introduction, nature of radioactivity, types of radioactive decay, units of radioactivity. Principles and instrumentation of Geiger Muller counter, solid and liquid scintillation counter. Bio-safety in radioisotope laboratory.

TEXT BOOKS

1. John Enderle Bioinstrumentation. 2006. Morgan and Claypool Publishers. NJ.
2. Richard Normann. Principles of bioinstrumentation. 1988. Wiley Publishers.US.
3. Keith Wilson and John Walker. 2010. Principle and Techniques of Biochemistry and molecular biology. Seventh edition. Cambridge University Press. NY.

REFERENCES

1. Boyer, R., 2000. Modern Experimental Biochemistry. 3rd Edition. Addison Wesley Longman. New Delhi.
2. Chatwal, G.R. and S.K. Anand, 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai
3. Friedfelder, D., 2001. Physical Biochemistry. 5th Edition. Oxford Publishers. New York.
4. Sharma, B.K., 2007. Instrumental Methods of Chemical Analysis, Krishna Prakashan Media (P) Ltd, India.
5. Wilson, K. and J. Walker, 2010. Principles and Techniques of Biochemistry and Molecular Biology. 7th low price Edition. Cambridge University Press, India.
6. James A. Blackburn, 2012. Modern instrumentation for Scientists and Engineers. Springer, Newyork.
7. Alan S, Morris, 2005. 3rd Edition. Measurements and Instrumentation Principles. Linacre House, Jordan hill, Oxford Professional Publishing Ltd.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 6 Hours

COURSE OBJECTIVES

- To enhance the students knowledge on various aspects of microbial physiology like growth, extremophiles studies and chemical characterization of microbes.
- To provide the updated **employment** opportunities present in advanced microbiological techniques.
- To explain the basic identification procedures for all groups of microorganisms.
- To describe the biochemical pathways of microorganisms.
- It develops the skill based analysis on microbiological assays.
- Students can be able to differentiate different group of microorganisms based on their metabolism.

COURSE OUTCOME

1. To students will get the knowledge of microbial physiology and characterization.
2. It will help the students to enhance the knowledge in latest technologies of Microbiology.
3. It explains the anaerobic microorganisms' cultivation methods.
4. The students can be able to determine the growth parameters of microorganisms.
5. It will describe the overall chemical characterization of microorganisms.
6. Fundamental classification of microorganisms groups will be performed.

Contents

1. Cultivation of anaerobic microorganisms – Wrights tube – Mc' Intosh anaerobic jar-Candle jar method.
2. Measurement of microbial growths– Turbidity methods – Determination of generation time
3. Chemical characterization –
 - a) Indole
 - b) MR
 - c) VP
 - d) Citrate utilization tests
 - e) TSI test
 - f) Catalase
 - g) Oxidase
 - h) Urease
 - i) Hydrogen sulphide production test
 - j) Carbohydrate fermentation tests
 - k) Starch
 - l) Casein hydrolysis tests
 - m) Gelatin hydrolysis tests

REFERENCES

1. Gunasekaran, P. 1996. Laboratory Manual in Microbiology. 1st Edition, New Age International Pvt. Ltd, New Delhi.
2. Jayaram, J. 2002. Laboratory Manual in Biochemistry. New Age International Pvt. Ltd., Publishers, New Delhi.

3. Palanivelu, P. 2004. Analytical Biochemistry and Separation Techniques. 3rd Edition, Twenty First Century Publication, Madurai.
4. Sarika, G. and A. Dubey 2006. Practical Approach Series: Microbiology and Biochemistry. High Tech Publishers and Distributors, Jaipur.
5. Singh, S.P. 2004. Practical Manual of Biochemistry. 5th Edition, CBS Publishers and Distributors, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- An introduction to know about the biological substance which has the medicinal value.
- It aids to improve the biopharmaceutical components and technical skills.
- To study the origin, types and action of drugs.
- It will help to study the effects on drugs on human health and legislations on them.
- Acquire knowledge on the action and effects of drugs on human health.
- It will explain the fundamentals of purification techniques.

COURSE OUTCOME

1. It provides the basic concept about the components and technique involved in the field of biopharmacy.
2. It will nourish the **entrepreneurial** skills in the bio pharmacy field.
3. It will make the students to understand the extraction
4. purification methods from natural sources.
5. Students can able to perform all chromatographic techniques.
6. It will help the students to understand the bioactive compounds analysis from plant extracts .

UNIT – I

Phytochemistry: Biosynthesis of primary and secondary metabolites - alkaloids, terpenoids. Phenolic compounds and coumarins. Classification and sources of alkaloids. Major classes in phenolic compounds – carotenoids, flavonoids, tannins and phenolic acids. Classification of terpenoids.

UNIT – II

General extraction and isolation techniques for compounds from plants. Techniques involved in extraction of phytochemicals – Percolation, Soxhlet extraction, Supercritical Fluid extraction, Pilot scale extraction, reflux and other methods.

UNIT – III

Isolation and purification techniques – Thin layer and Column chromatography. Chemical fingerprinting – HPLC and HPTLC.

UNIT – IV

Biotechnology of medicinal plants: Production of secondary metabolites from cultured plant cells, elicitation, immobilization and biotransformation. Medicinal plants – Plant DNA isolation.

UNIT – V

Bioactive studies: Anticancer, antidiabetic, anti-inflammatory, hepatoprotectives, antimicrobials from medicinal plants. Antioxidants of plant origin – Reactive Oxygen Species (ROS), antioxidant polyphenols.

TEXT BOOKS

1. Malcolm Rowland, Thomas N. Tozer. 2011. Clinical Pharmacokinetics: Concepts and Applications. 4th Edition. Williams & Wilkins Publishers USA.
2. Thomas N. Tozer, Malcolm Rowland. 2011. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 4th Edition. Lippincott Williams & Wilkins Publishers, Tokyo.
3. Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins Publishers, Baltimore.

REFERENCES

1. Harborne, J.B., 1998. Phytochemical methods to modern techniques of plant analysis. Chapman & Hall, London.
2. Trease G.E. and M.C. Evans, 1983. Textbook of Pharmacognosy 12th Edition. Balliere-Tindal, London.
3. Irfan A. Khan and Atitya Khanum, (Eds.) 2004. Role of Biotechnology in medicinal and Aromatic plants, Vols. I-X. Ukaaz Publications, Hyderabad.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- On successful completion of the course the students should have understood the Basic skills on handling the bio-molecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.
- It will explain the basic concepts on carbohydrates and their structural properties.
- Students can able to distinguish types of lipids and their properties.
- It will determine the genetic concepts of nucleic acid in all living forms.
- Students will study different types of enzymes and their activities.

COURSE OUTCOMES

1. To enable the students to learn the basic **skill** oriented knowledge on the functions, structures and biological importance of lifeless chemical compounds.
2. Students can able to define the structural identification of sugar molecules.
3. It will narrate the fundamentals of enzyme analysis and their activation sites.
4. Students can be able to differentiate different types of lipids.
5. Students can understand the fundamentals on nucleic acid synthesis
6. Students can understand the protein synthesis.

UNIT - I

Carbohydrates: Monosaccharides-Definition, classification, structure and properties. Disaccharides-Definition, types, structure and biological importance. Polysaccharides-types and properties.

UNIT - II

Lipids:- Definition, Classification and properties of lipids- Phospholipids, Glycolipids and Sphingolipids. Types of fatty acids -saturated, unsaturated and essential fatty acids. Classification and significance of lipoproteins. Importance of steroids, structure and biological significance of cholesterol.

UNIT - III

Amino acids: Classification of amino acids, essential amino acids, reactions of amino and carboxyl groups of amino acids. Proteins: Definition, classification and function of Proteins, structural levels of organization Denaturation and isoelectric point of Proteins.

UNIT - IV

Nucleic acids: Components of DNA and RNA. Double helical structure of DNA. Structure and types of RNA. Denaturation and renaturation of DNA. Genetic code. Protein synthesis (an outline)

UNIT - V

Enzymes: Classification of enzymes with examples, coenzymes and cofactors (structures not needed). Active site: Lock and Key model, Induced fit hypothesis. Factors affecting enzyme activity. Types of inhibition of enzyme action. Chemical and industrial applications of enzymes.

TEXT BOOKS

1. Ambika, S, 2004. Fundamentals of Biochemistry for Medical Students, CIT Chennai.
2. Deb C., 2011, Fundamentals of Biochemistry, 9th edition New Central Book Agency, Calcutta.
3. Jain, J.L, Sunjay Jain and Nitin Jain, 2005. Fundamentals of Biochemistry, S. Chand and Company Ltd, New Delhi.

REFERENCES

1. Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition WH Freeman and Company, New York.
2. Lubert Stryer, L. 2009, Biochemistry, W.H. Freeman and Company, NY.
3. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 2012, Harper's Biochemistry, 29th edition, McGraw-Hill Medical, London.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

- This paper aims at introducing students to the basic and applied entrepreneur aspects of plant biotechnology.
- It explains the fundamental requirements for plant tissue culture techniques.
- The students can able to study the different composition medium used for the plant tissue culture.
- It will demonstrate the transgenic plants and resistant plants propagation techniques.
- Students can able to distinguish the advanced genetic engineering techniques.
- It will explain the different media and hormone requirements for plant tissue culture.

COURSE OUTCOME

1. This **skill** oriented subject will enable for learning the techniques to save endangered species which will be useful for mankind.
2. Students can able to understand the history of plant tissue culture and related advanced genetic studies.
3. Students can able to understand the genetic engineering
4. Students can able to understand the genomic organization of plants.
5. It will distinguish the mitochondrial genome organization.
6. It will helps the students to understand the skill based technology involved in plant biotechnology

UNIT - I

Introduction: History of plant tissue culture, callus culture, cell suspension culture, regeneration, micropropagation, anther culture, meristem culture, embryo culture, somatic hybridization.

UNIT - II

Culture media: Composition of media, types of media, nutrient contents and hormone requirement. Preparation of media, sterilization of media, types of sterilization, surface sterilization.

UNIT -III

Genetic engineering A: Structure and organisation of plant genome, regulation of plant genome expression, transcriptional, translational and post transcriptional regulation of plant genome. Transposons, chloroplast and mitochondrial genome.

UNIT - IV

Genetic engineering B: Vector for the production of transgenic crop, plant virus vector, Transformation techniques, electroporation, particle gun bombardment, Agrobacterium, Integration of transgene.

UNIT - V

Applications: Transgenic plants, herbicides resistance, pest or insect resistance plants; Molecular farming and pharming: carbohydrates, lipids, therapeutic proteins, edible vaccines, purification strategies- oleosin partition technology.

TEXT BOOKS

1. Singh, B.D. 1998. Text Book of Biotechnology, Kalyani Publishers.
2. Neal Stewart, C. 2008. Plant Biotechnology and Genetics. John Wiley & Sons Inc., NJ.

REFERENCE

1. Slater, A., W. Nigel and M.R. Fowler. 2008. Plant Biotechnology, Oxford University Press, Oxford.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To make students familiar with practical techniques used for studying biomolecules.
- These techniques like extraction of biomolecules and
- Analysis of using methods like soxhlet and chromatography.
- It will ensure the students with **employment** oriented knowledge and methodologies.
- It will demonstrate the practical knowledge to do chromatographic techniques.
- Students will understand the biochemical analysis using various methodologies.

COURSE OUTCOME

1. The students will get the job oriented knowledge about various methods of analyzing biomolecules.
2. It will make the students to gain basic knowledge on bioinstrumentation techniques.
3. Students can do analysis on biomolecules analysis using various extraction methods.
4. Students able to know the solvents role in extraction
5. It will help the students to apply technical skills on research oriented activities.
6. The concept of this practical will make the students to get familiar with bioactive compound analysis for their entrepreneurial requirements.

Experiments:

1. Extraction Techniques
 - a. Percolation
 - b. Soxhlet method
2. Thin Layer Chromatography
3. Column chromatography
4. Analysis of a compound in HPLC
5. Analysis of a compound in HPTLC

REFERENCES

1. Trease, G E and M. C. Evans, Textbook of Pharmacognosy 1979. 12th ed. Balliere Tindal, London.
2. Harborne, J. B. 1984. Phytochemical Methods. London: Chapman and Hall Ltd, London.
3. Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, 1997, Practical HPLC method development, John Wiley and Sons 2nd Edition, USA.

Instruction Hours / week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To bring an effective practical skill oriented techniques for studying the biomolecules.
- The analysis techniques for carbohydrates and amino acids will provide an entrepreneurial knowledge.
- The study aimed to help the students to study carbohydrates analysis.
- It will explain the amino acid analysis for protein related studies in life science.
- This course will help the students to develop practical knowledge on bio molecules.
- The students can understand the lipid characterization based on numbers.

COURSE OUTCOME

- The **skilled** study will provide strong platform on various methods of analyzing biomolecules.
- The students will analyze the biomolecules for various studies and research activities.
- Students can be to differentiate the carbohydrates from protein
- Students able to know the amino acids and lipid classes.
- This course will make the students to exhibit the laboratory analysis on drug discovery from various sources.
- This course will make the students to understand the fundamentals of biochemistry analysis.

Contents**I. QUALITATIVE ANALYSIS**

1. Analysis of carbohydrates: a. Monosaccharides- Pentose- Arabinose.
Hexoses- Glucose, Fructose,
b. Disaccharides- Sucrose, Maltose, and Lactose
c. Polysaccharide- Starch.
2. Analysis of Amino acids: a. Histidine b. Tyrosine.
c. Tryptophan d. Arginine
e. Alanine f. Methionine

II. CHARACTERISATION OF LIPIDS [Group experiment]

1. Determination of acid number.
2. Determination of iodine number.

REFERENCES

1. Jayaraman J. 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
2. Sadasivam S and A. Manickam. 2009. Biochemical Methods, New Age International Publishers, New Delhi.
3. Singh.S.P.2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- This study will impart the basic **skilled** concept of plant biotechnology
- Understand the concept of advanced technology for plant breeding.
- It help the students to understand the culture media preparation for plant propagation.
- It explains the explants preparation for plant tissue culture techniques.
- The students can distinguish the micro propagation of plants for advanced genetic engineering techniques.
- Students can understand the somatic embryogenesis and its fundamentals.

COURSE OUTCOME

1. This course is an employment oriented study with comprehensive techniques with more advantages.
2. This course will help the students to understand the advanced agricultural technologies.
3. Able to develop new variety of plants
4. This skill based techniques will make them to apply the skills in the field trial studies.
5. It will explain the students to undergo artificial seed preparation techniques.
6. This course will make the students to do research in agriculture for sustainable production.

Experiments:

1. Culture Media preparation
2. Sterilization process
3. Preparation of explants
4. Surface sterilization
5. Callus induction and differentiation
6. In vitro germination of seed
7. Isolation of protoplast
8. Somatic embryogenesis
9. Micropropagation
10. Artificial seed preparation
11. Hairy root culture

REFERENCES

1. Aneja,K.R., 2004. Experiments in microbiology plant pathology and biotechnology. IV Edition, New age International Pvt. Ltd., Publisher, New Delhi

Instruction Hours/week: L: 4 T: 0 P: 0 Marks: Internal: 100 Total: 100 Marks

COURSE OBJECTIVES

- Know the basic **skilled** concept of computers.
- Understand the concept of Ms-word, Ms-Excel.
- Be able to work in Ms-PowerPoint.
- Knowledge about internet and the usage of E-Mail services.
- It will describe the basic operating system in computers.
- This course will deliver all basic concepts for Internet Technology.

COURSE OUTCOME

1. This course provides student with a comprehensive study of the introduction to computers.
2. It provides the knowledge of office package.
3. This course also intends to teach the usage of internet on the employment basis.
4. Students can able to perform MS Office programs
5. It will help the students to understand the Internet and its components.
6. This skill based course will make the students to explore in entrepreneurial too.

UNIT - I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers-the computer system- types of Input/ Output and memory devices- computer software-categories of software.

UNIT - II

Starting with MS Office Word – Working with Text – working with tables-Checking spelling and grammar- adding graphics to document- Mail merge- printing a document – Advanced features of MS Office Word- Keyboard shortcuts.

UNIT - III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

UNIT - IV

Starting with MS Office PowerPoint – Working with PowerPoint- Working with different views- Designing Presentations- Slide Show.- Printing in PowerPoint.

Unit - V

The Internet-Evolution of Internet-Owner of Internet- Anatomy of Internet – Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

TEXT BOOK

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions.2011. Pearson, New Delhi.

REFERENCES

1. Pradeep K.Sinha ,Priti Sinha. 2007. Computer Fundamentals, 6th Edition BPB Publications, New Delhi.
2. V. Rajaraman, 2003.. Fundamentals of Computers, Prentice-Hall of India Pvt. Ltd.
3. Wallace Wang 2007. Microsoft Office. For Dummies,1st Edition Wiley Publishing Inc.

Instruction Hours/week: L: 4 T: 0 P: 0 Marks: Internal: 100 Total: 100 Marks

COURSE OBJECTIVES

- This course in curriculum is an introduction to the multimedia and its applications in entrepreneurship.
- This course enables students to understand how the web pages are designed interactively.
- How to critically evaluate website quality, learn how to create and maintain quality web pages learn to create and manipulate images.
- To gain the skills and project-based experience needed for entry into web design and development careers.
- To explore the basic computer knowledge in advanced multimedia tool.
- The students can to able to analyze the advanced tools in multimedia technology.

COURSE OUTCOME

1. This course provides student with a comprehensive study of the introduction to computers.
2. It provides the knowledge of office package. This course also intends to teach the usage of internet.
3. Acquire basic **entrepreneurial skills** on Multimedia devices.
4. Understand current trends in multimedia by experiencing a variety of applications and development packages.
5. This course will help the students to perform graphics programs.
6. Better understanding on the advanced multimedia tools in computer operating system.

UNIT - I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT - II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT - III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images – Tagging images - Searching for images - Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT - IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects.

UNIT - V

Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks. Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic ActionScript concepts: ActionScript basics – Data type basics.

TEXT BOOKS

1. Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill . (Unit I, Unit II)
2. Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill. (Unit III)
3. Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press. (Unit IV, Unit V)

REFERENCES

1. Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, Tata McGraw-Hill.
2. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, Dream Tech Press, New Delhi

Instruction Hours / week: L: 2 T: 0 P: 0 Marks: Internal: 100 External: Nil Total: 100

COURSE OBJECTIVES

- To impart knowledge on both Aptitude and Soft skills to the students
- To critically evaluate various principles involved in solving mathematical problems
- To demonstrate data arrangements
- To adopt new and faster methods of calculations.
- Reinforcing competencies in soft skills
- To develop softskill which are crucial in a social setting

COURSE OUTCOME**Upon completion of the course students able to**

1. Achieve the analytical competencies
2. Improve their communication **skills**
3. Achieve the reasoning competencies
4. Move with professionals
5. Success in group discussion
6. Presentation **skills** on basis of employment.

UNIT - I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT – II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT – III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT – IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT - V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behaviour

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE:

- To help students enhance their Language skills
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

COURSE OUTCOME:

1. Develop the four types of skills
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT - I

Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT - II

Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT - III

Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT - IV

Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT - V

Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

TEXT BOOK

Bachelor of Science, Microbiology, 2015. Karpagam Academy of Higher Education, Coimbatore, India – 641 021.

1. Juneja. P. Om and Aarati Mujumdar, “*Business Communication -Techniques and Methods*”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.

REFERENCES

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007. Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman. 2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Instruction Hours / week: L: 6 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To focus on the basic principles of genetics incorporating the concepts of classical, molecular and population genetics.
- Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology that improve their chances of employability in biotechnological industries
- To explain the mutagen and process of mutation
- To explain about DNA as a genetic material
- To paraphrase the genetic material structure and model
- To explain the concept of recombination, linkage mapping and elucidate the gene transfer mechanisms in prokaryotes and eukaryotes

COURSE OUTCOME (CO'S)

1. This course provided candidates with basic knowledge and understanding of Molecular Biology with special reference to microbial genome.
2. Students undertaking this course will be able to describe the nature of molecular world and its application in modern Microbiological sectors.
3. Students able to understand the properties, structure and function of genes in microorganism at the molecular level
4. Describe the importance of genetic code and operon concept
5. Discuss the molecular mechanisms underlying mutations and repair mechanisms
6. Able to summarize the concept of recombination, linkage mapping and elucidate the gene transfer mechanisms in prokaryotes and eukaryotes

Unit – I

Historical development – Mendelian principles – Morgan's Hypothesis– DNA as a genetic material, Experimental evidence – Chromosomal theory of inheritance.

Unit – II

Structure and function of DNA and RNA - DNA replication – Enzymology of DNA replication – Different modes of DNA Replication - Models of DNA replication -Types of DNA replication-Eukaryotic DNA replication. Organization of gene and chromosome.

Unit – III

Genetic code - transcription – translation – Polypeptide synthesis (maturation and processing of RNA), Regulation of Gene expression- Operon concept – lactose, tryptophan and arabinose,

Unit – IV

Mutagens -Mutagenesis -Mutation – Spontaneous and Induced-Types of Mutation –Mutant detection- Mutant selection- Luria and Delbruck experiment-Ames test. DNA repair mechanisms.

Unit – V

Genetic recombination in bacteria – Conjugation, transformation, transduction. Importance in Genetics - Linkage and genetic mapping

TEXT BOOKS

1. Freifelder, D., 2002. Molecular Biology. Narose Publishing House. New Delhi.
2. Verma, P. S. and Agarwal, V. K., 2008 : *Cell Biology, Genetics, Molecular Biology and Evolution*. S. Chand & Company Ltd, New Delhi
3. Gardner, E.J., M.J. Simmons and D.P. Snustad, 2001. Principles of Genetics. 8th Edition. John Wiley and Sons, NY.
4. Klug, W.S. and M.R. Cummings, 2001. Essentials of Genetics. 4th Edition Prentice Hall, New Jersey.
5. Maloy, S.R., J.E. Cronan Jr and D. Freifelder, 2001. Microbial Genetics. Narosa Publishing House. New Delhi.
6. Weaver, R.F., 2002. Molecular Biology. 2nd Edition. McGraw-Hill, New York.
7. Bernard R. Glick, Jack J. Pasternak and Cheryl L. Patten, 2010. Molecular Biotechnology- Principles and Applications of Recombinant DNA. 4th Edition. American Society for Microbiology.

REFERENCES

1. Tamarin, R.H., 2001. Principles of Genetics. 7th Edition. Wm. C. Brown Publishers. England.
2. Snustad & Simmons, Principles of Genetics, 4th Edition, Wiley, 2005.
3. Nelson et al, 2006. Lehninger's Principles of Biochemistry, 4th Edition, McMillan.
4. Alberts et al, 2007. Molecular Biology of The Cell, 2nd Edition, Garland.
5. Lewin, 2007 Genes IX, 9th Edition, Jones & Bartlett.
6. Watson, J.D., and Baker, T.A., Bell, S.P. Gannm, A. and Levine, M. 2004. Molecular Biology of Genes. 5th Edition, Pearson Education.

Instruction Hours / week: L: 6 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To provide a strong base in the fundamentals of bacteria.
- To learn techniques and methods used in the cultivation and isolation of bacteria.
- To develop **skills** related to preservation of bacterial cultures.
- To learn about bacterial specialized structure using staining methods
- To learn the bacterial special structure capsule and spore
- To measure the bacterial size

COURSE OUTCOME (CO'S)

Students able understand and perform

1. Various Culture media and their applications
2. Various microbial culture techniques to obtain isolation of pure cultures of bacteria
3. Bacterial endospore and capsule
4. Able to analyze the Bacterial size
5. Identification of bacteria
6. Able explain the bacterial motility and flagella

UNIT – I

Scope of clinical Bacteriology - Safety precautions in Bacteriology laboratory – Aseptic collection – transportation – handling of pathological specimens (blood, urine, sputum, pus and stool) – Microscopic examination of pathological specimens – Antibiotic susceptibility testing (Kirby Bauer method).

UNIT – II

Definitions of pathogens, saprophytes and commensals - Infections – Sources and methods – Infectious disease cycle – Definitions of Endemics, Epidemics and Pandemics - Investigation of epidemics and its control.

UNIT – III

Gram positive bacteria: Morphology, cultural characteristics, pathogenecity and laboratory diagnosis. *Staphylococcus aureus*, *Streptococcus pyogenes*, *Bacillus anthracis*, *Corynebacterium diphtheriae*, *Clostridium tetani* and *Mycobacterium tuberculosis*.

UNIT – IV

Gram negative bacteria: Morphology, cultural characteristics, pathogenecity and laboratory diagnosis. *E. coli*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Salmonella enterica* (typhi), *Shigella dysenteriae* and *Treponema pallidum*.

UNIT – V

Normal microbial flora of the human body (skin, intestinal tract, genitourinary tract and respiratory tract). Pyrexia of unknown origin. Bacteria in blood and tissues - Vaccines and Antibiotics.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology. 7th Edition. Orient Longman, New Delhi.
2. Baron, E. J. and S. M. Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
3. Chakraborty, P., 2003. A Text book of Microbiology. 6th Edition. New Central Book Agency (P) Ltd, Calcutta.

REFERENCES

1. Collee J.G., A.G. Fraser, B.P. Marmion and A. Simmons, 1996. Mackie and McCartney Practical Medical Microbiology 14th Edition. NY, Churchill Livingstone.
2. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers, NY.
3. Thomas, P.A., 2007. Clinical Microbiology. Orient Longman Private Ltd, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 6 Hours

COURSE OBJECTIVES

- To make students practically familiar with skilled techniques on microbiology mainly includes the mutation technique and identification of major bacterial pathogens.
- Upon completion, students gained the knowledge of most common medically important organism and the infections they cause.
- Different approaches, techniques and tools used to identify pathogens and control them.
- Diagnostic approaches for microbial pathogens 14
- Developing efficient vaccines and new drugs

COURSE OUTCOME

1. To educate students about mutagenesis and pathogenic bacteria isolation.
2. To nurture the students with basic **employment** skills in advanced microbiology field
3. The students will be able to analyze the bacteria growth and growth condition
4. Able to identify the various factors for optimal growth of *E.coli*.
5. Understand the basic microbial structure and functions of various physiological groups of prokaryotes.
6. Able to utilize the various Culture media in the proper physical condition for fermentation
7. Able to explain the microbial metabolism – Autotrophy and heterotrophy modes of nutrition
8. Students able to understand the physical and chemical growth requirements of bacteria and thermal death time of bacteria.

Contents

1. Mutant isolation of gradient plate method
2. Mutagenesis by UV radiation
3. Isolation of streptomycin- resistant mutants by replica plating techniques
4. Extraction of nucleic acid from *E.coli*
5. Unidirectional transfer of genetic material- Bacterial conjugation
6. Genetic recombination in bacteria by transformation
7. Identification of major bacterial pathogens – *Escherichia coli*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Pseudomonas*, *Staphylococcus aureus*, *Streptococcus pyogenes*
8. Preparation of antibiotic disc
9. Antibiotic sensitivity testing – disc diffusion method.

REFERENCES

1. Aneja, K.R. 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology. 3rd Edition, New Age International (P) Limited Publishers, New Delhi.
2. Gunasekaran, P. 1996. Lab Manual in Microbiology. 1st Edition, New age international P Ltd, Publishers, New Delhi.
3. Jayaram, J. 2002. Lab Manual in Biochemistry. New Age International P. Ltd., Publishers, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 0 Marks: External:100

Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To strengthen the knowledge of personal health care to students
- To know the content on vaccine and its schedule throughout the life time for all age group.
- Diagnostic approaches for microbial pathogens
- Developing efficient vaccines and new drugs
- How to maintain hygiene
- To know about parenting

COURSE OUTCOME:

Introducing the basics about the health care and to study various types of vaccines to control the life time Infectious disease.

1. Students able to know the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
2. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
3. Apply systems concepts and methodologies
4. Analyze and understand interactions between social and environmental processes.
5. Reflect critically about their roles and identities as citizens and consumers
6. Environmental actors in a complex, interconnected world.

UNIT – I

Vaccination: History –Types of vaccines –conventional and modern vaccines, Route of administrations –mechanisms of inducing immunity.

UNIT – II

Vaccination schedule for adults - Hepatitis B vaccines, MMR – Tetanus - Varicella vaccines. Vaccines for travelers.

UNIT – III

Vaccines for 50 - year-old adult - types and routes. Vaccines for 65 – year - old adult - types and routes. Vaccines for healthcare workers.

UNIT – IV

Child health management - General health - Types of infection in child - Growth and development – Nutrition and fitness - Positive parenting.

UNIT – V

Vaccination schedule in children – New born - Child below 5yrs - Child below 10years Vaccines at adolescent age. Vaccine risks and safety.

TEXT BOOKS

1. Gary S. Marshall, M.D. 2015. The Vaccine Handbook: A Practical Guide for Clinicians. 5th Edition. Professional Communications Publishers.
2. International Travel and Health. WHO Guide. 2012.

3. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. 2012. 12th edition.
4. Vaccine Administration, Recommendations and Guidelines. CDC. 2012.

REFERENCES

1. Chaudhri, A.K., (Editor) 1998. Tripathy, G.C. and D. Sharma - Common sense rules for wellbeing. Naval Printing Press, New Delhi.
2. Dunne, J., (Editor) 1997. Webb, M., R. Scott and P. Beale - First aid manual. 7th Edition. Dorling Kindersley Ltd., London.
3. Nadkarni, S.S., 1995. Anatomy and Physiology. Syndicate Pvt. Ltd, Chennai.
4. Prasada Rao, J.V.R., 1999. Manual for Control of Hospital Associated Infections National AIDS Control Organisation. Ministry of Health and Family Welfare, Government of India. New Delhi.
5. Reed, G. (Editor), 1998. Prescott and Dunn's Industrial Microbiology. 4th Edition, CBS Publishers and Distributors, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

1. It explains the concept, principles on control and management of manufacturing and quality control testing of biopharmaceutical products.
2. It includes a view on regulatory issues involving the trends in biopharmaceutical industry and changing regulatory needs related to products.
3. To Understand the basics of pharmaceutical microbiology and important microorganism playing role pharmaceutically
4. To understand different products of microbial origin playing key role in pharmaceutical applications.
5. To understand role of secondary metabolites in pharmaceutical industry.
6. To understand good practices and regulation involved in utilizing microbial product for pharmaceutical application

COURSE OUTCOME

1. Provides knowledge in the large scale production of industrial product, providing the trends to cater the needs of industry.
2. This will help the students to enhance their employment knowledge on microbiology based commercial products.
3. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.
4. This course covers the principles of various processes associated with the production and recovery of different bio-products derived from microorganisms.
5. The students will be able to discuss the role of microorganisms in industry,
6. The students will be able to carry out experiments to produce microbial metabolites.

UNIT – I

Pharmacognosy: Authentication of medicinal plants – Organoleptic and other pharmacognostic studies. Anatomical studies of medicinal plants.

UNIT – II

Analysis of drugs from biological samples, extraction of drugs by various methods as LLE, SPE and Membrane filtration. Factors affecting extraction of drugs.

UNIT – III

Various types of raw materials used in the drug industry for the manufacture of finished products. General method of analysis to determine the quality of raw materials used in drug industry.

UNIT – IV

Indian Standard Specifications (ISI) laid down for sampling and testing of various drugs in finished form by the Bureau of Indian Standards.

UNIT – V

Toxicity testing in drugs and Safety and Legislation of drugs. Intellectual Property Rights (IPR) - patents, copy rights, trade marks. Patenting of biological material. Organic cultivation of medicinal plants.

TEXT BOOKS

1. Malcolm Rowland, Thomas N. Tozer. Clinical Pharmacokinetics: Concepts and Applications. 1995. Williams & Wilkins publishers.
2. Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.

REFERENCES

1. Trease, G. E. and M. C. Evans, 1979. Textbook of Pharmacognosy. 12th Edition. Balliere Tindal, London, 343-383.
2. Shargel, Alan H. Mutnick, F. Paul, Souney, Larry N. Sawnsen, 2004. Comprehensive Pharmacy Review, Wolters Kluwer, 5th Edition, USA.
3. Beckett, H. and J. B. Stenlake. Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition, Continuum International Publishing Group.
4. Jeffery, G. H., J. Basset, J. Mendham and R. C. Denny (Rev. by) 1989. Vogel's Text Book of Quantitative Chemical Analysis, 5th Edition, Bathpress, UK.
5. The Controller of Publications; New Delhi, Govt. of India, Indian Pharmacopoeia, Vol. I and Vol. II – 1996, 2007.
6. Sethi, P.D., 1997. Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition, Saujanya Books, New Delhi.
7. Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, 1997, Practical HPLC method development, John Wiley and Sons 2nd Edition, USA.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

- To familiarize the students with the basic cellular processes at molecular level
- To make students familiar with practical techniques used for studying biochemical structure and analysis of biochemical methods.
- To expertise in Qualitative/Quantitative tests of carbohydrates, reducing sugars, Protein and lipids
- To study the protein secondary and tertiary structures
- To study the effect of temperature, pH and heavy metals on enzyme activity.
- To gain the knowledge on vitamin estimation

COURSE OUTCOME

1. The practical knowledge and the skills associated about various techniques used in Biochemistry.
2. The skill in qualitative and quantity analysis of carbohydrates, protein and lipid
3. An understanding in protein secondary and tertiary structures
4. An insight in enzyme activity and its physical factors influence the activity
5. Knowledge on vitamin estimation
6. Cognitive skill and students able to solve the numerical problems

UNIT I

Buffers: Concept of acid base indicators, buffer systems of blood and body fluids. Components of the pH meter and the concept of pH. Chromatography: Paper, TLC, Molecular sieve and affinity chromatography- principal and applications.

UNIT II

Electrophoresis: Paper and Gel- Principles and applications of colorimetry and spectrophotometry. Isotopes: Definition and units of radioactivity: examples of natural and heavy isotopes in biological investigations.

UNIT III

Bioenergetics: Basic principles of thermodynamics – entropy, enthalpy and free energy; highenergy phosphates, oxidation-reduction reactions. Mitochondria: - Respiratory chain and oxidative phosphorylation.

UNIT IV

Metabolic pathways: Carbohydrate metabolism: Glycolysis, TCA cycle, HMP shunt, Glycogenesis and glycogenolysis. Lipid metabolism: Beta-oxidation, biosynthesis of saturated fatty acids- Palmitic acid.

UNIT V

Protein metabolism: General pathway of amino acid metabolism – deamination, transamination and decarboxylation. Urea cycle. Inter-relationship of carbohydrate, fat and protein metabolism (Flow chart only).

TEXT BOOKS

1. Ambika, S, 2004. Fundamentals of Biochemistry for Medical Students, CIT Chennai.
2. Deb C., 2011, Fundamentals of Biochemistry, 9th edition New Central Book Agency, Calcutta.
3. Jain, J.L, Sunjay Jain and Nitin Jain, 2005. Fundamentals of Biochemistry, S. Chand and Company Ltd, New Delhi.

REFERENCE BOOKS

1. Lehninger L, D.L. Nelson and M.M. Cox, 2012, Principles of Biochemistry, 6th edition WH Freeman and Company, New York.
2. Lubert Stryer, L. 2009, Biochemistry, W.H. Freeman and Company, New York.
3. Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 2012,
4. Harper's Biochemistry, 29th edition, McGraw-Hill Medical, London.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

- To provide an experience for the students in an interdisciplinary research program connecting animal genomics with animal reproduction and biotechnology.
- Identification and characterization of animal breeds,
- Developing DNA - based diagnostics and genetically engineered vaccines for animals,
- Studying animal genomics and its varied applications
- Developing embryo - transfer technology, cloning, transgenic animals.
- DNA forensics, cloning, wildlife conservation, stem cell research and bio - processing technologies are other important areas of animal biotechnology

COURSE OUTCOME

1. This course explores technologies using molecular biology, embryo manipulation
2. cell and tissue culture to manipulate the genomes of animals for ways to improve the live stock for food production and biomedical purpose.
3. Different culture medium for tissue culture
4. Learn the transgenic animal model.
5. Handling different instruments in lab.
6. Able to understand the importance of animal tissue culture

UNIT - I

Scope of Animal Tissue Culture: Laboratory design: aseptic techniques – handling instruments: Microscopes, Clean-bench, and bio safety.

UNIT - II

Animal Cell Culture Media: Natural and artificial media – their constituents; Physicochemical properties of media; Serum and serum-free media.

UNIT - III

Primary Cell Culture: Isolations of tissues, Methods of tissue disaggregation, Suspension culture, Monolayer culture, organ culture – types, Continuous cultures.

UNIT -IV

Embryology: Gametogenesis and fertilization in animals; types of cleavage pattern; role of maternal contributions in early embryonic development; *In vitro* fertilization.

UNIT - V

Transgenic Animals: Production and applications; transgenic animals: sheep, fish; Expression of bovine growth hormone; production of human proteins in milk and meat.

TEXT BOOKS

1. Freshney, R.I. 2004. Animal Cell Culture: A Practical Approach. V Edn., John Wiley & Sons, NY.
2. Davies, J.M. 2002. Basic Cell Culture, Oxford University Press, Oxford.

REFERENCES:

1. Ranga, M.M. 2002. Animal Biotechnology, Agrobios India Limited.
2. Primrose, S.B, Twyman. R.M, Old, R.W. 2000. Principles of Gene Manipulation, Blackwell Scientific Publications, London.
3. Houdebine, L.M., 1997. Transgenic Animals: Generation and Use. V Edition, CRC Press, New york.
4. Jenkins, N., 1999. Animal Cell Biotechnology Methods and Protocol. Humana Press, Totowa, New Jersey and Panima Publishing Corporation, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

1. To educate and enrich students on various methods of pharmacognosy and phyto chemical screening.
2. It includes a view on regulatory issues involving the trends in biopharmaceutical industry and changing regulatory needs related to products.
3. To Understand the basics of pharmaceutical microbiology and important microorganism playing role pharmaceutically
4. To understand different products of microbial origin playing key role in pharmaceutical applications.
5. To understand role of secondary metabolites in pharmaceutical industry.
6. To understand good practices and regulation involved in utilizing microbial product for pharmaceutical application

COURSE OUTCOME

1. Imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.
2. Develop skills on Food and drug based microbiological analysis.
3. To encourage students to the entrepreneurs and develop the capacity for setting up small scale enterprises with respect to food and pharmaceuticals within the country.
4. To organize functions for creating awareness about the importance of safe processed nutritious food.
5. To provide diagnostic analysis of food and pharmaceutical products.
6. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.

Contents

1. Pharmacognosy –
 - a. Organoleptic studies
 - b. Chemical analysis of plant power
2. Anatomical studies
3. Phytochemical screening
 - Test for alkaloids
 - Test for flavonoids
 - Test for glycosides
 - Test for terpenoids
 - Test for saponins

REFERENCES

1. Trease, G E and M. C. Evans, 1979. Textbook of Pharmacognosy. 12th Ed. Balliere-Tindal, London, 343-383.
2. Sethi, P.D. 1997. Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition, Saujanya Books, New Delhi.
3. Harborne, J. B. 1984. Phytochemical Methods. London: Chapman and Hall Ltd, London.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

1. Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body.
2. Interrelationship between carbohydrate, fat and protein metabolism.
3. Role of purine and pyrimidines in nucleic acid metabolism. Various disorders related to each metabolism
4. The course learning objectives is to provide the core principles and specialized knowledge of Carbohydrates, Lipids, Proteins, Vitamins, Porphyrin, cellular transport, law of thermodynamics, Lipid and Nitrogen metabolism.
5. Conceptual knowledge of Proteins and its classification. Primary, secondary, super secondary, tertiary and quaternary structure. The peptide bond- Ramachandran plot.
6. The knowledge of vitamins, its classification, porphyrins and porphyrin ring system.

COURSE OUTCOME

1. The practical knowledge and the skills associated about various techniques used in Biochemistry.
2. The skill in qualitative and quantity analysis of carbohydrates, protein and lipid
3. An understanding in protein secondary and tertiary structures
4. An insight in enzyme activity and its physical factors influence the activity
5. Knowledge on vitamin estimation
6. Cognitive skill and students able to solve the numerical problems

I. Quantitative estimation of the following in unknown solution.

1. Estimation of glucose (Anthrone method)
2. Estimation of phosphorus (Fiske-Subbarow method)
3. Estimation of urea (Dam TSC method)
4. Estimation of uric acid (Caraway method)
5. Estimation of iron (Wong's method)
6. Estimation of protein (Lowry's method)
7. Estimation of DNA (Diphenylamine method)
8. Estimation of RNA (Orcinol method)

II. Separation techniques (Group experiments)

1. Paper chromatography of sugars or amino acids (ascending)
2. Separation and identification of amino acids from mixture using TLC

REFERENCES

1. Harold Varley. 2005. Practical Clinical Biochemistry, CBS Publishing, New Delhi.
2. Jayaraman J. 2007. Laboratory Manual in Biochemistry, New Age International Publishers, New Delhi.
3. Sadasivam S and A. Manickam. 2009. Biochemical Methods, New Age International Publishers, New Delhi.
4. Singh.S.P.2009. Practical Manual of Biochemistry, CBS Publishers, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 3 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

Course Objectives

- 1.To provide an experience for the students in an interdisciplinary research program connecting animal genomics with animal reproduction and biotechnology.
2. Identification and characterization of animal breeds,
- 3.Developing DNA - based diagnostics and genetically engineered vaccines for animals,
- 4.Studying animal genomics and its varied applications
- 5.Developing embryo - transfer technology, cloning, transgenic animals
- 6.DNA forensics, molecular diagnostics, cloning, wildlife conservation, stem cell research and bio - processing technologies are other import areas of animal biotechnology.

Course Outcome

1. Aseptic laboratory techniques in animal tissue culture
2. Preparation of Animal Tissue Culture Medium
3. Preparation of Primary culture
4. Quantification of cells by trypan blue dye exclusion method.
5. Identification of leukocyte subsets.
6. Determination of total leukocyte count
7. Cryopreservation of cell lines.

REFERENCES

1. Portner, R. 2007. Animal Cell Biotechnology: Methods and Protocols. Volume 24, Springer –Verlag, NY.
2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, NY.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Discuss the fundamental mechanisms underlying protective immune responses and discuss the recent advances and emerging themes in immunology research.
- Describe the fundamental mechanisms underlying immunologic disease and associate these mechanisms with strategies for therapeutic modulation of the immune system.
- To provide overview of immune system, antigen antibody structure and interactions.
- To develop understanding of innate and adaptive immunity along with major cells and molecules involved.
- To integrate immunology with health and enrich the knowledge for autoimmune disorders, hypersensitivity reaction.

COURSE OUTCOME

1. Introducing the science of immunology
2. Know various types of immune systems their classification structure
3. Know the mechanism of immune activation.
4. Appreciate the basic immunological principles underlying biotherapeutics,
5. Recognize the commonality among diverse organ-specific disease states, and infer the mechanisms of therapeutic effect.
6. Understand and develop the [skill](#) related to immunological techniques.

UNIT – I

History of Immunology - Host parasitic relationships, Microbial infections, virulence and host resistance. Immunity - Innate immunity, Acquired immunity, Cell mediated Immunity, Humoral Immunity. Structures, composition and functions of cells and organs involved in immune system

UNIT – II

Antigens - types, properties, Haptens, adjuvants - vaccines – types, Toxoids - antitoxins. Immunoglobulins - structure, isotypes and properties - Theories of antibody production.

UNIT – III

Antigen - Antibody reactions – *In vitro* methods: Agglutination, precipitation, complement fixation, Immunofluorescence, ELISA, RIA, Immuno haematology – Blood groups – Blood transfusion reactions – Rh in-compatibilities.

UNIT – IV

Complement pathways – classical and alternative, function of complement components. Hypersensitivity reactions – Types and mechanisms. Auto immune diseases – Organ specific, Hashimoto's thyroiditis, Systemic, Rheumatoid arthritis. Immuno deficiency disease – DiGeorge syndrome.

UNIT – V

Major histocompatibility complex, Structure and function of Class - I and II MHC molecules. Transplantation immunology - Graft versus host reaction. Tumor Immunology.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2004. Text Book of Microbiology - Orient Longman. New Delhi.
2. Coleman, R.M., M.F. Lombard and R.E. Sicard, 2000. Fundamental Immunology 4nd Edition. Wm. C. Publishers. London.
3. Fathima, D. and N. Arumugam, 2005. Immunology. Saras Publications, Nagercoil.

REFERENCES

1. Kuby, J., R.A. Goldsby, T.J. Kindt and B. A. Osborne, 2003. Immunology. 5th Edition. W.H. Freeman and Company, New York.
2. Pathaka, S. and U. Palan, 2005. Immunology – Essentials and Fundamentals. 2nd Edition. Capital Publishing Company, New Delhi.
3. Rao, C.V., 2005. Immunology A Textbook. Narosa Publishing House Pvt. Ltd. New Delhi.
4. Roitt, I.M., J.J. Brostoff and D.K. Male, 2002. Immunology. 6th Edition. C.V. Mosby International Ltd. St. Louis.
5. Stites, D.P., J.D. Stobo, H.A. Fudanberg and J.V. Wells, 1994. Basic and Clinical Immunology. 8th Edition. Los Atlas Appleton Lange. San Francisco.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Describe the structure and replication strategies of the individual viruses discussed, including the processes of entry into cells, control of gene transcription and where relevant translation and gene product stability, control of and mechanism(s) of genome replication, virion assembly and egress from the cell.
- The course covers the following objectives:
- Knowledge on history, general characters of viruses and how viruses are classified on basis of architecture and genetic material.
- Discerning the plant and animal viruses and their replication strategies inside the host and also methods used in cultivation and detection of viruses.
- Comprehend the bacteriophages and other phages and their application.
- Knowledge on some common plant and animal diseases caused by different viruses, viruses transmission and control.

COURSE OUTCOME (CO'S)

1. Upon paper completion, students will have **skill-based** knowledge on structure of plants, animal, bacteria and viruses.
2. This paper also enables the student on isolation, propagation of various viruses.
3. It will help the students to understand the plant and animal viruses.
4. Students can distinguish the viruses According to their characteristic features.
5. It will explain the research activities involved in virology studies.
6. Skill based viral analysis can be performed in medical research.

UNIT – I

Early development of virology - Classification of viruses based on their genetic material - Virus cultivation – purification and assay of viruses.

UNIT – II

The structure of viruses - virion – general properties of viruses – viral symmetry (Helical capsid, icosahedral capsid and complex) - Nucleic acid – viral envelopes and enzymes, viral replications.

UNIT – III

Classification of Bacteriophage - Reproduction of double stranded DNA phage (T4- phage) – one step growth experiment - Reproduction of single stranded DNA phage (phage Φ X174)

UNIT – IV

Classification and reproduction of animal and plant viruses - Viruses and cancer - General properties of viroids and prions.

UNIT – V

Morphology, Replication, and Pathogenesis of plant viruses (Tobacco mosaic virus, Cauliflower mosaic virus, Gemini virus) - Morphology, Replication, and Pathogenesis of animal viruses (Human immunodeficiency virus, Rabies virus, Pox virus, Herpes viruses and Influenza viruses).

TEXTBOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology. 7th Edition. Orient Longman. New Delhi.
2. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
3. Dubey, R. C. and D.K. Maheswari, 2004. A Text book of Microbiology 1st Edition, S.Chand and Company Ltd.
4. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2003. Microbiology. 5th Edition. Tata McGraw-Hill Publishing Company. New Delhi.

REFERENCES

1. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers, New York.
2. Prescott, M., J.P. Harley and D.A. Klein, 2007. Microbiology. 7th Edition, McGraw-Hill Inc. New York.
3. Stanier R.Y., J.L. Ingraham, M.L. Wheelis and P. R. Painter, 2007. General Microbiology Macmillan Press Ltd. London.
4. Dimmock, N. J., A.J. Easton and K.N. Leppard, 2007. Introduction to Modern Virology. 6th Edition, Blackwell Scientific Publications, Oxford
5. White, D. O., Fenner, F. J. 1994. Medical Virology, 4th edn. Academic Press, New York.
6. Jay A. Levy, Heinz Fraenkel-Conrat, and Oliver S. Owens., 1994. Virology .3rd Edition Benjamin Cummings.
7. Edward, K. Wagner, Martinus .J. Hewllet, David. C. Bloom, David. Camerini, 2009. Basic Virology. Wiley Publishers
8. Alal. J. Cann, 2012. Principles of Molecular Virology. 5th Edition. Academic Press. US.

Instruction Hours / week: L: 5 T: 0 P: 0**Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.
- To obtain a good understanding of food microbiology and become qualified as microbiologist in food industries.
- To know the role of microbes which make crop output more and increase the fertility of crops.
- To provide students a basic understanding of environmental and agricultural microbiology including; microbial diversity in the environment in relation to environment and agricultural welfare, ecosystem wellness, microbial interactions with pollutants in the soil and environment and the fate of microbial pathogens in the environment and agricultural fields.
- Topics covered in detail include soil microbiology, aquatic microbiology, aero microbiology, biofertilizers and pesticides, microbial waste recycling and bioremediation etc.
- These topics were elaborated to students with their theoretical and practical use.
- The students will develop set of skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
- Familiarize students with general principles and subject knowledge in the field of environment and agricultural microbiology and to make students aware with current research in environmental and agricultural microbiology

COURSE OUTCOME

1. Provides job-oriented information about the role of microorganisms in many food, and beverage industries both in production and spoilage processes.
2. Develop job based output on industrial based technologies on Food microbiology.
3. It will explain the interactions between microorganisms and the food environment,
4. Know the Factors influencing their growth and survival.
5. Students able to apply these principles to understanding and solving problems in current environmental and agricultural issues.
6. Explain why microbiological quality control programmes are necessary in food production.

UNIT – I

Food and microorganisms – Important microorganisms in food – Fungi, Bacteria; Intrinsic and extrinsic parameters of food affecting microbial growth – Sources of contamination of food.

UNIT – II

Food preservation – principles – Food preservation using low temperature – characteristics of psychrotrophs – high temperature food preservation – characteristics of thermophiles – preservation of foods by drying chemicals and radiation – limitations – commercial application.

UNIT – III

Food borne diseases - Food poisoning - Food borne infection and Intoxication- Food control agencies- Microbiological criteria for food, microbial quality control and food laws, HACCP.

UNIT – IV

Biological Nitrogen fixation -symbiotic and non-symbiotic microorganisms, Root nodule formation - Nitrogen fixers – Hydrogenase – Nitrogenase – *Nif* gene – regulation - Biochemistry of Nitrogen fixation, Interaction of microbes with plants.

UNIT – V

Biofertilizer - Rhizobium, Azospirillum, Azotobacter, phosphobacteria, Plant Growth Promoting Rhizobacteria (PGPR) - Blue Green Algae (BGA) and Azolla - Production and quality control of biofertilizers., field application and crop response.

TEXT BOOKS

1. Adams, M.R. and M.O. Moss, 2003. Food Microbiology. New Age International (P) Limited Publishers. New Delhi.
2. Banwart, G.J., 2004. Basic Food Microbiology. 2nd Edition. CBS Publishers and Distributors New Delhi.
3. Jay, J.M., 2000. Modern Food Microbiology. CBS Publishers and Distributors. New Delhi.
4. Motsara, M.R., P. Bhattacharyya and B. Srivastava, 1995. Biofertilizer - Technology, Marketing and Usage. Fertilizer Development and Consultant Organization, New Delhi.
5. Subba Rao, N.S., 1999. Biofertilizers in Agriculture and Agroforestry. Oxford and IBH, New Delhi.
6. Rao, N.S., 1995. Soil Microorganisms and plant growth. Oxford and IBH Publishing Co., New Delhi.
7. Wallace, R.B, Oria, M, 2010. Enhancing food safety-the role of the food and drug administration. Washington; National Academic Press 2010
8. James, M. JAY, 2012. Modern Food Microbiology. 13th Edition Spring,US.
9. Pinam. M.Fratamico, Arun Kabhunia and James L. Smith,2015. Food Borne Pathogen and microbiology and Molecular Biology, Caistern Academic Press.
10. Forsythe, P.R and Hayes, 2013. Food Hygiene and Microbiology and HACCP. 3rd Edition. Springer Science plus Buisness media, Newyork.
11. Jain, N 2013.Agricultural Microbiology and Biotechnology. Centrum Press.
12. Sathyanarayanan, T, Bhavdish Narain Johri and Anil Prakash, 2012. Springer Science Plus Buisnss Media, London, Newyork.

REFERENCES

1. Atlas, R.M. and R. Bartha, 1992. Microbial Ecology- Fundamentals and Applications. 3rd Edition. Red Wood City. Benjamin/ Cumming Science Publishing Co., New Delhi.
2. Doyle, M.P., L. R. Beuchat and T. J. Montuile, 2001. Food Microbiology – Fundamentals and Frontiers. ASM Press, U.S.
3. Frazier, W.C. and D. C. Westhoff, 1995. Food Microbiology. Tata McGraw- Hill Publishing Company limited. New Delhi.
4. Gould, G.W., 1996. New Methods of Food Preservation. Blackie Academic and Professional, Madras.
5. Rangaswami, G. and D.J. Bhagyaraj, 2001. Agricultural Microbiology. 2nd Edition. Prentice Hall, New Delhi.

Instruction Hours / week: L: 5 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection and characterization
- Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation
- To provide students a basic understanding of environmental and agricultural microbiology including; microbial diversity in the environment in relation to environment and agricultural welfare, ecosystem wellness, microbial interactions with pollutants in the soil and environment and the fate of microbial pathogens in the environment and agricultural fields.
- Topics covered in detail include soil microbiology, aquatic microbiology, aero microbiology, biofertilizers and pesticides, microbial waste recycling and bioremediation etc.
- These topics were elaborated to students with their theoretical and practical use.
- The students will develop set of skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.

COURSE OUTCOME

1. It provides a comprehensive overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.
2. It will impart the student to develop their **entrepreneurial** knowledge on ecological behavior of microorganism.
3. It will distinguish biogeochemical cycles
4. This course will determine microbial role in nutrient cycling
5. This course can able to determine water quality,
6. It will explain the degradation of natural organic compounds and able to understand the pollutants in the environment.

UNIT - I

Aero biology : Droplet nuclei, aerosol, assessment of air quality-solid, liquid impingement methods. Air borne diseases – causative agent – viruses, bacteria and fungi and preventive measures.

UNIT - II

Aquatic microbiology: Water ecosystems - types of fresh water (ponds, lake, streams) marine habitats (estuaries, mangroves, deep sea, hydrothermal vents, salt pans, coral reefs). - Food chain. Potability of water- microbial assessment of water quality- water purification - Major water borne diseases and their control measures.

UNIT - III

Waste treatment: Types of wastes - solid and liquid wastes characterization; treatments- physical, chemical, biological; solid waste treatment – saccharification, gasification, composting. Liquid waste treatment- trickling- activated sludge - oxidation pond- oxidation ditch.

UNIT - IV

Bioremediation: Utilization for solid wastes - (SCP, mushroom, yeast): fuel (ethanol, methane) fertilizer (composting). Subterranean microbes and bioremediation. Waste disposal-solid, liquid, sewage.

UNIT - V

Positive and negative roles of microbes in environment: biodegradation of recalcitrant compounds - lignin - pesticides; bioaccumulation of metals and detoxification –biopesticides, biodeterioration of paper, leather, wood textiles, metal corrosion. Mode of deterioration- organisms involved -its disadvantages- mode of prevention. GMO and their impact.

TEXT BOOKS

1. Joseph C. Deniel, 1996, Environmental aspects of microbiology, British Sun Publication, Chennai.
2. Abbasi, S.A. 1998. Environmental pollution and its control. Cogent International publishers, Pondicherry.
3. Keya Sen and Nicholas J. Ashbolt 2010. Environmental Microbiology: Current Technology and Water Applications.

REFERENCE

1. Atlas, R.M. and Bartha, R. 1993. Microbial ecology, fundamentals and applications, 3rd Edition. The Benjamin/Cummings Publishing Co., New Delhi.
2. Mitchell, R. and Gu J.D. 2010. Environmental Microbiology. 2nd Edition, Wiley-Blackwell. John Wiley and Sons Publications, Canada.
3. Raina, M., Maier, Ian L. Pepper and Charles P. Gerba, 2008. Environmental Microbiology. 2nd Edition. Academic Press. New York.
4. Ralph Mitchell and Ji-Dong Gu, 2010. Environmental Microbiology. 2nd Edition. Wiley-Blackwell, A John Wiley and Sons, Inc., Publications.

Instruction Hours / week: L: 5 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

- To give knowledge about urine analysis
- Hematology and blood analysis
- Blood Banking and basics of medical microbiology, clinical biochemistry, parasitology
- Serological test with reference to infection
- To test the stool sample for parasite
- To understand the abnormalities identification using human sample

COURSE OUTCOME

1. be skilled in current laboratory practices as entry-level practitioners.
2. demonstrate the ability to think critically and solve problems in a laboratory setting.
3. demonstrate the ability to communicate verbally and in writing.
4. act as ethical and responsible members of the health care team.
5. Diagnosis of different disease in clinic
6. It help in self employment by keeping diagnostic lab.

UNIT - I

Organization of the clinical laboratory and role of medical laboratory technicians. Safety regulations, first aid and clinical Laboratory records. General Comments on specimen collection.

UNIT - II

Haematology – Introduction, specimen collection and laboratory preparation in haematology, routine haematological tests. Clinical biochemistry – specimen required, Routine biochemical tests.

UNIT - III

Principles of Immunohaematology, Clinical significance of blood transfusion. Collection and processing of blood for transfusion. Transfusion reaction and hemolytic disease of new born. Blood grouping.

UNIT - IV

Slide Agglutination test: VDRL, WIDAL, ASO, CRP. Stool Examination: Microscopic examination of Ova, Cyst, Pus Cells. Hanging Drop Examination.

UNIT - V

Clinical pathology and urine analysis, Laboratory examinations of miscellaneous body fluids, semen analysis.

TEXT BOOKS

1. Ananthanarayanan R and Jayaram Panicker, C.K. 2005. Text Book of Microbiology. 7th Edition. Orient Longman. New Delhi.
2. Bailey and Scott. 1994. Diagnostic microbiology. 9th Edition, Baron and Fine Gold C.V. Mosby Publications. St. Louis.

3. Chakraborty, P. 2003. A Text book of Microbiology. 6th edition. New Central Book Agency (P) Ltd., Calcutta.

REFERENCES

1. Jawetz, E.; J.L., Melnic and E.A. Adelberg. 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers, NY.
2. Mackie and McCartney. 1994. Medical microbiology. Vol. – I & II. Churchill Livingston. NY.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

1. This course has been designed to provide the student knowledge about eco friendly product which Play a crucial role in determining its future use and applications in environmental management.
2. Provides detailed idea about biofertilizer production and plant disease.
3. These topics were elaborated to students with their theoretical and practical use.
4. The students will develop set of skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
5. To apply these principles to understanding and solving problems in current environmental and agricultural issues.
6. Familiarize students with general principles and subject knowledge in the field of environment and agricultural microbiology.

COURSE OUTCOME

- To promote **entrepreneurship** skills and create awareness in production of Organic Inputs
- To acknowledge the participants with quality standards of Organic Farming inputs
- This course will determine microbial role in nutrient cycling
- This course can able to determine water quality,
- It will explain the degradation of natural organic compounds and selected pollutants in the environment.
- Students aware with current research in environmental and agricultural microbiology

UNIT – I

Introduction to Biofertilizers- Different types – its Application in Agriculture – Advantages of Biofertilizers over chemical fertilizers

UNIT – II

Types of carrier material used – its sterilization and processing – Glassware sterilization – Packing materials – Media preparation.

UNIT – III

Strain selection – Inoculum development – Mass production – Packaging – Quality control of different Biofertilizers (Rhizobium, Phosphate solubilizers, Azotobacter, Azospirillum, Mycorrhizae, Azolla, Algae)

UNIT – IV

Methods of application of Biofertilizers – Effects of Biofertilizer on crop yield – N₂ Fixation, phosphate solubilization – pot experiment – field trials.

UNIT – V

Methods and application of Biofertilizers in different crops – Groundnut, Rice and Vegetables

TEXT BOOKS

1. Subba Rao, N.S., 1999. Biofertilizers in Agriculture and Agroforestry. Oxford and IBH, New Delhi.
2. Rangaswami, G. and D.J. Bhagyaraj, 2001. Agricultural Microbiology. 2nd Edition. Prentice Hall, New Delhi.
3. Rao, N.S., 1995. Soil Microorganisms and plant Growth. Oxford and IBH Publishing Co., New Delhi.

REFERENCES

1. Alexander, M. 1977. Introduction to soil Microbiology, NY, John Wiley & Sons.
2. Atlas.R.M and Bartha.R 1992. Microbial ecology. Fundamentals and applications. 3rd Edition. Red Wood City. C.A. Benjamin
3. Bagyaraj and Rangasamy. 2002. Agricultural Microbiology. 2nd Edition. Prentice Hall, India
4. Paul. E.A. and Clark F.E., 1986. Soil Microbiology and Biochemistry. Academic Press, New York.
6. Robert, L.Tate, 1995. Soil microbiology. 1st Edition, John Wiley & Sons, Inc, New York.

Instruction Hours / week: L:5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

SCOPE

The facility design provides an overview of the concepts of manufacture herbal medicine in today's regulatory environment.

COURSE OBJECTIVES

- Be able to advise and educate effectively to create a comprehensive wellness plan incorporating herbal, dietary and lifestyle recommendations integrating self-awareness and lessons of nature
- Possess knowledge of traditional herbal systems as well as an understanding of the principles and practices of modern Western herbalism
- Have a foundational understanding of biomedicine, pharmacology, herbal preparations, history, clinical assessment, safety, and plant identification and wild crafting.
- To impart knowledge on herbal formulation
- To develop knowledge on effective drug therapy
- To promote and nurture research activities.

COURSE OUTCOME

- Be able to demonstrate basic **skills** in herb identification, harvesting, and preparation
- Be able to address potential safety concerns including herb-drug interactions
- Be able to grow personally and professionally and to participate actively in the field of herbalism through writing, research, public speaking, and/or professional affiliation
- This course will determine microbial role in nutrient cycling
- This course can able to determine water quality,
- It will explain the degradation of natural organic compounds and selected pollutants in the environment.

UNIT – I

Pharmacognosy – History of Indian systems of medicine - Siddha, Ayurvedha, and Unani systems of medicine. Medicinal plants, their chemical constituents and medicinal uses - Future of pharmacognosy.

UNIT – II

Classification of medicinal plants - Vernacular name and family - Geographical source, cultivation, collection, and processing for market and commerce in crude drugs.

UNIT – III

Organoleptic evaluation - Morphological and histological studies, chemical constituents of medicinal plants- Therapeutic and other pharmaceutical uses..

UNIT – IV

Preparation of plant samples, extraction and phytochemical screening of medicinal plants. Storage of plant samples. Propagation of medicinal plants - Micro and macro propagation conservation of rare medicinal and aromatic plants.

UNIT – V

Drug adulteration - methods of Drug evaluation, Herbal food - Food processing - packaging - Herbal sale and Export of medicinal plants - marketing - Intellectual property rights - Export laws

TEXT BOOKS

1. Malcolm Rowland, Thomas N. Tozer. Clinical Pharmacokinetics: Concepts and Applications. 1995. Williams & Wilkins publishers.
2. Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.
3. Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins publishers.

REFERENCES

1. George Edward Trease and W.C. Evans - Pharmacognosy 12th edition, English Language Books Society, Baelliere Tindall.
2. Handa, S.S. and Kapoor, V.K. Pharamcognosy by 2nd Edition, Vallabh Prakashan Publishers, New Delhi.
3. Kokate, C.K., Durohit, A.P. and Gokhale, S.R., Pharmacognosy by 12th edition - Nirali Prakasham Publishers, Pune.
4. Kumar N.C. (1993) An Introduction to Medical Botany and Pharmacognosy. Zion Publisher.

Instruction Hours / week: L:0 T: 0 P: 0**Marks: External:100 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- To detail the importance of computer in field of life sciences.
- To obtain good understanding about the interpretation of biological data base.
- To uptake knowledge in latest tools and technology.
- Program aims to develop students' understanding of medical microbiology with hand on experience in the isolation of the bacteria from different sources.
- It gives the knowledge about the pathogenicity, understanding the biofilm formation in bacteria, role of biofilm in pathogenicity and there antibiotics resistance pattern of pathogenic bacteria (Environmental source, Agricultural part), which is useful for public awareness.
- Understanding of application of Virus (bacteriophage) in transduction
- Impart basic understanding of bioinformatics approaches for bacterial/viral/fungal identifications and drug design
- Develop competence to integrate biological information with computational softwares

COURSE OUTCOME

1. To develop the **skills** on various search engines and software tools involved in bioinformatics
2. To design new drugs
3. Molecular interaction studies
4. Docking studies
5. Active site of binding
6. working with phylogeny trees

UNIT - I

Bioinformatics - definition, concept, scope, relevance of bioinformatics. Recent development in bioinformatics. Applications and scope of bioinformatics.

UNIT - II

Databases: Gene banks, objectives, types of databases- flat files, relational databases, objective oriented databases, hypertext databases, web interfaces; Resource databases- Generalized (DNA, protein) and specialized databases. Search tools: Data mining, BLAST and FASTA.

UNIT - III

Phylogenetic analysis: Concept of phylogenetic trees, phylogenetic trees and multiple alignment methods - distance matrix, character based evaluation of methods, evaluation of phylogenies, steps in constructing alignments and phylogenies, working with phylogeny trees - with suitable software-EMBOSS

UNIT - IV

Gene prediction: Approaches and methods, tools- GRAIL, GenLang, BCM, GeneFinder, Procrustes, GeneParser. Prediction of protein structure- Methods for structure prediction for known and unknown folds, prediction of protein function.

UNIT - V

Genomics: Gene mapping, sequence assembly and gene expression, DNA microarrays, microarray design and data analysis. Proteomics: Definition, proteome analysis; tools for proteome analysis, protein protein interactions; metabolic and genetic networks, concept of E- cell.

TEXT BOOKS

1. Hooman Rashidi, Lukas K. Buehler, Bioinformatics Basics: Applications in Biological Science and Medicine. 2005. CRC Press/Taylor & Francis Group.
2. Stephen A. Krawetz, David D. Womble. Stephen A. Krawetz, David D. Womble. 2003. Introduction to Bioinformatics: A theoretical and Practical approach.. Humana Press, USA.
3. Bryan Bergeron. Bioinformatics Computing.2002. Prentice Hall.

REFERENCES

4. David W. Mount, 2001, Bioinformatics. Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press.
5. Higgs D and W. Taylor, 2000, Bioinformatics. Sequence, Structure and databanks – A Practical Approach, Oxford University Press.
6. Baxevanis A.D and B.F. Francis Ouellette, 2001, Bioinformatics – A Practical Guide to the Analysis of Genes and Proteins, Wiley – Interscience.
7. G. Gibson and S.V. Muse, 2002, A Primer of Genome Science, Sinauer Associates, Inc. Publishers.
8. S. Misener and S.A. Krawetz, 2000, Methods in Molecular Biology – Bioinformatics. Methods and Protocols, Humana Press.
9. Attwood T.K and D.J. Parry-Smith, 2001, Introduction to Bioinformatics, Pearson Education Asia.
10. Claverie J.M, C. Notredame, 2003, Bioinformatics for Dummies, wiley Publishing, Inc.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- To make the students better to understand the aspects of skilled manufacturing practices, kinds of pathogenic microorganisms in food and quality control in food and pharmaceutical industries.
- Develop industry-oriented skills on developing drugs and food.
- To make the students to understand the food quality systems and advancement universally.
- It will explain the students about all kinds of bio safety levels in laboratories.
- To train the students to be competent working professionals in the food industry and pharmaceutical industry.
- To help the students to explain the production of quality food by imparting better nutritional, sanitation & hygiene concepts.

COURSE OUTCOME

1. Imparts skilled knowledge on good manufacturing practices and food spoilage of different types of foods.
2. Develop skills on Food and drug based microbiological analysis.
3. develop the capacity for setting up small scale enterprises with respect to food and pharmaceuticals within the country.
4. To organize functions for creating awareness about the importance of safe processed nutritious food.
5. To provide diagnostic analysis of food and pharmaceutical products.
6. The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites

Contents

1. Analysis of Blood grouping and Rh typing
2. Performance of WIDAL – slide and tube test
3. Identification of antibodies by Passive agglutination – RPR, ASO, RA and CRP
4. Ouchterlony's double immuno diffusion
5. Enumeration of leucocytes by Leishmann stain
6. Isolation of coliphages from sewage sample.
7. Demonstration of Cultivation of virus using embryonated egg.
8. Assessment of milk quality by MBRT
9. Identification of Bacteria and Fungus from spoiled food and vegetables.
10. Bacteriology analysis of food samples (TPC)
11. Isolation of free living and symbiotic organisms
12. Cultivation of Mushroom
13. Isolation of micro-organisms from air
14. Bacteriological examination of water by MPN test.
15. To determine dissolved oxygen of water.
16. To determine BOD
17. To determine COD
18. Demonstration of waste water treatment plant.

REFERENCES

1. Aneja, K.R., 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology. 3rd Edition, New Age International (P) Limited Publishers, New Delhi.
2. Cappuccino, J.G. and N. Sherman, 2004. Microbiology A Laboratory Manual. Benjamin Cummings, New York.
3. Jayaraman, J., 2006. Laboratory Manual in Biochemistry. 1st Edition, New Age International Pvt. Ltd., New Delhi.
4. Reddy, S.M. and S. Ram Reddy, 2004. Microbiology A Laboratory Manual. 3rd Edition. Sri Padmavathi Publication, Hyderabad.
5. Chakraborty, P. and N. K. Pal, 2008. Manual of Practical Microbiology and Parasitology. New Central Book Agency (P) Ltd, India.
6. Mukherjee, K.L., 2005. Medical Laboratory Technology. Vol – III, Tata McGraw - Hill Publishing Company Ltd., New Delhi.
7. Ramnik Sood, 2003. Medical Laboratory Technology, 5th Edition, Jaypee Brothers, Medical Publishers, New Delhi.
8. Talib, V.H. and S.R. Khurana, 2003. A Handbook of Medical Laboratory Technology, 2nd Edition, CBS Publishers and Distributors, New Delhi.
9. Vandepilte, J., J. Verhaegan, K. Engbaek, P. Rohner, P. Prot and C.C. Heuck, 2004. Basic Laboratory Procedures in Clinical Bacteriology. 2nd Edition, A.I.T.B.S Publishers and Distributors, New Delhi.

15MBU521

INTERNSHIP PROGRAMME

Semester – V
2C

Instruction Hours / week: L: 0 T: 0 P: 0

Marks: Internal: 50 Total: 50

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- The use of microorganisms for the production of food, either human or animal, the microorganisms used in industrial processes may be natural isolates; laboratory selected mutants or genetically engineered organisms
- To encompass the use of microorganisms in the manufacture of food or industrial products.
- To impart theoretical knowledge of role of microbes in industrial production of different biochemicals/bio-molecules.
- The theory syllabus covers area such as design of bioreactors, media formulations and factors affecting the industrial production of bio-chemicals along with approaches that can be used for enhanced production.
- Role of micro-organism in production of organic acids, alcohols, wine, vinegar, enzymes, vitamins, antibiotics, amino-acids and steroids.

COURSE OUTCOME

1. Industrial microbiology encompasses the use of microorganisms in the manufacture of food or industrial products.
2. Provides [skill](#) development in the large scale production of industrial product, providing the trends to cater the needs of industry
3. To organize functions for creating awareness about the importance of safe processed nutritious food.
4. To provide diagnostic analysis of food and pharmaceutical products.
5. The students will be able to discuss the role of microorganisms in industry,
6. Able to carry out experiments to produce microbial metabolites.

UNIT – I

History and development of Industrial microbiology - Industrially important strains – screening methods, preservation techniques – strain development – mutation, recombinant DNA technology and plasmid fusion.

UNIT – II

Media for industrial fermentation process - media formulation, sterilization of media – Fermentor designing - body construction, mass transfer, oxygen transfer, effect of viscosity- Scale up process.

UNIT – III

Fermentation types – submerged fermentation, solid state fermentation, batch fermentation, continuous fermentation – Types of fermentors – Tower, fed batch and airlift, Components of CSTR – Down stream process - cell disruption, centrifugation, precipitation, intracellular and extra cellular liquid extraction and product formulation.

UNIT – IV

Role of microorganism in the pharmaceutical sciences - Microbial spoilage, preservation and Sterilization of pharmaceutical products.

UNIT – V

Role of precursors and steering agents - in production of antibiotics, vitamins and enzymes - standardization and Quality control of Pharmaceutical products – Antiseptics, disinfectants, Injectables, IV fluids and pyrogen testing.

TEXT BOOKS

1. Casida, L.E. Jr., 2003. Industrial Microbiology. New Age International Publishers, New Delhi.
2. Demain, A. L. and J. E. Davies, 1999. Manual of Industrial Microbiology and Biotechnology. 2nd Edition, A.S.M. Press, Washington, D.C.
3. Hugo, W.B. and A.D. Russell, 1998. Pharmaceutical Microbiology. 6th Edition, Publisher Blackwell Science Ltd.
4. Mansi, E.M.T. and C.F.A. Bryce, 2002. Fermentation Microbiology and Biotechnology. Taylor and Francis, New York.
5. Patel, A.H., 2003. Industrial Microbiology. Macmillan India Ltd. New Delhi.

REFERENCES

1. Reed, G., 2002. Prescott and Dunn's Industrial Microbiology. 5th Edition. CBS Publishers, New Delhi.
2. Shuler, M.L. and F. Kargi, 2005. Bioprocess Engineering Basic Concepts. Pearson Education, New Delhi.
3. Stanbury, P.T. and A. Whitaker, 2005. Principles of Fermentation Technology, Pergamon Press, NY.
4. Waites, M. J., 2007. Industrial Microbiology. Blackwell Publishing Company. UK.

Instruction Hours / week: L: 5 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
- To demonstrate with products and ask the student to identify the different types of IPR's.
- Provide knowledge on database concept, management, retrieval along with utilization in gene and protein analysis.
- Impart basic knowledge of patenting, intellectual property rights, laws available and copyrights.
- Impart basic knowledge of technology in microbes to develop new variety

COURSE OUTCOME

Upon completion of the course students able to

1. develop **skills** in the basic tools in recombinant technology, various concepts of cloning vectors and the cloning strategies
2. Familiarize with the principles of bioethical concepts
3. Emphasize on IPR issues and need for knowledge in patents in biotechnology
4. Learn about the applications of microbes in biotransformations, therapeutic and industrial biotechnology
5. Describe aspects of genetically engineered microbes for industrial application
6. This paper imparts knowledge on applications of microorganisms in various fields and helps to gain **employability** in pharmaceutical industries

UNIT – I

Restriction enzymes – types and nomenclature - classification, Target site of enzymes, Host controlled restriction and modification, Star activity and uses - Nucleases, methylases - ligases. Joining of DNA fragments with vector - linkers, adaptors and homopolymer tailing.

UNIT – II

Cloning vectors: Plasmid as Cloning Vectors, Binary vectors and co-integrate vectors. Plasmids types in Gram negative bacteria - *E. coli* - PBR322. Bacteriophage λ and M13, Cosmids - phagemid, Yeast vectors, Shuttle vectors, Ti – plasmid and Ri plasmid. Prokaryotic hosts: *E. coli*, Eukaryotic hosts - yeast cells.

UNIT – III

Gene cloning - basic steps in cloning, construction of cDNA and genomic libraries-selection and screening method of recombinants. Cloning strategies – transformation techniques and transfection. Blotting techniques: Southern, Northern and Western. PCR – methods and application. Finger printing.

UNIT – IV

Patenting – fundamental requirements – patenting multicellular organisms – patenting and fundamental research. Patenting the genes, patenting biological materials and biotechnology. Discrepancies in biotechnology / chemical patenting. Patenting Process.

UNIT – V

Intellectual Property Rights – historical perspective – recent developments, IPR in India, IPR and the rights of farmers in developing countries.

TEXT BOOKS

1. Dubey, R.C., 2006. Biotechnology. S. Chand and Company Ltd. New Delhi.
2. Ramadass, P. and S. Meerarani, 2000. Text book of Animal Biotechnology. 2nd Edition. Madras Veterinary College, Chennai.
3. Kumar, H.D. 2003. Biotechnology. Affiliated East West Press Private Limited, New Delhi.

REFERENCES

1. Brown, T.A., 1998. An Introduction to Gene Cloning. 3rd Edition. Stanley Thrones Publication, Cheltheham.
2. Glick, B.K. and J.J. Pasternak, 2003. Molecular Biotechnology: Principles and Applications of Recombinant DNA 3rd Edition. ASM Press, Washington.
3. Old, R.M. and S. B. Primrose, 2003. Principles of Gene Manipulation. 6th Edition. Blackwell Scientific Publication. London.
4. Smith, J., 2003. Biotechnology. Cambridge University Press. UK.
5. Winnacker, E.L., 1987. From Genes to Clones: Introduction to Gene Technology. VCH. Weinheim, Germany.
6. Kshitiji Kumar Singh, 2015. Biotechnology and Intellectual property rights: Legal and Social Implications. Springer.
7. Peppler and Pearlman, D and H.J 2014. Microbial Technology: Microbial Processes. 2nd Edition. Academic Press Inc. UK.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Learners familiar with current developments and advances in the field of Mycology and Parasitology.
- Establish basic theoretical knowledge in the fields of Mycology and Parasitology. And to study the properties and various infections caused by the fungal, protozoan and helminthes.
- Describe basic morphology, life cycle, pathogenesis, lab diagnosis and treatment of parasites and fungi.
- Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.
- Describe basic principle and procedures of isolation of fungus and parasites from clinical samples like stool, vaginal swab etc.
- Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.

COURSE OUTCOME

1. Involves the identification, classification, and characterization of pathogenic species.
2. This paper imparts employability in hospital laboratories.
3. Properly use aseptic techniques, including sterilization.
4. Know General parasitological concepts and identification in stool sample
5. microbes, pathogens and their control Learning methods for antimicrobial susceptibility testing
6. In this course the students will observe and perform experiments related to clinical microbiology and virology which will enhance their laboratory skills, and scientific knowledge.

UNIT – I

General Properties of Fungi - Medically important fungi – diagnosis of fungal disease - routine mycological techniques - antifungal agents

UNIT – II

Superficial mycosis - Cutaneous mycosis - Systemic mycosis - Opportunistic mycosis - Subcutaneous mycosis

UNIT – III

Introduction to Parasitology - protozoa-amoebae – flagellates - Laboratory techniques in parasitology - Ova, cyst analysis direct and concentration methods. Blood smear examination - antiprotozoan therapy.

UNIT – IV

Protozoan infections - *Entamoeba histolytica*, *Plasmodium falciparum*, *Leishmania donovani* - *Giardia intestinalis* *Trichomonas vaginalis*.

UNIT – V

Helminthic infections – *Taenia solium*. Trematodes - *Schistosoma haematobium*, Nematodes - *Trichuris trichiura* - *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria Bancrofti*.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2009. Text Book of Microbiology. 8th Edition. Orient Longman. New Delhi.
2. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
3. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
4. Chatterjee, K.D., 1980. Parasitology in relation to medicine, 12th Edition, Chatterjee Medical Publishers, Calcutta.

REFERENCES

1. Chunin, J., 2000. Parasitology. New York Publishers, London.
2. Dismukes, W.E., P. G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press. UK.
3. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.
4. Mehrotra, R.S. and K. R. Aneja, 2007. Introduction to Mycology. New Age International Ltd. New Delhi.
5. Panjarathinam, R., 2007. Text book of Medical Parasitology, 2nd Edition. Orient Longman Publishers.
6. Parija, S.C., 2008. A Text book of Medical Parasitology. 3rd Edition. All India Publishers and Distributors, New Delhi.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

- 1.To expand student's knowledge of applied microbial ecology
- 2.The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.
- 3.The knowledge can give the base for understanding processes and changes in the environment.
- 4.The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.
- 5.The lectures will be implemented with individual practical work in the laboratory and presentations of the seminars.
- 6.The students can get general competences in microbial ecology

COURSE OUTCOME

1. Provides a comprehensive skilled overview of biogeochemical processes relevant to environmental scientists and engineers mediated by microorganisms.
2. Understand various plant microbes interactions especially rhizosphere and their applications especially the biofertilizers and their production techniques
3. Understand the basic principles of environment microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation
4. Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission
5. Comprehend the various methods to determine the Sanitary quality of water and sewage treatment methods employed in waste water treatment
6. Provide learning opportunities to critically evaluate research methodology and findings.

UNIT – I

Definition of Bioremediation - Types of pollution - organic, inorganic in soil, water and air - Remediation by bacteria, fungi, microalgae and green plants.

UNIT – II

Bioaccumulation and biomagnification processes - microbial remediation by natural attenuation - biostimulation - bioaugmentation.

UNIT – III

Application of immobilized microbes in soil decontamination - use of genetically engineered microorganism and bioremediation.

UNIT – IV

Biodegradation of organic compounds - humification and polymerization reaction - bio-transformation of metal and metal compounds - phyto -remediation use of microalgae, green plants to remove pollutants

UNIT – V

Phyto-extraction - Types of phytoextraction - induced phyto-extraction and continuous phyto-extraction - phyto-degradation - rhizofiltration - phyto-stabilisation - phyto-volatilisation of metals - phyto-remediation of organic. Bioavailability and uptake. Biotransformation and compartmentalization.

TEXT BOOKS

1. Joseph C. Deniel, 1996, Environmental aspects of microbiology, British Sun Publication, Chennai.
2. Abbasi, S.A. 1998. Environmental pollution and its control. Cogent International publishers, Pondicherry.
3. Keya Sen and Nicholas J. Ashbolt 2010. Environmental Microbiology: Current Technology and Water Applications.

REFERENCES

1. Moo-Young, M., Anderson, W.A. and Chakrabarty, A.M. 1996. Environmental Biotechnology: Principles and applications. Boston, Mass.: Kluwer Academic Publishers.
2. Wainwright, M. 1999. An introduction to environmental biotechnology. Boston, Mass. Klumer Academic Publishers.
3. Atlas, R.M. and Bartha, R. 1993. Microbial ecology, fundamentals and applications, 3rd Edition. The Benjamin/Cummings Publishing Co., New Delhi.
4. Mitchell, R. and Gu J.D. 2010. Environmental Microbiology. 2nd Edition, Wiley Blackwell. John Wiley and Sons Publications, Canada.
5. Raina, M., Maier, Ian L. Pepper and Charles P. Gerba, 2008. Environmental Microbiology. 2nd Edition. Academic Press. NY.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To demonstrate an understanding at an advanced level of microbial virulence mechanisms
- To understanding of various infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment)
- To Understand the basics of pharmaceutical microbiology and important microorganism playing role pharmaceutically
- To understand different products of microbial origin playing key role in pharmaceutical applications
- To understand role of secondary metabolites in pharmaceutical industry.
- To understand good practices and regulation involved in utilizing microbial product for pharmaceutical application

COURSE OUTCOME

- Students Work cooperatively as part of a small group and Critically assess and interpret scientific literature
- Students can develop the **skills** on diagnostic strategy and learn independently
- Able to apply the secondary metabolites in pharmaceutical industry.
- Able to identify a unknown organisms in clinical samples,
- Able to describe the pathogenesis of pathogens
- Able analyze the Drug in quantitatively and qualitatively

UNIT – I

History of chemotherapy. Types of antimicrobial agents, Paul Ehrlich and his contributions to chemotherapy. Development of synthetic drugs, development of antibiotics, Chemical non-medicinal antimicrobials- sanitizers, disinfectants, aantiseptics. Selective toxicity and target sites of drug action.

UNIT – II

Bactericidal and bactedriostatic agents, Factors affecting static and cidal activity, phenols and phenolic compounds, alcohols, halogens, heavy metals, dyes, detergents, aldehydes.

UNIT – III

Assay methods of antimicrobial agents – Phenol coefficient, qualitative assay of drugs (drug sensitivity testing), quantitative assays – liquid tube assay (MIC), agar tube assay. Agar plate assay.

UNIT – IV

Principles of chemotherapy and Drug Resistance The physical and lab diagnosis, tests for sensitivity, choice drug determination, dosage,route of administration, combined drug therapy.

UNIT – V

Mode of action of important drugs – Cell wall inhibitors (betalactam drugs), membrane inhibitors (polymyxin), Ribosomal inhibitors (aminoglycosides – streptomycin), folic acid inhibitors (sulfa drugs), antifungal drugs (nystatin).

TEXT BOOKS

1. Malcolm Rowland, Thomas N. Tozer. Clinical Pharmacokinetics: Concepts and Applications. 1995. Williams & Wilkins publishers.
2. Thomas N. Tozer, Malcolm Rowland. Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. 2006. Lippincott Williams & Wilkins publishers.
3. Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins publishers.

REFERENCES

1. Trease, G. E. and M. C. Evans, 1979. Textbook of Pharmacognosy. 12th Edition. Balliere Tindal, London, 343-383.
2. Shargel, Alan H. Mutnick, F.Paul, Souney, Larry N. Sawnsen, 2004. Comprehensive Pharmacy Review, Wolters Kluwer, 5th Edition, USA.
3. Beckett, H. and J. B. Stenlake. Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition, Continuum International Publishing Group.
4. Jeffery, G. H., J. Basset, J. Mendham and R. C. Denny (Rev. by) 1989. Vogels Text Book of Quantitative Chemical Analysis, 5th Edition, Bathpress, UK.
5. Sethi, P.D., 1997. Quantitative Analysis of Drugs in Pharmaceutical Formulations, 3rd Edition, Saujanya Books, New Delhi.
6. Lloyd R. Snyder, Joseph J. Kirkland, Joseph I. Glajch, 1997, Practical HPLC method development, John Wiley and Sons 2nd Edition, USA.
7. Hugo and Russell, 2011. Pharmaceutical Microbiology. 8th Edition. Wiley Blackwell Publications.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- To focus on the basic principles of Genetics incorporating the concepts of classical, molecular and population genetics.
- Compilation is required for recent advances in genetic principles for strong foundation in Biotechnology.
- To obtain a fundamental knowledge of the basic principles of system microbiology through a series of required topics in genomics, transcriptomics, proteomics, and metabolomics, highthroughput biological techniques and bioinformatics.
- To obtain depth of knowledge in selected areas of system microbiology through advance level
- Role of micro-organism in production of organic acids, alcohols, wine, vinegar, enzymes, vitamins, antibiotics, amino-acids and steroids.

COURSE OUTCOME (CO'S)

1. Students undertaking this practical shall be able to describe the key concept in the basic Microbial Genetics
2. Effectively understand the implication of mutation and its characteristics.
3. Further, the experiments would allow students to recall and relate the information gained from Microbial Genetics theory paper and [skills](#) associated with it.
4. Students able demonstrate the gene transfer techniques.
5. Students can estimate the genetic materials.
6. Able to distinguish the plasmid and Genomic DNA.

Contents

1. Isolation of genomic DNA from bacteria
2. Isolation of plasmid DNA from bacteria
3. weight by Agarose gel electrophoresis
4. Determination of molecular weight by SDS PAGE electrophoresis (Demo)
5. Isolation of antibiotic producers from soil microbes
6. Production of Penicillin by batch fermentation
7. Cellulase production test
8. Identification of clinically important fungi – *Candida albicans*
9. Identification of *Aspergillus sp.* by Lacto phenol cotton blue mounting
10. Identification of *Mucor sp.* by Lacto phenol cotton blue mounting
11. Identification of *Rhizopus sp.* by Lacto phenol cotton blue mounting
12. Identification of *Fusarium sp.* by Lacto phenol cotton blue mounting
13. Identification of *Penicillium sp.* by Lacto phenol cotton blue mounting
14. Observation of parasites – *Entamoeba sp.* *Plasmodium sps.* *Ascaris sp.* *Taenia sp.*
15. Observation of parasites – Blood smear examination

REFERENCES

1. Aneja, K.R., 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology. 3rd Edition, New Age International (P) Limited Publishers, New Delhi.
2. Dubey, R.C. and D.K. Maheshwari, 2002. Practical Microbiology. 1st Edition. S. Chand and Company Ltd, New Delhi.
3. Kalaichelvan,P.T.2005.Microbiology and Biotechnology:A Laboratory Manual.MJP Publishers, Chennai.
4. Nigam, A. and A. Ayyagari, 2007. Laboratory Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill Publishing Company Limited, New Delhi.
5. Sharma,K.2007.Manual of Microbiology: Tools and Techniques. 2nd Edition,Ane Books India,Delhi.
6. Chakraborty, P. and N.K. Pal, 2008. Manual of Practical Microbiology and Parasitology, New Central Book Agency (P) Ltd, India.
7. Mukherjee, K.L., 2002. Medical Laboratory Technology: A Procedure Manual for Routine Diagnostic Tests. Vol. 2, Tata McGraw Hill Publishing Company Limited, New Delhi.
8. Patel, A.H, 1994.A Manual of Medical Laboratory Technology.Navaneet Prakashan Ltd, Bombay.
9. Satyadev, G., 2004. Handbook of Medical Laboratory Technology. 1st Edition, Paras Medical Publisher, Hyderabad, India.
10. Talib, V.H. and S.R. Khurana, 2003. A Handbook of Medical Laboratory Technology. 2nd Edition, CBS Publishers and Distributors, New Delhi.

15MBU691

PROJECT VIVA VOCE

**Semester – VI
10H – 6C**

Instruction Hours / week: L: 10 T: 0 P: 0 Marks: Internal: 60 External: 90 Total: 150

Instruction Hours / week: L: 0 T: 0 P: 0

Marks: External: 100 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVE

1. This paper provides information about the role of microorganisms in products development.
2. To understand basic of managements such as nature scope, evolution, level and components of management
3. Understanding important concepts of entrepreneurship such as Planning, decision making, leadership, organizations and authority
4. Understand basic requirements for establishing a bio-based startup and company
5. Understand food spoilage microorganisms; the microbiology of food preservation and food commodities; fermented and microbial foods; principles and methods for the microbiological examination of foods; micro biological quality control, and quality schemes.
6. The students will develop set of skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.

COURSE OUTCOME

1. To encode the importance of the role of microorganisms in food industries
2. To obtain a good understanding of industrial microbiology and become an **Entrepreneur**.
3. To obtain knowledge in patenting and start up a career in Life Sciences.
4. It provides information about the role of microorganisms in products development.
5. To understand basic of managements such as nature scope, evolution, level and components of management
6. Understanding important concepts of entrepreneurship such as Planning, decision making, leadership, organizations and authority

UNIT - I

Entrepreneur – development and activity, institutes involved. Contributions of government to entrepreneurs and risk assessment. Industrial Microbiology - Definition, scope and historical development.

UNIT - II

Fermentation products- Bakers yeast, food and feed yeasts. Bacterial and Fungal Amylases. Proteolytic Enzymes, Pectinases and Invertases.

UNIT - III

Mushroom cultivation and Composting- Cultivation of *Agaricus campestris*, *Agaricus bisporus*, and *Volvariella volvaciae*; Preparation of compost, filling tray beds, spawning, maintaining optimal temperature, casing, watering, harvesting, storage.

UNIT - IV

Biofertilizers- Historical background, Chemical fertilizers versus biofertilizers, organic farming. *Rhizobium* sp, *Azospirillum* sp, *Azotobacter* sp, as Biofertilizers.

UNIT - V

Patents and secret processes, History of patenting, composition, subject matter and characteristics of a patent, Inventor, Infringement, cost of patent. Patents in India and other countries.

TEXT BOOKS

1. John Bessant, Joe Tidd. Innovation and Entrepreneurship. 2011. Third Edition. CRC Press.
2. H. Nandan . Fundamentals of Entrepreneurship. 2013. PHI Learning; Third edition
3. E. M. T. El-Mansi, C. F. A. Bryce, Arnold L. Demain, A.R. Allman. 2006. Fermentation Microbiology and Biotechnology, Second Edition. CRC Press

REFERENCES

1. L.E.Casida, 2002. Industrial Microbiology- New age International publication.
2. Motsara, M.R., P. Bhattacharyya and B. Srivastava, 1995. Biofertilizer - Technology, Marketing and Usage. Fertilizer Development and Consultant Organization, New Delhi.
3. K.R.Aneja, 1995. Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom production technology- New age International publication.
4. .Atlas, R.M. and Bartha, R. 1993. Microbial ecology, fundamentals and applications, 3rd Edition. The Benjamin/Cummings Publishing Co., New Delhi.
5. Mitchell, R. and Gu J.D. 2010. Environmental Microbiology. 2nd Edition, Wiley-Blackwell. John Wiley and Sons Publications, Canada.
6. Raina, M., Maier, Ian L. Pepper and Charles P. Gerba, 2008. Environmental Microbiology. 2nd Edition. Academic Press. New York.
7. Subba Rao, N.S., 1999. Biofertilizers in Agriculture and Agroforestry. Oxford and IBH, New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 0 Marks: External: 100 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Comprehensive and detailed understanding of genetic methodology
- To know the quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.
- The knowledge required to to design, execute, and analyze the results of genetic experimentation in animal and plant model systems.
- To Understand the Genetic constituents of bacteria with special emphasis on inheritance and mutations
- To understand the mechanism of genetic transfers in microbes
- To understand different techniques used to study the microbial genetics and utilizing the microbial phenomenon in different biotechnological applications

COURSE OUTCOME

1. The ability to recognize the experimental rationale of genetic studies
2. Insight into the mathematical, statistical, and computational basis of genetic analyses that use genome-scale data sets in systems biology settings.
3. This course will helps to understand and develop the **employability** skill in genetic technologies in industries related to biotechnology, pharmaceuticals, energy, and other fields.
4. It provides the **entrepreneurial** ability to characterize, isolate and identify different microbes.
5. It includes a detailed study of characterization, etiology, pathogenicity and clinical systems.
6. Students able to apply the knowledge in gene sequencing

UNIT – I

Molecular definition of a gene – simple and complex transcription units. Chromosomal organization of genes and noncoding DNA – Nonfunctional DNA, Protein-coding genes, tandemly repeated genes code rRNA, tRNAs and histones. Mobile DNA – movements of mobile elements DNA or an RNA intermediate.

UNIT – II

Structural organization of eukaryotic chromosomes – eukaryotic nuclear DNA associates with histone proteins to form chromatin, modification of histone tails, non-histone proteins and scaffold proteins. Eukaryotic chromosomes contains one linear DNA molecule.

UNIT – III

Methods for DNA sequencing – chain termination DNA sequencing, conventional DNA sequencing. Sequence assembly by short gun methods and clone contig methods. Whole genome shotgun sequencing.

UNIT – IV

Locating the genes in a genome sequence – gene location by sequence inspection, ORF method. Experimental techniques for gene location – hybridization test method, cDNA sequencing for gene mapping, exon-intron boundaries.

UNIT – V

Functions of individual genes – computer analysis of gene function, homology evolutionary relationship. Assigning gene function by experimental analysis – functional analysis by gene inactivation, individual gene inactivation by homologous recombination and without homologous recombination.

TEXT BOOKS

1. Charlie Hodgman, Chungui Lu, Sandra Kirk. An Advanced Textbook on Genomic and Proteomic Sciences. 2011. Garland publishers.
2. Arthur M. Lesk. Introduction to Genomics. 2012. Oxford University Press.
3. Steven Haddock . Practical Computing for Biologists . 2011. CLR publishers.
4. Jeremy W. Dale. 2010. from Genes to Genomes. Garland publishers.

REFERENCES

1. Brown, T.A. 2002. Genomes. 2/e. Bios Scientific Publishers Limited. New Delhi India.
2. Lodish, H., A. Berk, P. Matsudaira, C.A. Kaiser, M. Krieger, M.P. Scott, S.L. Zipursky and J. Darnell. 2003. Molecular cell biology, 5/e. W.H. Freeman and Company, NY, USA.
3. Brown, T.A. 1994. DNA sequencing: the basics. Oxford University Press, Oxford.
4. Davis, K. 2001. Cracking the genome: Inside the race to unlock human DNA. Free Press. NY.
5. Freifelder, D. 2004. Molecular Biology 2/e. Narosa Publishing House, India.

Instruction Hours / week: L: 0 T: 0 P: 0**Marks: External: 100 Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- Describe the source and variability of raw food material and their impact on food processing operations.
- Describe the source and variability of raw food material and their impact on food processing operations.
- Explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.
- Explain the properties and uses of various packaging materials.
- The course aims to provide instruction in the general principles of food microbiology.
- The course covers the biology and epidemiology of food borne microorganisms of public health significance, including bacteria, yeasts, fungi, protozoa and viruses,
- To understand food spoilage microorganisms; the microbiology of food preservation and food commodities; fermented and microbial foods; principles and methods for the microbiological examination of foods; micro biological quality control, and quality schemes.

COURSE OUTCOME

1. Apply the scientific method to food science problems and quantitative reasoning skills to food science data
2. Apply critical thinking and analytical evaluation to contemporary food science information and literature
3. Apply principles from general chemistry, biology, physics, statistics, and mathematics to food science problems
4. Describe the source and variability of raw food material and their impact on food processing operations.
5. Explain the principles and current practices of processing techniques
6. Able to know the effects of processing parameters on product quality.

UNIT - I

Historical developments and importance of food microbiology. Human nutrition, nutritive value of food and dietary requirement. Nutrients deficiency diseases.

UNIT - II

Microbiology of vegetable, fruits, cereal and cereal products, juice; bread, confectionary, beverages. Food standards and rules, laws governing food Quality Control; Various types of packaging

UNIT - III

Quality assessment, Spoilage and Methods of Preservation of Fish; Canning, Freezing, Drying, Salting, Smoking and Curing. Processing of poultry meat and egg, Spoilage and control measures. Quality control of processed fish; poultry meat and eggs.

UNIT - IV

Construction of cold storage - types of freezers -plate contact freezer, air blast freezer, cryogenic freezing and refrigerated vans. Types of driers - roller drier, tray drier, spray drier, freeze drier, fluidized bed drier and solar drier.

UNIT - V

Classification and characterization of food industrial wastes from processing industry. Beverage industry; Fish, Meat and Poultry industry, Sugar industry and Dairy industry; Waste disposal methods.

TEXT BOOKS

1. Casida, L.E. Jr., 2003. Industrial Microbiology. New Age International Publishers, New Delhi.
2. Demain, A. L. and J. E. Davies, 1999. Manual of Industrial Microbiology and Biotechnology. 2nd Edition, A.S.M. Press, Washington, D.C.
3. Hugo, W.B. and A.D. Russell, 1998. Pharmaceutical Microbiology. 6th Edition, Publisher Blackwell Science Ltd.
4. Mansi, E.M.T. and C.F.A. Bryce, 2002. Fermentation Microbiology and Biotechnology. Taylor and Francis, New York.
5. Patel, A.H., 2003. Industrial Microbiology. Macmillan India Ltd. New Delhi.

REFERENCES

1. Pearson A.M and Gillett T.A, 1996. Processed Meats; CBS Publishers.
2. WJ, Olson V.M, Shemwell GA and Pasch S; 1988. Egg and poultry meat processing; Stadelman, Elliswood Ltd.
3. Rao MA and Rizvi S.S.H; 1986. Engineering Properties of Foods; Marcel Dekker Inc.
4. Toledo .T. 2000. Fundamentals of Food Process Engineering. 2nd Edition. CBS Publishers.
5. Herzka A and Booth R.G; 1981, Food Industry Wastes: Disposal and Recovery Applied Science Pub Ltd.
6. Fair G.M, Geyer J.C and Okun D.A, 1986. Water and Wastewater Engineering, John Wiley & Sons, Inc.

15MBP101 FUNDAMENTALS OF MICROBIOLOGY AND CLASSIFICATION
4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURE OBJECTIVES

- The course is designed to provide a basic understanding on the fundamental aspects of microbiology from historical development.
- To improve the proficiency and knowledge of the candidate on the study of microbial techniques for well exploitation of microorganisms.
- To comprehend the various methods for identification of unknown microorganisms
- This course enables the students to understand various physical and chemical means of sterilization and also learn various techniques for isolation of pure cultures.
- This course figures out them to know about culture collection and maintenance of microbial cultures.
- The beneficial and harmful manifestations of microorganisms especially of bacteria and their role in microbial mineralization and disease processes

COURSE OUTCOME (CO'S)

1. Understand the basic microbial structure and functions of various physiological groups of prokaryotes and eukaryotes.
2. Learn the theory and practical skills in microscopy handling and staining techniques know various culture media and their applications.
3. Study microbial nutritions- Autotrophy and heterotrophy modes of nutrition.
4. Identify the unknown organisms by using microbial tools.
5. Demonstrate electricity generation from the organic matter.
6. Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy

UNIT – I

History of Microbiology. Microbial evolution and Diversity – Taxonomic ranks - Classification system – Phenetic and Phylogenetic Haeckel's three-kingdom concept, Whittaker's Five-kingdom concept, Three-domain concept of Carl Woese.

UNIT – II

Microscopy –Simple, Compound, Dark-field, Phase contrast, Fluorescent and Electron microscopes. (SEM and TEM), Confocal microscopy – Principles and their applications. Stains and Staining techniques: Simple, Differential staining methods.

UNIT – III

Classification of bacteria - Bergey's manual and its importance. Classification of algae Clamydomonas, volvox, diatoms, red and brown algae. Classification of virus – DNA, RNA viruses. Classification and taxonomy of fungi – Alexopolous. Economical importance of Fungi. Classification of protozoa – *Entamoeba histolytica*, *Giardia*, *Trichomonas*, *Plasmodium*.

UNIT – IV

Sterilization and disinfection, culture methods: Auxenic and synchronous, aerobic and anaerobic, culture media and nutritional types, growth curve, generation time and growth kinetics. Factors influencing microbial growth. Preservation methods and quality control.

UNIT – V

Modern Microbiology: Molecular taxonomy, 16S/18S rRNAs and its importance in identification of microorganisms. Phylogenetic tree, Molecular tools in assessing microbial diversity, Metagenomics, prebiotics and probiotics and their applications, microbial fuel cells.

TEXT BOOKS

1. Dubey, R.C. and D.K. Maheswari, 2010. A Text book of Microbiology. 3rd Edition, S. Chand and Company, New Delhi.
2. Modi, H. A., 1996. Elementary Microbiology. Vol.2, AKTA Prakashan Nadiad. Gujarat
3. Powar, C.B. and H.F. Dagainawala, 2008 .General Microbiology. Volume: II. Himalaya Publishing House.
4. Singh, R.P. 2007. General Microbiology. Kalyani Publishers, New Delhi.
5. Frobisher, H., Hinsdil, R.D., Crabtree, K.T. and Goodhert, D.R. 2005. Fundamentals of Microbiology, Saunder and Company, London.

REFERENCES

1. Holt, J.G., N.R. Krieg, P.H.A. Sneath, J.T. Staley and S.T. Williams, 2000. Bergey's Manual of Determinative Bacteriology. 9th Edition, Lippincott Williams and Wilkins Publishers. Baltimore.
2. Pelczar Jr. M.J., E.C.S. Chan and N.R. Kreig, 2004. Microbiology. 5th Edition. Tata McGraw-Hill Publishing Company. New Delhi.
3. Prescott, L.M., J.P.Harley and C.A.Klein, 2003. Microbiology, 5th Edition McGraw Hill Publishing Company Limited. New York.
4. Salle, A.J., 2007. Fundamental Principles of Bacteriology. 7th Edition, Envins Press, New York.
5. Tortora, G.J., Funke, B.R. and Case, C.L. 2010. Microbiology: An Introduction. 10th Edition. Pearson Education, Singapore.
6. Alcom, I.E. 2006. Fundamentals of Microbiology. VIII Edition, Jones and Bartlett Publishers, Sudbury. Massachusetts.
7. Stanier, R.Y., J.L. Ingraham, M.L. Wheelis and P.R. Painter, 2008. General Microbiology. 5th Edition. Macmillan Press Ltd. London.
8. Talaro K. P. and Talaro A. 2006. Foundations in Microbiology. 6th Edition. McGraw-Hill College Dimensi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- To gain the knowledge with the various inner and outer structures of prokaryotes and eukaryotes in detail.
- To provide information on sources of energy and its utilization by microorganisms. Microorganisms play important role in environment as producers, consumers and decomposers.
- To impart knowledge on metabolic function and biochemical reaction going on inside the microbial cell.
- To teach metabolic pathways, their regulation and engineering, and methods used in their elucidation.
- To teach students about cell cycle, growth and methods to determine microbial growth.
- Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy

COURSE OUTCOME (CO'S)

1. The students will be able to understand and predict the various metabolic reactions in microbial cell.
2. This will make them to predict the intermediate products which can be employed in industrial production processes.
3. The students will be able to know how bacterial and archaeal structure lead to function, how metabolic processes are regulated.
4. The course makes them to understand how microbes respond to environmental stressors, and how microbes can be manipulated to enhance their growth or the production of desired products.
5. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement
6. The students will be able to understand how the organisms communicate to the population by using various mechanisms.

UNIT – I

Microbial Anatomy:- Prokaryotic cell structure and organization, cell membrane, plasma membrane, cytoplasmic matrix, inclusion bodies, ribosome, nucleoid, prokaryotic cell wall, capsule, slime layers, S layers, pili and fimbriae, flagella and motility. Eukaryotic cell structure and its organelles. Lichens and microalgae: Structural organization and their properties; mycoplasma, basic structure of viruses.

UNIT – II

Formation of specialized structures:- Endo and exospores, endospore formation in *Bacillus* sp. Exospore formation in *Streptomyces*: Sporulation in fungi: *Aspergillus* sp., *Penicillium* sp.: Biofilm and biosurfactants in bacteria. Spore cycle, factors affecting spore formation.

UNIT – III

EMP, HMP and ED pathway, TCA cycle, Glyoxylate cycle. Aerobic respiration and anaerobic respiration. Generation of energy - substrate level and oxidative phosphorylation – ATP generation. Lipid metabolism.

UNIT – IV

Biosynthesis of fatty acids, nucleotide, amino acids, proteins, phospholipids, Archaeal lipids. Cell wall biosynthesis of Gram positive and Gram negative bacteria. Toxins- characterization, mechanism of action. Cell membrane synthesis and synthesis of secondary metabolites.

UNIT – V

Photosynthesis – Oxygenic and anoxygenic – The prototrophic prokaryotes- purple photosynthetic bacteria, sulfur oxidizing and reducing bacteria – methanogenesis – assimilation of carbondioxide – photosynthetic pigments, bioluminescence. Quorum sensing cell signaling – mechanism and applications.

TEXT BOOKS

1. Berg, J.M, Tymoczko J.L, Stryer L and Clarke N.D., 2001. Biochemistry. 5th Edition. WH Freeman & Co.
2. Doelle, H.W., 2005. Bacterial Metabolism. Elsevier India Pvt. Ltd., New Delhi.
3. Moat, A.G., and Foster J.W., 2003. Microbial Physiology. John Wiley and Sons, New York.
4. Nelson, D., and Cox M.M, 2009. Principles of Biochemistry. W.H. Freeman and Company, New York.

REFERENCES

1. Atlas, R.M., 1997. Principles of Microbiology. 2nd Edition. Wm. C. Brown Publishers, Iowa, US
2. Caldwell, D.R., 2008. Microbial Physiology and Metabolism. Second edition, Wm C Brown Publishers, England.
3. Madigan, M.T., J.M. Martinko and J. Parker, 2003. Brock Biology of Microorganisms. 10th Edition. Prentice Hall. New Jersey.
4. Rose, A.H., 2008. Chemical Microbiology – An Introduction to Microbial Physiology. International Edition, Plenum Publishing Corporation.
5. White, D., 2003. Physiology and Biochemistry of Prokaryotes. 2nd Edition. Oxford University Press. NY.
6. Voet, D, and Voet J.G, 2003. Biochemistry. John Wiley and Sons, New York.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To gain the knowledge with the various inner and outer structures of prokaryotes and eukaryotes in detail.
- To provide information on sources of energy and its utilization by microorganisms. Microorganisms play important role in environment as producers, consumers and decomposers.
- To impart knowledge on metabolic function and biochemical reaction going on inside the microbial cell.
- To teach metabolic pathways, their regulation and engineering, and methods used in their elucidation.
- To teach students about cell cycle, growth and methods to determine microbial growth.
- Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy

COURSE OUTCOME (CO'S)

- 1.The students will be able to understand and predict the various metabolic reactions in microbial cell.
- 2.This will make them to predict the intermediate products which can be employed in industrial production processes.
- 3.The students will be able to know how bacterial and archaeal structure lead to function, how metabolic processes are regulated.
- 4.The course makes them to understand how microbes respond to environmental stressors, and how microbes can be manipulated to enhance their growth or the production of desired products.
- 5.Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement
- 6.The students will be able to understand how the organisms communicate to the population by using various mechanisms.

UNIT – I

Genetics – historical introduction – Mendelian principles – nucleic acid as genetic information carriers: Experimental evidence– The duplex DNA – chemical and physical structure of DNA – circular and superhelical DNA - different forms of DNA. DNA replication – enzymology of DNA replication- different modes, models and types of DNA replication- Eukaryotic DNA replication.

UNIT – II

Mutagen – mutation – mutagenesis - Luria Delbruck experiments and its significance –molecular basis of mutation–spontaneous and induced mutations - Different types of mutation - mutant detection - mutant

selection – carcinogenicity testing. DNA damage -types of damage (deamination, oxidative damage, alkylation, Pyrimidine dimers) - DNA repair mechanism (base excision, nucleotide excision, recombination repair, SOS repair).

UNIT – III

Genetic code - DNA transcription in prokaryotes and eukaryotes. Transcriptional control and modification system– RNA translation in prokaryotes and eukaryotes. Polypeptide synthesis (maturation and processing of RNA) - Translational modification - Regulation of gene expression – Operon model (Lac, Trp, Ara) - Regulation of gene expression in eukaryotes.

UNIT – IV

Genetic recombination in bacteria – conjugation, transformation, transduction. Linkage and genetic mapping. Phage genetics (Replication cycle) – Phage T4 mutants (detection and isolation) – Genetic recombination – Genetic map of T4 phage, Gene mapping.

UNIT – V

Yeast genetics - Life cycle - metabolism – Genomes - extra chromosomal element - genetic nomenclature - tetrad analysis. Petite mutants (mutant isolation and complementation) - Gene conversion and gene mapping in Yeast. Genetic mapping in *Neurospora*. Genetic mapping in *Drosophila*.

TEXT BOOKS

1. Malacinski, G. M, 2008. Freifelder's Essentials of Molecular Biology Molecular Biology. Narosa Publishing House. New Delhi.
2. Verma, P. S. and Agarwal, V. K., 2008: Cell Biology, Genetics, Molecular Biology and Evolution. S. Chand & Company Ltd, New Delhi
3. Gardner, E.J., M.J. Simmons and D.P. Snustad, 2008. Principles of Genetics. 8th Edition. John Wiley and Sons, NY.
4. Guthrie, C., and G. Fink, 2002. Guide to Yeast Genetics and Molecular Cell Biology. Elsevier Publication, USA.
5. Klug, W.S. M.R. Cummings, C. A. Spencer and M. A. Palladino, 2009. Essentials of Genetics. 7th Edition. Prentice Hall, New Jersey.
6. Maloy, S.R., J.E. Cronan Jr and D. Freifelder, 2001. Microbial Genetics. Narosa Publishing House. New Delhi.
7. Weaver, R.F., 2002. Molecular Biology. 2nd Edition. McGraw-Hill, New York.

REFERENCES

1. Alberts, 2008. Molecular Biology of The Cell, 5th Edition, Garland Science, Taylor and Francis group, LIC, an Informa Science.
2. Griffiths et al, 2002. Modern genetic analysis, 2nd Edition, Freeman.
3. Hartl and Jones, 1998. Genetics-Principles and Analysis, 4th Edition, Jones & Bartlett.
4. Krebs, E.J., S.T.Kilpatrick and E.S.Goldstein, 2008. Lewin's Genes X, 10th Edition , Jones and Bartlett publishers Canada.
5. Nelson, D., and M.M.Cox , 2008. Lehninger's Principles of Biochemistry, 5th Edition, McMillan.
6. Tamarin, R.H., 2001. Principles of Genetics. 7th Edition. Wm. C. Brown Publishers. England

7. Turner, P., A. McLennan, A. Bates and M.White.2005. Molecular Biology.3rd Edition. Taylor and Francis group.
8. Watson, J.D., T. Baker, S. Bell, A. Gann, M. Levine and R. Losick, 2008. Molecular Biology of Genes. 6th Edition, Pearson Education.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- Introduce the basic concept of qualitative and quantitative analysis of a given sample
- To Study various spectroscopic techniques and its instrumentation.
- To know the concept of separation science and its applications.
- To understand the basic laboratory skills that are essential for beginning-level employment in clinical, pharmaceutical, microbiology, biochemistry and biotechnology laboratories.
- To impart the concept of radiochemical analysis along with industrial analyzers
- To understand working of different laboratory equipment's used in microbiological laboratories

COURSE OUTCOME (CO'S)

1. This enables students to be able to explain bioinstrumentation techniques, design and application.
2. To know the concepts and operation of various lab instruments and related terms.
3. Acquire knowledge and lab skills to perform experiments in laboratory.
4. Connect the concepts of physics, chemistry and engineering principles in the instrumentation.
5. The students will be able to know all the basic principles, technology and applications of various instruments in life science.
6. Comprehend the techniques and the underlying principles in bioinstrumentation.

UNIT – I

Spectroscopy – properties of electromagnetic radiations, Instrumentation and applications of – UV Visible light spectroscopy, spectrofluorimeter, atomic spectroscopy, FTIR, NMR spectroscopy and MALDI –TOF. Flow cytometer.

UNIT – II

Centrifugation – principle, types of centrifuges, principles and applications of analytical and preparative centrifuge, density gradient and ultra centrifuge. Relative molecular mass determination and sedimentation coefficient. Sub-cellular Fractionation of cellular components.

UNIT – III

Chromatography - principle, instrumentation and applications of ion exchange chromatography, affinity, gel filtration and column chromatography. Low pressure liquid chromatography (LPLC) and high

performance liquid chromatography (HPLC) and fast protein liquid chromatography (FPLC), gas liquid chromatography mass spectroscopy (GC – MS).

UNIT – IV

Electrophoresis - principle, instrumentation and applications of agarose gel electrophoresis, sodium doecyl sulphate – polyacrylamide gel electrophoresis (SDS-PAGE), native PAGE, isoelectric focusing, immuno electrophoresis, pulse field gel electrophoresis, capillary electrophoresis, gel documentation – applications.

UNIT – V

Radioisotopic techniques – introduction, nature of radio activity, types and rate of radio active decay, units of radio activity, detection and measurement of radio activity. Principle, instrument and applications of Geiger-Muller counter, solid and liquid scintillation counter and autoradiography. Biosafety methods in radio active laboratory.

TEXT BOOKS

1. John Enderle Bioinstrumentation. 2006. Morgan and Claypool Publishers. NJ.
2. Richard Normann. 1988. Principles of bioinstrumentation. Wiley Publishers.US.
3. Keith Wilson and John Walker. 2010. Principle and Techniques of Biochemistry and molecular biology. 7th Edition. Cambridge university press. NY.

REFERENCES

1. Boyer, R., 2000. Modern Experimental Biochemistry. 3rd Edition. Addison Wesley Longman. New Delhi.
2. Chatwal, G.R. and Anand, S. K, 2003. Instrumental Methods of Chemical Analysis. 5th Edition, Himalaya Publishing House, Mumbai
3. Friedfelder, D., 2001. Physical Biochemistry: Applications to biochemistry and molecular biology. Oxford Publishers. New York.
4. Sharma, B.K., 2007. Instrumental Methods of Chemical Analysis, Krishna Prakashan Media (P) Ltd, India. .
5. Wilson, K and Walker, J, 2010. Principles and Techniques of Biochemistry and Molecular Biology, 7th Low Price Edition, Cambridge University Press, India.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To educate the students about concepts of designs of water distribution systems, sewer networks, working principles and design of various physical, chemical and biological treatment systems of water and wastewater.
- To study about the biofertilizers, plant disease and increasing soil fertility.
- To impart a skilled knowledge on Microbes and environment and ecological importance.
- The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.
- The knowledge can give the base for understanding processes and changes in the environment.
- The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.

COURSE OUTCOME (CO'S)

1. This course will provide the student insights into these invaluable areas of Environmental microbiology, which play a crucial role in determining its future use and applications in environmental management.
2. Students able to know detailed idea about biofertilizer production and plant disease.
3. Students able to become Entrepreneur after understanding this process and product development.
4. This course will determine microbial role in nutrient cycling
5. This course can able to determine water quality.
6. It will explain the degradation of natural organic compounds and selected pollutants in the environment.

UNIT – I

Aquatic environment - microbiology of water - water pollution and water borne pathogens. Bacteriological examination of water, indicator organism. Microbiology of sewage. Chemical and biochemical characteristic of sewage. methods of sewage treatment - physical screening, chemical, biological (sludge digestion; activated sludge, aerating filters, oxidation pond).

UNIT – II

Microbiology of air - Microbial contaminants of air, sources of contamination, microbial indicators of air pollution. Enumeration of bacteria in air. Air samplers and Sampling techniques. Air sanitation.

UNIT – III

Bioremediation – contaminated soil, aquifers, marine pollutants, air pollutants, stimulation of oil spills degradation. Bioremediation of air pollutants. Bioleaching – recovery of metal from ores – oxidation of minerals – testing for biodegradability.

UNIT – IV

Biological nitrogen fixation - symbiotic and non-symbiotic microorganisms, root nodule formation, nitrogen fixers, hydrogenase, Nitrogenase, *Nif* gene regulation. Biochemistry of nitrogen fixation, Rhizosphere- R: S ratio, Interaction of microbes with plants. Bioconversion of agricultural wastes.

UNIT – V

Biofertilizer - Application of biofertilizers and biomanures – A combination of biofertilizer and manure applications with reference to soil, seed and leaf sprays. Laboratory and field application; Cost-benefit analysis of biofertilizer and biomanure production.

TEXT BOOKS

1. Subba Rao, N.S., 1999. Biofertilizers in Agriculture and Agroforestry. Oxford and IBH, New Delhi.
2. Rangaswami, G. and D.J. Bhagyaraj, 2001. Agricultural Microbiology. 2nd Edition. Prentice Hall, New Delhi.
3. Rao, N.S., 1995. Soil Microorganisms and plant Growth. Oxford and IBH Publishing Co., New Delhi.
4. Pelzar, M.J. and M. Reid, 2003. Microbiology. 5th Edition. Tata Mc Graw-Hill. New York.
5. Reinheimer, G., 1991: Aquatic Microbiology. 4th Edition. John Wiley and Sons. New York.

REFERENCES

1. Joseph C. Deniel, 1996, Environmental aspects of microbiology, British Sun Publication, Chennai.
2. Abbasi, S.A. 1998. Environmental pollution and its control. Cogent International publishers, Pondicherry.
3. Keya Sen and Nicholas J. Ashbolt 2010. Environmental Microbiology: Current Technology and Water Applications.
4. Josdand, S.N., 1995. Environmental Biotechnology. Himalaya Publishing House, Bombay.
5. Maier, R.M., Pepper, I.L., Gerba, C.P. 2009. Environmental Microbiology IInd Edition Elsevier Publisher.
6. Metcalf, R.L. and Luckmann, W.H. 1994. Introduction to insect pest management 3rd edn. John Willey and Sons, Inc.
7. Atlas, R.M. and M. Bartha, 2000. Microbial Ecology - Fundamental and Applications. 3rd Edition. Redwood City CA. Benjamin/Cumming Science Publishing Co., New Delhi.
8. Maier, R.M., I.L. Pepper and C.P. Gerba, 2000. Environmental Microbiology. 1st Edition. Academic Press. New York.

9. Mitchell, R., 1992. Introduction to Environmental Microbiology; Prentice Hall. Inc. Englewood Cliffs-New Jersey.
10. Motsara, M.R., P. Bhattacharyya and B. Srivastava, 1995. Biofertilizer- Technology, Marketing and Usage. Fertilizer Development and Consultant Organization, New Delhi.

Instruction Hours / week: L: 0 T: 0 P:4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- This course is put forward with the objectives of equipping the candidates with practical knowledge on basic techniques involved in the isolation, characterization and identification of different types of microorganism.
- Know various Culture media and their applications and also understand various physical and chemical means of sterilization.
- Know General bacteriology and microbial techniques for isolation of pure cultures.
- Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively.
- Comprehend the various methods for identification of unknown microorganisms.
- Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism

COURSE OUTCOME

1. A student able to skillfully isolate and identify the microorganisms using different microbiological techniques needed in laboratory.
2. To enhance the ability of the student skills in medical laboratories and research sectors.
3. Demonstrate practical skills in the use of tools, technologies and methods common to microbiology.
4. To apply the scientific method and hypothesis testing in the design and execution of experiments
5. To develop theoretical and practical skills in the design and execution of experiments.
6. Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.

1. Micrometry
2. Measurement of pH
3. Staining techniques: Simple, Gram, Negative and Endospore
4. Motility determination - Hanging drop and SIM inoculation
5. Cultivation of anaerobic microorganisms – Wrights tube – Mc Intosh anaerobic jar - roll tube methods.
6. Permanent slide preparation
7. Lactophenol cotton blue mounting of fungi - *Aspergillus* sp, *Mucor* sp, *Rhizopus* sp, *Fusarium* sp, *Penicillium* sp
8. Measurement of microbial growth – Viable count – Direct count – Turbidity methods

9. Biochemical characterization
 - a) Indole
 - b) MR
 - c) VP
 - d) Citrate utilization tests
 - e) TSI test
 - f) Catalase
 - g) Oxidase
 - h) Urease
 - i) Nitrate
 - j) Hydrogen sulphide production test
 - k) Litmus milk reduction test
 - l) Carbohydrate fermentation tests
 - m) Amino acid utilization
 - n) Hydrolysis of polymers- Starch, Lipid, Casein, Gelatin.

REFERENCES

1. Aneja, K.R., 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology, 3rd Edition, New Age International (P) Limited Publishers, New Delhi.
2. Cappucino, J.G. and N. Sherman, 2001. Microbiology A Laboratory Manual, 6th Edition, Benjamin Cummings, New York.
3. Dubey, R.C. and D.K. Maheshwari, 2002. Practical Microbiology, 1st Edition, S. Chand and Company Ltd, New Delhi.
4. Gunasekaran, P., 1996. Lab Manual in Microbiology, 1st Edition, New Age International (P) Ltd, Publishers , New Delhi.

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100**COURSE OBJECTIVES**

- To acquire skill on the different molecular mechanism of gene transfer, mutations and separation of nucleic acids.
- This course is put forward with the objectives of equipping the candidates with practical knowledge on basic techniques.
- To impart skills of isolation, characterization and identification of different types of microorganism.
- Know various Culture media and their applications and also understand various physical and chemical means of sterilization.
- To make students understand the principles of Genetics
- Students will learn the basic principles of inheritance at the molecular, cellular and organismal levels.

COURSE OUTCOME

1. A student undertaking this course will be learning the principles behind the molecular techniques which would enable him to work in competent molecular biology based laboratories.
2. Imparts knowledge on the different aspects of genetics and pedigree analysis.
3. Students will apply their knowledge of to selected examples of changes or losses in cell function.
4. Identify the organs and tissue systems of plants, and explain their respective function.
5. Impart knowledge on applications of microorganisms in various fields
6. Provides skill development on microbial products.

EXPERIMENTS

1. Spontaneous Mutation – gradient plate technique
2. Induced Mutagenesis-chemical and physical - UV
3. Replica plating technique.
4. Isolation of Mutants and Revertants
5. Transformation in Bacteria
6. Bacterial Conjugation
7. Induction of Lac operon
8. Measurement of growth-one step growth curve using a T even phage
9. Titration of phages (T4)
10. Nuclear staining for nucleic acid identification.
11. Spectrophotometric estimation of protein – BSA
12. Analysis of amino acid by Paper chromatography
13. Analysis of amino acid by Thin layer chromatography
14. Purification of metabolites by column chromatography

15. Analysis of amino acid by HPLC

REFERENCES

1. Arora, B. and D.R. Arora, 2007. Practical Microbiology, 1st Edition, CBS Publishers and Distributors, Bangalore.
2. Benson, H.J., 1998. Microbiological Application (Laboratory Manual in General Microbiology), 7th Edition, WCB.
3. Palanivelu, P., 2004. Analytical Biochemistry and Separation Techniques, 3rd Edition, Twenty First Century Publication, Madurai.
4. Chakraborty, P. and N.K. Pal, 2008. Manual of Practical Microbiology and Parasitology, New Central Book Agency (P) Ltd, India.
5. Gaud, R.S. and G.D. Gupta, 1999. Practical Microbiology, 1st Edition, Nirali Prakashan, Pune.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Virology, often considered a part of microbiology or of pathology, is the study of biological viruses and virus like agents.
- Viral structure, classification and evolution, their ways to infect and exploit cells of virus reproduction, the disease they cause.
- The techniques to isolate and culture them and their potential uses in research and therapy.
- To know how viruses are classified
- To understand the architecture of viruses
- To understand the interactions between viruses and the host immune system

COURSE OUTCOMES

1. Describe the structure and replication strategies of the viruses, the processes of entry into cells, control of gene transcription and where relevant translation and gene product stability, control of and mechanism of genome replication, virion assembly and egress from the cell.
2. Define the process of virus latency and describe in molecular terms control of the process and activation of viral genomes during reactivation.
3. Describe the growth behavior differences between normal cells and cells transformed by oncogenic DNA and RNA viruses.
4. Integrate experimental strategies learned in the context of viral systems into the design of experiments involving other systems.
5. Discern the replication strategies of representative viruses from the seven Baltimore classes
6. To understand the interactions between viruses and the host immune system

UNIT – I

Historical perspective of virology - Scope of virology -Viral classification and properties of viruses – Replication of viruses, cultivation of viruses (animal inoculation, Embryonated egg and tissue culture) - properties of viroids and Prions.

UNIT – II

Animal viruses- DNA viruses - morphology, replication, pathogenesis and laboratory diagnosis of Pox virus, Adeno virus, Hepatitis viruses – type A,B and D. Herpes simplex viruses, oncogenic viruses- Papova virus,- oncogenes and Oncogenesis.

UNIT – III

Animal viruses - RNA viruses - morphology, replication, pathogenesis and laboratory diagnosis of Poliovirus. Rabies virus, Influenza virus, mumps virus, Measles virus and rubella virus, Retro virus - HIV virus. Dengue and Japanese Encephalitis, SARS, Swine Flu.

UNIT – IV

Plant viruses – RNA viruses – TMV, Cowpea mosaic virus, Bromomosaic viruses, Satellite viruses – Double stranded DNA viruses – CaMV – Single stranded DNA viruses – Gemini virus. Structure and replication of Bacteriophage (T4) – Filamentous phage (ΦX174).

UNIT – V

Common type of hospital infections – hospital waste disposal. Viral vaccines and interferons - Antiviral drugs - strategies to develop AIDS vaccines - Rabies vaccines preparation (animal and cell culture) and their immunization dosage.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text book of Microbiology. 7th Edition. Orient Longman. New Delhi.
2. Carter J & Saunders V. 2007. Virology: Principles and Applications. 1stEd. Wiley.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Dubey, R.C. and D.K. Maheswari, 2004. A Text book of Microbiology. 1st Edition, S. Chand and Company Ltd, New Delhi.
5. Pelczar, Jr. M.J., E.C.S. Chan and K. R. Kreig, 2003. Microbiology 5th Edition Tata McGraw-Hill Publishing Company. New Delhi.

REFERENCES

1. Acheson NH. 2006. Fundamentals of Molecular Virology. Wiley publication.
2. Cann, A.J, 2005. Principles of Molecular Virology, Academic Press.
3. Dimmock, N.J., A.J. Easton and K.N. Leppard, 2007. Introduction to Modern Virology, 6th Edition, Blackwell Scientific Publications, Oxford, UK.
4. Flint, S. J., V. R. Racaniello, L. W. Enquist, V. R. Rancaniello, and A. M. Skalka., 2003. Principles of Virology: Molecular Biology, Pathogenesis, and Control of Animal Viruses. American Society Microbiology.
5. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers, NY.
6. Jay A. Levy, Heinz Fraenkel-Conrat, and Oliver S. Owens., 1994. Virology. 3rd Edition Benjamin Cummings.
7. Knipe D.M., Howley P.M., Griffin D.E. 2006. Fields Virology. 5th Ed. Vols. I,II. Lippincott, Williams & Wilkins.
8. Prescott, M., J.P. Harley and D.A. Klein, 2007. Microbiology. 7th Edition, McGraw-Hill Inc. New York.
9. White, D. O., Fenner, F. J. 1994. Medical Virology, 4th edition, Academic Press, New York.

Instruction Hours / week: L: 5 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Medical Bacteriology introduces basic principles and then applies clinical relevance of many etiological agents responsible for global infectious diseases.
- The infectious disease cycle of the pathogens enables to solve the epidemics.
- The territory covered by infections and the immune response
- We focus on pathogenic mechanisms in order to foster a student's ability to solve problems in their future clinical career and able to establish the medical laboratory.
- This course provides learning opportunities in the basic principles of medical microbiology and infectious disease
- It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora

COURSE OUTCOMES

1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.
2. Application of molecular techniques to medical microbiology; biochemical and genetic mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobials.
3. Demonstrate an understanding of skin and respiratory tract infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify unknown organisms in clinical samples, and describe the pathogenesis of important pathogens.
4. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
5. To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.
6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.

UNIT – I

Laboratory precaution and guidelines – Aseptic collection – transportation – handling and examination of pathological specimens – methods of isolation, identification and interpretation of pathogenic organisms – antibiotic susceptibility testing..

UNIT – II

Infections – types – methods – infectious disease cycle. Definitions of Epidemics, Endemics Pandemics and investigation of epidemics and control. Definition of pathogens, Saprophytes and Commensals. **Quality control in microbiology lab.**

UNIT – III

Gram positive organisms: Morphology, cultural characteristics, antigenic property, pathogenicity, laboratory diagnosis and treatment. *Staphylococcus* sp., *Streptococcus* sp., *Bacillus* sp., *Corynebacterium* sp., *Clostridium* sp. and *Mycobacterium* sp.

UNIT – IV

Gram negative organisms: Morphology, cultural characteristics, antigenic property, pathogenicity, laboratory diagnosis and treatment. *E.coli*, *Klebsiella* sp., *Proteus* sp., *Pseudomonas* sp., *Vibrio* sp., *Salmonella* sp., *Shigella* sp., *Treponema* sp., *Neisseria* sp. and *Haemophilus* sp.

UNIT – V

Nosocomial infection – Urinary tract infection, Respiratory tract infection, Sexually transmitted disease – Immunoprophylaxis – Vaccines and antibiotics.- Phage typing and bacteriocin typing.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. A.J.Salle. Fundamentals principles of bacteriology. 2008. T.M.H. Edition. Mc Graw Hill.
3. Carl Fraenkel. Text book of bacteriology. 2012. Printing company publishers, New York.

REFERENCES

1. Brook,G.F., J. S. Butel, A. Stephen and Morse, 2003. Medical Microbiology, 22nd Edition. Mc Graw Hill.
2. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
3. Dismukes, W.E., P.G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press, UK.
4. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. NY.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Medical Bacteriology introduces basic principles and then applies clinical relevance of many etiological agents responsible for global infectious diseases.
- The infectious disease cycle of the pathogens enables to solve the epidemics.
- The territory covered by infections and the immune response
- We focus on pathogenic mechanisms in order to foster a student's ability to solve problems in their future clinical career and able to establish the medical laboratory.
- This course provides learning opportunities in the basic principles of medical microbiology and infectious disease
- It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora

COURSE OUTCOMES

1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.
2. Application of molecular techniques to medical microbiology; biochemical and genetic mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobial agents.
3. Demonstrate an understanding of skin and respiratory tract infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify unknown organisms in clinical samples, and describe the pathogenesis of important pathogens.
4. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
5. To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue.
6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.

UNIT – I

Introduction to microbial technology, restriction enzymes – nomenclature – types – and its properties, isolation of DNA, plasmids and RNA. Handling and quantification of nucleic acids, radiolabelling and non radiolabelling of nucleic acids, gel electrophoresis - Blotting techniques – Southern, Northern and Western blotting techniques.

UNIT – II

Cloning vectors: Plasmid as cloning vectors - pBR322, Bacteriophage - ϕ , M13; Cosmid, phagemids. Yeast vector. Expression vectors. Prokaryotic hosts: *E.coli*, Eukaryotic hosts: Yeast cell. Gene cloning - basic steps, cloning construction of cDNA, selection and screening method of recombinants. Biolabelling of genes and proteins.

UNIT – III

Transgenic plants: Methodology, development of herbicide resistance plants, delayed fruit ripening, Biocontrol agents - Insecticidal toxin of BT, cry gene and baculovirus. Transgenic animals. Methodology, development of transgenic mice – its application. DNA diagnostic in medical forensics. Biosafety and Bioethics.

UNIT – IV

Patenting – fundamental requirements – patenting multicellular organisms – patenting and fundamental research. Patenting of biological materials, Product patents, conditions for patenting, Patenting of liveforms, regulating recombinant technology, Food and food ingredients. Trade secrets. How do write a patent?.

UNIT – V

Discrepancies in biotechnology / chemical patenting. IPR – historical perspective – recent developments – IPR in India, IPR and the rights of farmers in developing countries.

TEXT BOOKS

1. Sathyanarayana, U., 2005. Biotechnology. 1st Edition. Books and Allied (P) Ltd., Kolkata, India.
2. Dubey, R.C., 2002. Text book of Biotechnology. S. Chand and Company Ltd., New Delhi.
3. Ramawat, K.G., 2003. Text book of Plant Biotechnology. S. Chand and Company Ltd. New Delhi.
4. Watson, J.D., M. Gilman and J. Wikowski, 2001. Recombinant DNA. 2nd Edition, Scientific American Books. W.H. Freeman and Co. NY.
5. Verma, A. and Podila, G.K. 2005. Biotechnological Applications of Microbes. I.K. International Publishing House. New Delhi.

REFERENCES

1. Brown, T.A., 2001. Gene Cloning and DNA analysis: An Introduction. 4th Edition. Blackwell Publishing, USA.
2. Glick, B.K. and J.J. Pasternak, 2003. Molecular Biotechnology. Principles and Applications of Recombinant DNA. 3rd Edition. ASM Press, Washington.
3. Old, R.M. and S.B. Primrose, 2003. Principles of Gene Manipulation. 6th Edition. Blackwell Scientific Publication. London.
4. Primrose, S.B., 2001. Molecular Biotechnology 2nd Edition. Blackwell Scientific Publishers, Oxford Press, London.
5. Winnacker, E.L., 2003. From Genes to Clones: Introduction to Gene Technology. 1st Edition, VCH. Weinheim. Germany.
6. Slater, A. and N. Scott, 2003. Plant Biotechnology - The Genetic Manipulations of plants. 2nd Edition, Oxford University Press. New York.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****Course Objectives**

- To educate the students about concepts of designs of water distribution systems, sewer networks, working principles and design of various physical, chemical and biological treatment systems of water and wastewater.
- To study about the biofertilizers, plant disease and increasing soil fertility.
- To impart a skilled knowledge on Microbes and environment and ecological importance.
- The main goal is to know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.
- The knowledge can give the base for understanding processes and changes in the environment.
- The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.

COURSE OUTCOME (CO'S)

7. This course will provide the student insights into these invaluable areas of Environmental microbiology, which play a crucial role in determining its future use and applications in environmental management.
8. Students able to know detailed idea about biofertilizer production and plant disease.
9. Students able to become Entrepreneur after understanding this process and product development.
10. This course will determine microbial role in nutrient cycling
11. This course can able to determine water quality.
12. It will explain the degradation of natural organic compounds and selected pollutants in the environment.

UNIT – I

Marine microorganisms: collection, preservation, enumeration (total and viable counts), isolation of culture and identification based on morphological, physiological and biochemical characteristics. International and national collection centres.

UNIT – II

Extremophiles: Thermophiles, basophiles, halophiles, psychrophiles, acid – alkaliphiles, oligotroph, toxotolerant, xerotolerant, endolith – Extremophiles and their environment, biodiversity. Genomics of extremophiles, phylogeny of extremophiles, 16S RNA classification in mitochondrial DNA genome, RAPD, RFLP studies.

UNIT – III

Microbiology of degradation of xenobiotic environment: Ecological considerations, decay behaviour, degradative plasmids, hydrocarbons, oil pollution, surfactants, pesticides, Bioremediation:- Factors affecting bioremediation – role of microbes in the marine nutrient cycles – diseases of marine organisms and its impact on marine biodiversity.

UNIT – IV

Brief account of photosynthetic and accessory pigments: Chlorophyll – bacterial chlorophyll – carotenoids – rhodopsin, phycobilliprotein, carbohydrates, anabolism – autotrophy – photosynthesis – autotrophic generation of ATP, fixation of CO₂ – Calvin cycle– C₃ and C₄ pathway.

UNIT – V

Bar coding of marine organisms: Genome sequencing and physical mapping of genome. Composting of domestic, agricultural and industrial wastes, vermicomposting. SCP production; Mushroom cultivation.

TEXT BOOKS

1. Colin Munn. Marine Microbiology: Ecology & Applications. 2011. 2nd edition. Black Well Publishers.
2. David Sige. 2005. Freshwater Microbiology: Biodiversity and Dynamic Interactions of Microorganisms in the Aquatic Environment. 1st Edition. Black well Publishers.
3. Se-Kwon Kim. 2013. Bioactive compounds and biotechnological applications. CLS Publishers

REFERENCES

1. Dube, H.C., 1994. A text book of fungi, bacteria and viruses. Vikas Publishing House, New Delhi.
2. Dale, J.W. 1994. Molecular genetics of Bacteria. John Wiley and Stones.
3. Pelczar, M. JR. E.C.s. and Chan and Noel, R. K. 2006. Microbiology. Tata McGraw, Hill. Co. 5th Edition, New Delhi.
4. Presscott, L.N., Harley, J.P. and Klein, D.A. 1999. Microbiology. W.C. Brown Publishers.
5. Stanier, R.Y., Ingharam J.L. Wheelis, M.L. Painter, P.R. 1986. General Waste water engineering Treatment, Disposal and Reuse. Metcaff and Eddy. Inc., Tata Mc Grew Hill, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- About collection, interpretation and presentation of statistical data
- The analytics of data, probability, and hypothesis testing of samples
- The essential role of statistics in present, future use and applications of Biology.
- To equip students with a basic understanding of the underlying principles of quantitative and qualitative research methods.
- Provide students with in-depth training on the conduct and management of research from inception to completion using a wide range of techniques
- The ethical and philosophical issues associated with research in education

COURSE OUTCOMES

1. Apply basic statistical concepts commonly used in health and medical sciences
2. Use basic analytical techniques to generate results
3. Interpret results of commonly used statistical analyses in written summaries.
4. Demonstrate statistical reasoning skills correctly and contextually.
5. Provide learning opportunities to critically evaluate research methodology and findings.
6. Enable students to be reflexive about their role and others' roles as researchers.

UNIT – I

Information networks-internet, web browsers, HTTP,HTML and URLs. EMBnet – NCBI, Virtual tourism. Introduction to Operating systems like Windows, UNIX & LINUX - Computer Viruses – Overview and prevention.

UNIT – II

Bioinformatics tools - Global Vs local alignment – Similarity searching –Pair wise alignment and multiple alignments – Biological Databases – Literature, Sequence and Structure – identification and retrieving data from databases.

UNIT – III

Protein information resources –primary sequence database, Composite protein sequence database, secondary database, and Composite protein structure database. Protein structure prediction - Proteomic tools at ExPASy server.

UNIT – IV

Protein structure comparison and classification – RNA structure analysis – Plasmid mapping and Primer designing– Structure visualization softwares – Phylogenetics – Tree types and construction methods.

UNIT – V

DNA sequencing –Specialized genomic resources. DNA microarray – principles and databases – Genomics and Proteomics – genes prediction, splices sites and regulatory regions – Drug designing and Commercial Bioinformatics.

TEXT BOOKS

1. Hooman Rashidi, Lukas K. Buehler, 2005. Bioinformatics Basics: Applications in Biological Science and Medicine. CRC Press/Taylor & Francis Group.
2. Stephen A. Krawetz, David D. Womble. Stephen A. Krawetz, David D. Womble. 2003. Introduction to Bioinformatics: A theoretical and Practical approach. Humana Press, USA.
3. Bryan Bergeron. 2002. Bioinformatics Computing. Prentice Hall Publishres.

REFERENCES

1. David W. Mount, 2001, Bioinformatics. Sequence and Genome Analysis, Cold Spring Harbor Laboratory Press.
2. Higinns D and W. Taylor, 2000, Bioinformatics. Sequence, Structure and databanks – A Practical Approach, Oxford University Press.
3. Baxevanis A.D and B.F. Francis Ouellette, 2001, Bioinformatics – A Practical Guide to the Analysis of Genes and Proteins, Wiley – Interscience.
4. G. Gibson and S.V. Muse, 2002, A Primer of Genome Science, Sinauer Associates, Inc. Publishers.
5. S. Misener and S.A. Krawetz, 2000, Methods in Molecular Biology – Bioinformatics. Methods and Protocols, Humana Press.
6. Attwood T.K and D.J. Parry-Smith, 2001, Introduction to Bioinformatics, Pearson Education Asia.
7. Claverie J.M, C. Notredame, 2003, Bioinformatics for Dummies, Wiley Publishing, Inc

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVE**

- This course has been intended to provide knowledge about the Bio nanomaterials synthesis and its advancement.
- To foundational knowledge of the Nanoscience and related fields.
- To make the students acquire an understanding the Nanoscience and Applications
- To help them understand in broad outline of Nanoscience and Nanotechnology.
- Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment
- Apply their learned knowledge to develop Nanomaterial's.

COURSE OUTCOME (CO'S)

1. Students get an idea about application of nanotechnology in biology.
2. It provide analytical knowledge of trends and developments in the field of nanotechnology
3. Acquire knowledge in nanotechnology and how it will support the employment greatly.
4. Students able to construct hierarchy strategy in machine.
5. Able to describe self-application and machine phase biotechnology.
6. Students have an enhanced knowledge and understanding of chemical transformation and biomolecular sensing.

UNIT – I

Biotechnology to Bionanotechnology: Bionanomachines – Modern bionano materials – protein, nucleic acid, lipids used for carrying information – polysaccharides use in special structural roles – Present status of bionanotechnology.

UNIT – II

Molecular design for nanotechnology: Recombinant DNA technology – X-ray crystallography, NMR spectroscopy and electron microscopy, use in nanotechnology – Computer modeling to bionanomachines and computer assisted molecular design.

UNIT – III

Structural principles of Bionanotechnology: Natural bionanotechnology design for specific environment – Biomolecular structure as low materials – Hierarchical strategy in construction of nanomachines – protein folding – self organization – molecular recognition – flexibility.

UNIT – IV

Functional principles of Bionanotechnology: Information driven nano assembly – chemical transformation – biomolecular sensing – self application – machine phase bionanotechnology.

UNIT – V

Future of Bionanotechnology: Problems in bionanotechnology – Abide finger problem – Sticky finger problem – role of enzyme to solve these problems – Core studies – nonotube synthesis, nanoscale assembler, nanosurveillance – ethical consideration – respect for life, potential dangers, fuel

TEXT BOOKS

1. David S. Goodsell. Bionanotechnology. 2004. Wiley-Blackwell.
2. Kenneth Gonsalves, Craig Halberstadt, Cato T. Laurencin, 2007. Biomedical Nanostructures. Wiley-Blackwell.
3. Cristina Sabliov, Hongda , Rickey Yada. 2015. Nanotechnology and Functional Foods. Wiley-Blackwell Publishers
4. Rakesh Kumar, Kamalapati Tiwari. A Textbook of Nanoscience. 2013. Publisher: S.K. Kataria & Sons.

REFERENCES

1. David S. Goodsell, 2004. Bionanotechnology, Lessons from nature, John Wiley & Sons Inc. publication.
2. David S. Goodsell, 1996. Biomolecules and Nanotechnology, Ancient Scientist, 88, 230 – 237.
3. Blundell T. L. and Johnson L. N, 1976. Protein crystallography, New York.
4. Eisenberg. D and D. Crothers 1979. Physical Chemistry with Applications to the Life Sciences. Benjamin Cummings, Menlo Park, California.
5. Ausubel, F. M., Brent R. Kingston R. E., Moore, D. D., Siedman, J. G., Smith, J. A. and Struhl K, 1999. Short protocols in Molecular Biology, Fourth Edition. Wiley, New York.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVE**

- 1.To learn the information on an organism's evolutionary relationships based on phylogeny.
- 2.To emphasize on molecular analysis of the microorganisms for species confirmation.
- 3.To know molecular techniques
- 4.To study DNA, RNA and Protein
- 5.To know biochemical taxonomy
6. To study gene molecular level.

COURSE OUTCOME

- 1.Students can gain the knowledge to construct phylogenetic tree, multiple sequence alignment.
2. Able to understand the various groups of microorganisms are genetically related
3. Able to trace their evolution.
- 4.Student can get employment in the biodiversity division.
5. Students able to know the species at genetic level.
6. Students able to understand the DNA, RNA and Protein level of conformation.

UNIT – I

Introduction to microbial taxonomy – morphological taxonomy, biochemical taxonomy, and molecular taxonomy. Numerical taxonomy – basic concepts of taxonomy. Positive and negative aspects of each taxonomical methods. Morphological phylogeny

UNIT- II

Molecular taxonomy – G +C content, DNA – DNA hybridization, RFLP, RAPD, STRR & LTRR, REP – PCR, rRNA based DNA finger printing methods

UNIT – III

Microbial identification and taxonomy using 16SrRNA. 16S rRNA / Rdna fingerprinting - RT- PCR. DNA Isolation, amplification, Cloning, transformation, Blue-white screening.

UNIT – IV

Isolation of Plasmid, Dot blot /Southern blot using specific probes.16S rDNA sequencing by chain-termination method. GenBank –guidelines. NCBI, EMBL & DDBJ – retrieving sequences.

UNIT – V

Molecular phylogeny – tree terminology, phylogenetic trees – MEGA, Phylip, RAPDistance. Cladogram, additive trees and ultrametric trees, rooted, unrooted trees and tree shapes.

TEXT BOOKS

1. Dubey, R.C. and D.K. Maheswari, 2004. A Text book of Microbiology 1st Edition, S. Chand and Company Ltd.
2. Modi, H. A., 1995. Fundamentals of Microbiology. Vol.7. AKTA Prakashan Nadiad. Gujarat.
3. Powar, C.B. and H. F. Dagainawala, 2003. General Microbiology. Volume: II, Himalaya Publishers, New Delhi.

REFERENCES

1. Roderic D. M. Page, Edward C. Holmes 1998. Molecular Evolution: A Phylogenetic Approach. Blackwell publishing, USA.
2. S. B. Primrose, 1998. Principles of Genome Analysis: A Guide to Mapping and Sequencing DNA from Different Organisms Microbial Genome Methods by Kenneth W. Adolph (Hardcover - Oct 28, 1996)
3. Genome Mapping and Sequencing by Ian Dunham (Hardcover - Sep 1, 2003).
4. Brendan Wren (Editor), Nick Dorrell 2002. Functional Microbial Genomics (Volume 33) (Methods in Microbiology), Academic Press, UK.
5. Sandy B. Primrose Richard M. Twyman 2005. Principles of Genome Analysis and Genomics, Blackwell Publishing, USA.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- This course encompasses the use of microorganisms in the manufacture of food or industrial products.
- The use of microorganisms for the production of food, either human or animal, the microorganisms used in bio processes may be natural isolates; laboratory selected mutants or genetically engineered organisms.
- To know the basics and concepts of various biotechnological related terms
- Elucidate the significance of transgenic plants as bioreactors for the production of enzymes.
- Address bioethical and biosafety issues related to plant transgenics
- Elucidate the molecular techniques involved in gene manipulation and rDNA technology

COURSE OUTCOME

1. This course will enable the students to design the various microbial fermentation products and their production, purification for various applications
2. To know the process protocol for the, synthesis and characterization of nanoparticles
3. Explain the gene transfer methods for the production of transgenic animals
4. Gain experimental knowledge to perform animal biotechnology related experiments
5. Explain the application of biotechnology in medical and its allied fields, gene therapy, genetic counseling
6. Address the bioethical issues & concerned linked to medical biotechnology

UNIT-I

Design of a basic fermenter, bioreactor configuration, design features, computer control of fermentation process, measurement and control of process. Reactors for specialized applications: Tube reactors, packed bed reactors, fluidized bed reactors, cyclone reactors, trickle flow reactors, their basic construction and types for distribution of gases.

UNIT – II

Transport phenomena in fermentation: Gas- liquid exchange and mass transfer, oxygen transfer, critical oxygen concentration, heat transfer, aeration/agitation, its importance. Sterilization of Bioreactors, nutrients, air supply, products and effluents, process variables and control, scale-up of bioreactors.

UNIT – III

Growth of cultures in the fermenter. Importance of media in fermentation, media formulation and modification . Kinetics of growth in batch culture, continuous culture with respect to substrate utilization, specific growth rate, steady state in a chemostat, fed-batch fermentation, yield of biomass, product, calculation for productivity. Storage of cultures for repeated fermentations, scaling up of process from shake flask to industrial fermentation.

UNIT – IV

Biomass separation by centrifugation, filtration, flocculation and other recent developments. Cell disintegration: Physical, chemical and enzymatic methods. Extraction: Solvent, two phase, liquid extraction, whole broth, aqueous multiphase extraction. Purification by different methods. Concentration by precipitation, ultra-filtration, reverse osmosis. Drying and crystallization.

UNIT – V

Isolation, selection and improvement of microbial cultures. Strain improvement for the selected organism: Use of recombinant DNA technology, protoplast fusion techniques for strain improvement. Improvement of characters other than products and its application in the industry. Preservation of cultures after strain improvement programme.

TEXT BOOKS

1. Demain, A. L. and J. E. Davies, 1999. Manual of Industrial Microbiology and Biotechnology. 2nd Edition, A.S.M. Press, Washington, D.C.
2. Hugo, W.B. and A.D. Russell, 1998. Pharmaceutical Microbiology. 6th Edition, Publisher Blackwell Science Ltd.
3. Mansi, E.M.T. and C.F.A. Bryce, 2002. Fermentation Microbiology and Biotechnology. Taylor and Francis, New York.
4. Patel, A.H., 2003. Industrial Microbiology. Macmillan India Ltd. New Delhi.

REFERENCES

1. Reed, G., 2002. Prescott and Dunn's Industrial Microbiology. 5th Edition. CBS Publishers, New Delhi.
2. Shuler, M.L. and F. Kargi, 2005. Bioprocess Engineering Basic Concepts. Pearson Education, New Delhi.
3. Stanbury, P.T. and A. Whitaker, 2005. Principles of Fermentation Technology, Pergamon Press, NY.
4. Waites, M. J., 2007. Industrial Microbiology. Blackwell Publishing Company. UK.

Instruction Hours / week: L: 0 T: 0 P: 0**Marks: External: 100****Total: 100****End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- 1.To make an awareness of physically, socially and psychologically well being.
2. To know the Health awareness
- 3.To know the disease mechanism
- 4.To prevent the disease.
5. Healthy diet habit.
- 6.Normal exercise for body.

COURSE OUTCOME (CO'S)

- 1.Students get an idea about nutritional food, proper diet and routine exercise.
- 2.To make an awareness of physically, socially and psychologically well being.
- 3.To know the Health awareness
- 4.To know the disease mechanism
- 5.To prevent the disease
6. Students able to understand the importance of fitness in leading healthy life

UNIT - I

Definition of Health and wellness - Factors affecting health and wellness. Physiological, psychological and social health.

UNIT - II

Fitness - Definition, basic components of physically active life style in preventing obesity, osteoporosis, heart disease, and diabetes, Physical fitness tests - for flexibility, muscle endurance (any 3 tests for each) and cardio vascular endurance.

UNIT - III

Nutrition and exercise - energy requirement for, aerobic and anaerobic exercises, carbohydrate loading, water and dehydration, special foods. Importance of exercise in preventing life style diseases - Diabetes, CVD, hypertension, obesity and osteoporosis.

UNIT - IV

Sports nutrition - special foods - Nutrition and performance of athletes and players, dietary modifications and diet plan, sports supplementation.

UNIT - V

Special nutritional needs for monitoring, space, military and sea voyage.

TEXT BOOKS

1. Jerrold Greenberg . Comprehensive Stress Management. 2012. McGraw Hill Publishers.
2. Gwen Robbins, Debbie Powers, Sharon Burgess . A Wellness Way of Life. 2012. McGraw Hill Publishers.
3. Charles Corbin, Gregory Welk, William Corbin, Karen Welk. Concepts of Fitness And Wellness: A Comprehensive Lifestyle Approach.2012. McGraw Hill publishers.
4. Michael Teague, Sara Mackenzie, David Rosenthal. 2012. Your Health Today: Choices in a Changing Society. McGraw Hill Publishers.

REFERENCES

1. Nickolaos katsilambros. Clinical nutrition in practice. 2010. Wiley Black well publication. U.K.
2. Doyle, M.P., L. R. Beuchat and T. J. Montuile, 2001. Food Microbiology – Fundamentals and Frontiers. ASM Press, U.S.
3. Frazier, W.C. and D. C. Westhoff, 1995. Food Microbiology. Tata McGraw- Hill Publishing Company limited. New Delhi.
4. Gould, G.W., 1996. New Methods of Food Preservation. Blackie Academic and Professional, Madras.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- To obtain outstanding practical skill in various techniques in Microbial Biotechnology and Agricultural Microbiology.
- The course provides the basics of microbiology to build a foundation for more advanced studies in microbiology and biotechnology
- In this course students will learn key methods of microbial production (e.g. fermentation, recombinant protein production and purification).
- Practice in research project planning, in different methods for biotechnology, and for conducting scientific research project.
- To develop an understanding of the major principles of and current issues in the several topical areas that collectively constitute Microbiology Techniques.
- It will distinguish the students to acquire practical skills on advanced laboratory analysis.

COURSE OUTCOME (CO'S)

1. This practical course renders a candidate the knowledge of advanced techniques involved in Microbial Biotechnology and Agricultural Microbiology.
2. Candidates would be able to understand and perform molecular techniques which forms an integral part of core Microbiology.
3. This practical course renders a candidate the knowledge of advanced techniques involved in microbial biotechnology.
4. He/she will be able to judge how microbes and enzymes could be applied in industry.
5. Candidates would be skilled enough to perform a molecular technique which forms an integral part of industrial microbiology.
6. Students can develop entrepreneur skills for applications in biotechnology based industries.

EXPERIMENTS

1. Isolation of plasmid DNA from Bacteria
2. Isolation of chromosomal DNA from Bacteria
3. Determination of molecular weight by SDS Polyacrylamide gel electrophoresis
4. Isolation of microbes from soil
5. Isolation of free-living N₂ fixation from soil - Azotobacter
6. Isolation of symbiotic nitrogen fixers from root nodule - Rhizobium
7. Isolation of phosphate solubilisers, ammonifiers and denitrifiers
8. Study of Mycorrhizae, Cyanobacteria and Azolla
9. Determination of Dissolved oxygen of water

10. Determination of BOD (Biochemical Oxygen Demand) of water
11. Determination of COD (Chemical Oxygen Demand) of water

REFERENCES

1. Aneja K.R., 2001. Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology, 3rd Edition, New Age International (P) Limited Publishers, New Delhi
2. Cappucino, J.G. and N. Sherman, 2001. Microbiology A Laboratory Manual, 6th Edition, Benjamin Cummings, New York.
3. Chirikjan, J.G., E.C. Kisailus, B. King, R. Krasner and H. Mortensen, 1995. Biotechnology. Theory and Techniques, Vol II, Jones and Bartlett Publishers, London.
4. Palanivelu, P., 2004. Analytical Biochemistry and Separation Techniques, 3rd Edition, Twenty First Century Publication, Madurai.

Instruction Hours / week: L: 0 T: 0 P: 5 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- To acquire practical knowledge in numerous diagnostic tests and procedures used in the microbiology laboratory.
- To understand the importance of diagnostic procedures and gain skills related to the laboratory experiments.
- To learn the techniques pertaining to amplification of biological molecules
- To provide hands-on experience to determine microorganisms in clinical samples
- To understand the importance of diagnostic procedures and gain skills related to the laboratory experiments.
- It helps the students to study the advanced laboratory diagnosis procedures.

COURSE OUTCOME (CO'S)

1. This course provides the current medical aspects on the clinical diagnosis of infection providing the combined treatment of bacteriology and virology.
2. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.
3. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.
4. The significance of bacterial genetic variation (in drug resistance, pathogenesis or virulence and variation, diagnosis, and vaccination), and manipulation of cloned DNA.
5. To know the Virulence of bacteria, bacterial virulence factors and their regulation.
6. To understand drug resistance, drug-bacteria relationship, clinical implications, and prevention

EXPERIMENTS

1. Laboratory diagnosis of pyogenic infections – tuberculosis – enteric fever – diarrhea – UTI – anaerobic infections
2. Isolation and identification of *Candida albicans*
3. Antibiotic sensitivity test disc preparation
4. Antibiotic sensitivity test – Kirby - Bauer, Stroke's method
5. MIC determination by Broth dilution technique, filter paper disc assay
6. Wet mount preparation of parasites- Saline, iodine
7. Identification of parasites-formal ether concentration, floatation methods
8. Morphological examination of fungi in tissues

9. Cultivation of viruses-Egg inoculation
10. Isolation of coli phage from sewage using membrane filter technique.
11. Examination of plant diseases: Wilt of potato, Citrus canker, Rice dwarf virus

REFERENCES

1. Arora, B. and D.R. Arora, 2007. Practical Microbiology, 1st Edition, CBS Publishers and Distributors, Bangalore.
2. Cappucino, G.J., and N. Sherman, 2001. Microbiology A Laboratory Manual. 6th Edition. Benjamin Cummings, New York.
3. Ellenj O Baron and Sydneym Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, C V Mosby Company, St Louis.
4. Gaud, R.S. and G.D. Gupta, 1999. Practical Microbiology. 1st Edition. Nirali Prakashan, Pune.
5. Mukherjee, K.L. 2005. Medical Laboratory Technology, Vol. III, Tata McGraw-Hill Publishing Company Ltd, New Delhi.
6. Reddy, S. M. and S. R. Reddy, 2004. Microbiology A Laboratory Manual. 3rd Edition. Sri Padmavathi Publication, Hyderabad.
7. Sundararaj, T. Microbiology laboratory manual 2005. Aswathy Sundararaj Publishers. Chennai.
8. Vandepilte, J., J. Verhaegan, K. Engbaek, P. Rohner, P. Prot and C.C. Heuck, 2004. Basic Laboratory Procedures in Clinical Bacteriology. 2nd Edition, A.I.T.B.S Publishers and Distributors, Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours**COURSE OBJECTIVES**

- Imparting advanced technological knowledge through a detailed study of topics such as immunodiagnosis, assessment of cell mediated immunity and current trends in immunology of diseases.
- The students will be able to identify the cellular and molecular basis of immune responsiveness.
- The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.
- The students will be able to describe immunological response and how it is triggered and regulated.
- The students will be able to demonstrate a capacity for problem-solving about immune responsiveness.
- Students will be able to transfer knowledge of immunology into clinical decision-making through case studies presented in class.

COURSE OUTCOME (CO'S)

1. To strengthen the technical skill on the immune system, their structure and classification, genetic control of antibody production, Types, structure of antigens and immunodiagnostics.
2. To obtain knowledge of through Molecular immunology, hypersensitive immune reaction and Latest trends in immunology.
3. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity.
4. Develop understanding about immune system, antigen antibody interactions.
5. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.
6. Introducing the **employment** aspect of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.

UNIT – I

Immunity – types. Cells of the immune system - lymphoid cells, mononuclear cells, granulocytic cells and mast cells. T & B – cell maturation, activation and differentiation. Organs of the immune system - primary and secondary lymphoid organs – cutaneous / mucosal - associated lymphoid tissues

UNIT – II

Antigens - factor influence immunogenicity - Epitopes - Haptens - study of antigenicity. Immunoglobulins – structure – types and biological activities. Antigenic determinants. Monoclonal antibodies.

UNIT – III

Hypersensitive reactions – Type. Complement system - classical, alternative and lectin pathways, biological consequences. T - cell receptor. Cytokines – Structure, functions and receptors. Major Histocompatibility complex, classes, structure and its functions.

UNIT – IV

Autoimmune diseases: Antigen processing and presentation - Transplantation immunology - Transplantation antigens, HLA typing. Tumor immunology - treatment of tumors. Immune response to infectious disease.

UNIT – V

Antigen - Antibody reactions: Agglutination and precipitation. Complement fixation test, Immunofluorescence, ELISA, RIA, Immuno electron microscopy. Forensic serology, Immunohaematology – ABO, RH incompatibility.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2004. Text Book of Microbiology - Orient Longman. New Delhi.
2. Coleman, R.M., M.F. Lombard and R.E. Sicard, 2000. Fundamental Immunology 4nd Edition. Wm. C. Publishers. London.
3. Fathima, D. and N. Arumugam, 2005. Immunology. Saras Publications, Nagercoil.

REFERENCES

1. Coleman, R.M., M.F. Lombard and R.E. Sicard, 2000. Fundamentals of Immunology 4th Edition. WMC Publications. London.
2. Goldsby, R.A., T.J. K. Barbara and A. Osborne, 2006. Kuby Immunology. 6th Edition. W.H. Freeman and Company, New York.
3. Hyde, R.M., 2000. NMS - Immunology. 4th Edition, Lippincott Williams and Wilkins, Baltimore.
4. Janeway, Jr. C.A., P.T. M. Walport and M. J. Shlomchick, 2001. Immunobiology - The Immune System in Health and Disease. 5th Edition. Churchill Livingstone - Garland Publishing Company, New York.
5. Pathaka, S. and U. Palan, 2005. Immunology – Essentials and Fundamentals. 2nd Edition. Capital Publishing Company, New Delhi.
6. Roitt, I.M., J.J Brostoff and D.K. Male, 2002. Immunology. 6th Edition. C.V. Mosby Publishers. St. Louis.
7. Delves, P., Martin, S., Burton, D. and Roitt, I. 2006. Roitt's Essential Immunology, Wiley-Blackwell, London

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours**COURSE OBJECTIVES**

- To encompass the employability use of microorganisms in the manufacture of food or industrial products.
- The aim of the course is to give the students broad theoretical and practical skills in food and industrial microbiology.
- This paper adds information about the role of microorganisms in many food, beverage and pharma industries both in production and spoilage processes.
- The students will be able to discuss the role of microorganisms in industry, as well as to carry out experiments to produce microbial metabolites.
- It will make the students to explore their practical skills in entrepreneurial activities.
- It will deliver the large-scale production of microbial products techniques in advanced level.

COURSE OUTCOME (CO'S)

1. Provides knowledge in the large-scale production of industrial product, providing the trends to cater the needs of industry.
2. This will help the students to enhance their employment knowledge on microbiology based commercial products.
3. The aim of the course is to give the students broad theoretical and practical skills in industrial microbiology.
4. To encode the importance of the role of microorganisms in food industries both in beneficial and harmful ways.
5. To obtain a good understanding of industrial microbiology and become qualified as microbiologist in food and other industries and candidate able to become entrepreneur after understanding this entire course.
6. Explain why microbiological quality control programmes are necessary in food production.

UNIT – I

Food and microorganisms – Important microorganisms in food – Fungi, Bacteria; Intrinsic and extrinsic parameters of food affecting microbial growth – sources of contamination of food. Food sanitation – indicators of food safety – Coliform bacteria.

UNIT – II

Food preservation – principles – factors affecting preservation – food preservation using temperature – low temperature food preservation – characteristics of psychrotrophs – high temperature food preservation – characteristics of thermophiles – preservation of foods by drying chemicals and radiation – limitations – commercial application.

UNIT – III

Food borne diseases - food poisoning - food borne infection and intoxication- Food control agencies - microbiological criteria for food, microbial quality control and food laws, Hazard Analysis Critical Control Point (HACCP).

UNIT – IV

History and chronological development of industrial microbiology. Industrially important strains – isolation and preservation. Inoculum development for various fermentation processes - strain development – mutation, recombinant DNA technology and protoplast fusion. Fermentation – submerged, solid state, batch and continuous.

UNIT – V

Fermentor design – scale-up process. Types of fermentors - Tower, cylindroconical, airlift and Components of CSTR. Downstream process – intracellular and extracellular product separation column chromatography, affinity. Production of beverages – beer, vitamins - vitamin B12, Riboflavin, antibiotics.

TEXT BOOKS

1. Banwart, G.J., 2004. Basic Food Microbiology. 2nd Edition. CBS Publishers and Distributors New Delhi.
2. Casida, L.E. Jr., 2003. Industrial Microbiology, New Age International Publishers, New Delhi.
3. Doyle, M.P., R. L. Beuchat and T. J. Montuile, 2001. Food Microbiology – Fundamentals and Frontiers. ASM press.
4. Frazier, W.C. and D.C. Westhoff, 1995. Food Microbiology. Tata McGraw-Hill Publishing Company Limited. New Delhi.
5. Patel, A.H., 2003. Industrial Microbiology, Macmillan India Ltd. New Delhi.
6. Shuler, M.L. and F. Kargi, 2005. Bioprocess Engineering Basic Concepts. Pearson Education, New Delhi.

REFERENCES

1. Atlas, R.N. and Bartha, 2000. Microbial Ecology - Fundamental and Applications. 3rd Edition. Redwood City CA. Benjamin/Cumming Science Publishing Co., New Delhi.
2. Gould, G.W., 1996. New Methods of Food Preservation. Blackie Academic and Professional, Madras.
3. Jay, J.M., 2000. Modern Food Microbiology. CBS Publishers and Distributors. New Delhi.
4. Mansi, E.M.T. and C.F.A. Bryce, 2002. Fermentation Microbiology and Biotechnology. Taylor and Francis, New York.
5. Reed, G., (Editor) 2002. Prescott and Dunn's Industrial Microbiology. 5th Edition. CBS Publishers, New Delhi.
6. Stanbury, P.T. and A. Whittaker, 2005. Principles of Fermentation Technology. Pergamon Press, NY.
7. Waite, M.J. 2007. Industrial Microbiology, Blackwell Publishing. UK.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Medical Bacteriology introduces basic principles and then applies clinical relevance of many etiological agents responsible for infectious diseases.
- The infectious disease cycle of the pathogens enables to solve the epidemics.
- The territory covered by infections and the immune response
- We focus on pathogenic mechanisms in order to foster a student's ability to solve problems in their future clinical career and able to establish the medical laboratory.
- This course provides learning opportunities in the basic principles of medical microbiology and infectious disease
- It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora

COURSE OUTCOMES

1. Demonstrate an understanding at an advanced level of microbial virulence mechanisms and host response to infection.
2. Application of molecular techniques to medical microbiology; biochemical and genetic mechanisms of antimicrobial agent activity, microbial susceptibility and resistance to antimicrobial agents.
3. Demonstrate an understanding of skin and respiratory tract infections (microbial causes, pathogenesis, transmission of infection, diagnosis, prevention and treatment) by being able to identify unknown organisms in clinical samples, and describe the pathogenesis of important pathogens.
4. It also provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases.
5. To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue
6. Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.

UNIT – I

General Properties of Fungi - Isolation and identification of medically important fungi – diagnosis of fungal disease - routine mycological techniques - antifungal agents

UNIT – II

Superficial mycosis –Pityriasis versicolor, Tinea nigra, piedra. Cutaneous mycosis – Dermatophytes. Systemic mycosis –Opportunistic mycosis – Candidosis, Cryptococcosis, aspergillosis. Subcutaneous mycosis - Sporotrichosis, Chromoblastomycosis, Mycetoma

UNIT – III

Introduction to Parasitology - protozoa-amoebae – flagellates - Laboratory techniques in parasitology - Ova, cyst analysis direct and concentration methods. Blood smear examination - antiprotozoan therapy.

UNIT – IV

Protozoan infections - *Entamoeba histolytica*, *Plasmodium falciparum*, *Leishmania donovani* - *Giardia intestinalis* *Trichomonas vaginalis*, *Toxoplasma gondii*, *Pneumocystis carinii*

UNIT – V

Helminthic infections – *Taenia solium*. *Trematodes* - *Schistosoma haematobium*, Nematodes - *Trichuris trichiura* - *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria Bancrofti*.

TEXT BOOKS

1. Ananthanarayanan, R. and C.K.J. Panicker, 2009. Text Book of Microbiology. 8th Edition. Orient Longman. New Delhi.
2. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
3. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
4. Chatterjee, K.D., 1980. Parasitology in relation to medicine, 12th Edition, Chatterjee Medical Publishers, Calcutta.

REFERENCES

1. Chunin, J., 2000. Parasitology. New York Publishers, London.
2. Dismukes, W.E., P. G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press. UK.
3. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.
4. Mehrotra, R.S. and K. R. Aneja, 2007. Introduction to Mycology. New Age International Ltd. New Delhi.
5. Panjarathinam, R., 2007. Text book of Medical Parasitology, 2nd Edition. Orient Longman Publishers.
6. Parija, S.C., 2008. A Text book of Medical Parasitology. 3rd Edition. All India Publishers and Distributors, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- About collection, interpretation and presentation of statistical data
- The analytics of data, probability, and hypothesis testing of samples
- The essential role of statistics in present, future use and applications of Biology.
- To equip students with a basic understanding of the underlying principles of quantitative and qualitative research methods.
- Provide students with in-depth training on the conduct and management of research from inception to completion using a wide range of techniques
- The ethical and philosophical issues associated with research in education

COURSE OUTCOMES

7. Apply basic statistical concepts commonly used in health and medical sciences
8. Use basic analytical techniques to generate results
9. Interpret results of commonly used statistical analyses in written summaries.
10. Demonstrate statistical reasoning skills correctly and contextually.
11. Provide learning opportunities to critically evaluate research methodology and findings.
12. Enable students to be reflexive about their role and others' roles as researchers.

UNIT-I

Definitions-Scope of Biostatistics- Variables in biology, collection, classification and tabulation of data- Graphical and diagrammatic representation.

Measures of central tendency – Arithmetic mean, median and mode. Measures of dispersion-Range, standard deviation, Coefficient of variation.

UNIT – II

Correlation – Meaning and definition - Scatter diagram –Karl pearson's correlation coefficient. Rank correlation.

Regression: Regression in two variables – Regression coefficient problems – uses of regression.

UNIT – III

Test of significance: Tests based on Means only-Both Large sample and Small sample tests - Chi square test - goodness of fit. Analysis of variance – one way and two way classification. CRD, RBD Designs.

UNIT – IV

Research: Scope and significance – Types of Research – Research Process – Characteristics of good research – Problems in Research – Identifying research problems. Research Designs – Features of good designs.

UNIT – V

Sampling Design: Meaning – Concepts – Steps in sampling – Criteria for good sample design. Scaling measurements – Techniques – Types of scale.

REFERENCES

- 1 .Jerrold H.Zar, 2003. Biostatistical Analysis, Fourth Edition, Pearson Education (P) Ltd, New Delhi.
2. Kothari. C.R., 2004. Research Methodology – Methods and Techniques, Second edition, New Age International Pvt. Ltd, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

1. Offers advanced level training on gene sequencing, mapping,
2. Expression and proteomic techniques.
3. To know DNA replication
4. To know the Transcription
5. To know the protein translation
6. To know the techniques to study DNA, RNA, Protein

COURSE OUTCOME (CO'S)

1. Students able to understand the principle of gene sequencing, mapping, expression, experimental and analytical proteomics.
2. Candidate can perform advanced molecular techniques and can work in the different genomic laboratory.
3. Expression and proteomic techniques.
4. To know DNA replication
5. To know the Transcription
- To know the techniques to study DNA, RNA, Protein

UNIT – I

Genome Sequencing: Gene, genomes, sequencing. Genomes - methodology, chain termination method, chemical degradation method, shotgun sequencing and assembly of contiguous DNA sequence. cDNA and genomic library construction.

UNIT – II

Genomic Mapping – Different types of genome maps and their uses, genetic and physical mapping techniques. Map resources. Practical uses of genome maps, Genetic markers -RFLP, Mini and micro satellite, STS and EST, SSCP, RAPD, AFLP, SNPs.

UNIT – III

Gene expressions and microarrays - gene structure and pseudo genes. Concepts of microarrays, spotter analysis, Normalization – total intensity, using regression techniques, ratio statistics. Clustering gene expression profiles - hierarchical, single -linkage, complete linkage, and average linkage. Tools for microarray analysis- MADAM, spot finder, SAGE Applications of microarrays - Bioinformatics challenges in micro array design and analysis.

UNIT – IV

Experimental proteomics - proteome analysis- 2-D gel electrophoresis: general strategy, immobilized pH gradients, sample preparation, isoelectric focusing, second dimension PAGE, staining, transfer of proteins from 2D gels, image acquisition and analysis of 2-D gels.

UNIT – V

Analytical proteomics: RP-HPLC, Mass spectrometry – ESI MS and MALDI techniques and applications. Characterization of protein complexes – protein-protein interactions, yeast two-hybrid system and protein micro arrays.

TEXT BOOKS

1. Charlie Hodgman, Chungui Lu, Sandra Kirk. An Advanced Textbook on Genomic and Proteomic Sciences. 2011. Garland Publishers.
2. Arthur M. Lesk. 2012. Introduction to Genomics. Oxford University Press, India.
3. Steven Haddock, 2011. Practical Computing for Biologists. CLR Publishers.
4. Jeremy W. Dale. 2010. From Genes to Genomes. Garland Publishers.

REFERENCES

1. Bourneand, P.E. and H. Weissig, 2003. Structural Bioinformatics. John Wiley & Sons (Asia), Singapore.
2. Brown, T.A., 2002. Genomes. John Wiley & Sons (Asia) Pvt. Ltd. Singapore.
3. Cantor, C.R. and C.L. Smith, 1999. Genomics: The Science and Technology behind the Human Genome Project, John Wiley and Sons (Asia) Pvt. Ltd. Singapore.
4. Dov Stekal, 2003. Microarray Bioinformatics, Cambridge University Press, Cambridge, UK.
5. Gibson and Muse, 2003. A Primer of Genome Science. Sinauer Associates Inc. Publishers, Sunderlands, New York.
6. Liebler, 2001. Introduction to Proteomics, Tools for the New Biology. Humana Press, New Jersey.
7. Pennington, S. and M.J. Dunn, 2001. Proteomics: From Sequence to Function. Bios Scientific Publishers Ltd. Oxford, U.K.
8. Primrose and Twyman, 2003. Principles of Genome Analysis. Blackwell Publishing, Oxford, UK.
9. Simpson, R.P., 2004. Proteins and Proteomics. A Laboratory Manual. Cold Spring Harbor Laboratory Press, NY.
10. Westermeier, R. and T. Naven, 2002. Proteomics in Practice. Wiley – VCH, Weinheim, Germany.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours**

- To inculcate the quality standards and the quality control practice followed in the industry.
- To bring awareness about biosafety and to enhance the entrepreneurship and employability.
- Knowledge of the principles and documentation of the quality system is a prerequisite for the course.
- Develop goal-oriented standards, policies, and procedures based on user-defined data quality requirements.
- Confirm that draft standards are acceptable to all users.
- Ensure that developed standards conform to the primary goals of the organization.

COURSE OUTCOME

1. Set up and Assess Food Quality Assurance Plans.
2. Create and Critically Evaluate quality specifications for raw materials, and associated final product and appropriate packaging.
3. Design and critically evaluate appropriate testing and recording procedures for raw materials and associated Final product.
4. Design, and evaluate processing documentation including Standard Operating procedures.
5. To realize the importance of significance of quality
6. Identify requirements of quality improvement programs

UNIT - I

An introduction to industrial microbiology. Definition of Quality assurance- roles and responsibilities of Quality assurance in industrial Microbiology. Roles and responsibilities of Quality control in industrial Microbiology.

UNIT - II

Antimicrobial agents – Definitions, properties, mode of action and applications. Antimicrobial agents for external usage - Chemical antimicrobial agents, synthetic antimicrobial agents, naturally antimicrobial agents.

UNIT - III

Sterilization – Types and methods of sterilization. Sterility testing and assessment of Microbial Contamination. Quality parameter to asses Natural products, Nutraceutical product, Pharmaceutical products.

UNIT - IV

Disinfection – Types and methods. Disinfection agents- properties and mode of action (Phenol, isopropyl alcohol and ethanol). Antibiotics and antimicrobial drug resistance, search for new antimicrobial agents.

UNIT - V

Quality assurance and Quality control – pharmacopeias, quality checking, routine examination and validation of industry. International disinfectant testing protocols, assessment of biocide effectiveness.

TEXT BOOKS

1. Malcolm Rowland, Thomas N. Tozer. 1995. Clinical Pharmacokinetics: Concepts and Applications. Williams & Wilkins publishers.
2. Thomas N. Tozer, Malcolm Rowland. 2006 Introduction to Pharmacokinetics and Pharmacodynamics: The Quantitative Basis of Drug Therapy. Lippincott Williams & Wilkins Publishers.
3. Nita K. Pandit. 2007. Introduction to the Pharmaceutical Sciences. Lippincott Williams & Wilkins Publishers.

REFERENCES

1. W.B.Hugo and A.D.Russel, 2006. Pharmaceutical Microbiology –4th Ed, Blackwell Scientific Publications.
2. Brock-Madigan M.T. 2006. Biology of Microorganisms –11th Edition. Pearson- Prentice Hall, USA.
3. Gunasekaran, P.1996. Laboratory Manual in Microbiology. 1st Edition, New Age International Pvt. Ltd, New Delhi.
4. Beckett, H. and J. B. Stenlake. 2003. Practical Pharmaceutical Chemistry, Part I and Part II, 4th Edition, Continuum International Publishing Group.
5. Jeffery, G. H., J. Basset, J. Mendham and R. C. Denny (Rev. by) 1989. Vogels Text Book of Quantitative Chemical Analysis, 5th Edition, Bathpress, UK

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- To study about the biofertilizers, plant disease and increasing soil fertility.
- To provide the knowledge on biomanure and biofertilizer and to become an entrepreneur in the field.
- To Provides detailed idea about biofertilizer production and plant disease.
- To provide the student knowledge about ecofriendly product which play a crucial role in determining its future use and applications in environmental management.
- The students will be able to make qualitative and quantitative description of the basic enzymatic phenomena and processes.
- To provide the student for entrepreneur.

COURSE OUTCOME (CO'S)

1. This course has been designed to provide the student knowledge about eco friendly product.
2. Product play a crucial role in determining its future use and applications in environmental management.
3. Provides detailed idea about biofertilizer production and plant disease.
4. To produce and impart training of ecofriendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.
5. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.
6. Provides detailed **entrepreneurial** idea about biofertilizer production and plant disease.

UNIT – I

Fertilizer - importance and present status of types of fertilizers and application. Nitrogen; Carbon, phosphorus and sulphur cycles. Biogeochemical cycles associated with microorganisms.

UNIT – II

Biofertilizers – Nostoc, Anabaena, Gloeocapsa and Scytonema; Free living forms – Azotobacter, Azospirillum; Symbiotic forms – Rhizobium; Legume Association; *Pseudomonas*; Non-legume association.

UNIT – III

Mycorrhizal association - Vesicular arbuscular mycorrhizal association (VAM) –Actinomycetes associations in biofertilizer.

UNIT – IV

Biomanures- Properties, production and applications; Composts – production and applications. Agro wastes – Poultry manure and saw-dust.

UNIT – V

Vermi composting– Properties, production and applications Types of compost pits and biodegradation. Application of biofertilizers and biomanures.

TEXT BOOKS

1. Subba Rao, N.S., 1999. Biofertilizers in Agriculture and Agroforestry. Oxford and IBH, New Delhi.
2. Rangaswami, G. and D.J. Bhagyaraj, 2001. Agricultural Microbiology. 2nd Edition. Prentice Hall, New Delhi.
3. Rao, N.S., 1995. Soil Microorganisms and plant Growth. Oxford and IBH Publishing Co., New Delhi.
4. Pelzar, M.J. and M. Reid, 2003. Microbiology. 5th Edition. Tata Mc Graw-Hill. New York.

REFERENCES

1. Burns, R.C. and R.W.F. Hardy, 1975. Nitrogen fixation in bacteria and higher plants. Springer – Verlag, Bertin.
2. Gallen and Chaplin, 1987. Introduction to Nitrogen fixation. Elsevier Publications.
3. Harley, J.L. and S.E. Smith, 1983. Mycorrhizal Symbiosis. Academic Press, London.
4. Kumar, H.D, 1990. Introductory Phycology. Affiliated East-West Press Ltd., Madras.
5. Marks, G.C. and T.T. Koslowski, 1973. Ectomycorrhizae, Academic Press, London.
6. Rao, N.S., G.S. Venkataraman and S. Kannaiyan, 1983. Biological N₂ fixation, ICAR Publications, New Delhi.
7. Sandera, F.E., B. Mosse and P.B. Tinke, 1975. Endomycorrhizae, Academic Press, London.
8. Rao, N.S, 1980. Biofertilizers in Agriculture. Oxford & IBH Publishing Co., Pvt., Ltd., Bombay.
9. Thompson, L. M. and T. Fredrick, 1979. Soils and Soil Fertility. Tata Mc Graw-Hill Publishing Co., New Delhi.
10. Tilak, K.V.B.R, 1990. Bacterial Biofertilizers. IARI Publications, New Delhi.
11. Tirdale, S.L. Nelson, L. Werver and J.D. Becton, 1985. Soil fertility and fertilizers. Macmillan Publishing Co., New York.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 3 Hours****COURSE OBJECTIVES**

- To provide the knowledge on basics of biochemistry and its applications and to highlight the technical skill.
- To describe the classification and functions of lipids.
- To summarize the structure and classification of enzymes
- To state the Structure and types of DNA
- To analyse the functions and properties of phosphoglycerides
- To understand about storage and structural polysaccharides.

COURSEOUTCOME

1. Understand the structures of enzymes, proteins, carbohydrates and fats
2. Understand the functions of biomolecules
3. Analyze the process of metabolism
4. Understand of nucleic acids and their importance to combine and analyses information.
5. Explain the structure and mechanism of enzyme action
6. Summarize the DNA & RNA structure and base pairing schemes.

UNIT - I

Definition and scope of biochemistry, cellular basis of life, molecular composition of cells, elements and compounds of life Biochemical functions of cell organelles.

UNIT - II

Proteins- protein content of various type of cells, biological role of proteins; primary, secondary, tertiary, quaternary structure of proteins. Classification of proteins.

UNIT - III

Saccharides - Mono, oligo and polysaccharides; isomerism, chain and ring structure of carbohydrates, structure of starch, cellulose, glycogen and mucopolysaccharides.

UNIT - IV

Fatty acids- properties and nomenclature, essential and non-essential fatty acids. Classification of lipids and storage of lipids.

UNIT - V

DNA- Properties, structure, and importance. Prokaryotic and Eukaryotic cell differences. DNA as genetic material and genetic code

TEXT BOOKS

1. Ambika, S, 2004. Fundamentals of Biochemistry for Medical Students, CIT Chennai.
2. Deb C., 2011, Fundamentals of Biochemistry, 9th edition New Central Book Agency, Calcutta.
3. Jain, J.L, Sunjay Jain and Nitin Jain, 2005. Fundamentals of Biochemistry, S. Chand and Company Ltd, New Delhi.

REFERENCES

1. E.J. Wood and W.R. Pickering, 1982. Introducing biochemistry. ELBS/John Muray.
2. A.L., Lehninger, 1982. Principles of biochemistry, Worth Publishers, Inc. New York.
3. E.E. Conn and P.K. Stumpf. 1976. Outlines of biochemistry. Wiley Eastern, New Delhi.
4. L. Stryer.1995. Biochemistry W.H. Freeman Press, San Francisco, USA

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- Aimed to provide training on various methods of handling.
- Concerning the care and use of laboratory animals.
- Laboratory animal care provides the proper handling and care for various species of animals used in research, testing, and in education.
- It extensively deals with the amended act on the Animal Welfare and the concept, availability, and use of research or testing methods that limit the use of animals or minimize animal distress.
- It extensively deals with the amended act on the Animal Welfare and the concept, availability, and use of research or testing methods that limit the use of animals or minimize animal distress.
- To study the preclinical studies.

COURSE OUTCOME (CO'S)

1. Laboratory animal care provides the proper handling and care for various species of animals used in research, testing, and in education.
2. It extensively deals with the amended act on the Animal Welfare and the concept, availability, and use of research or testing methods that limit the use of animals or minimize animal distress.
3. This course content will enhance the employment in drug testing field.
4. Validation for equipment, methods, cleaning and process
5. Students can develop their entrepreneurial skills in analysis of pens design and environment.
6. Ethical knowledge for use of animals in research.

UNIT – I

Modern methods of care, management breeding and maintenance of Laboratory animals – rabbit.

UNIT – II

Modern methods of care, management breeding and maintenance of Laboratory animals – mice.

UNIT – III

Modern methods of care, management breeding and maintenance of Laboratory animals – rat.

UNIT – IV

Modern methods of care, management breeding and maintenance of Laboratory animals– guinea pig.
Specific pathogen free animal – gnotobiotic animal

UNIT – V

Handling – various routes of inoculation and bleeding. Laboratory use of animals in microbiology - antibody production. Disposal of animal house wastes and carcasses.

TEXT BOOKS

1. The IACUC Handbook, 2nd ed., eds. Silverman, Murthy, Suckow. CRC Press, 2006.
2. Anesthesia and Analgesia in Laboratory Animals. American College of Laboratory Animal Medicine, second edition, eds. Richard Fish, Peggy Danneman, Marilyn Brown, and Alicia Karas. Academic Press, 2008.
3. The Mouse in Biomedical Research, second edition, eds. James G. Fox, Muriel T. Davisson, Fred W. Quimby, Stephen W. Barthold, Christian E. Newcomer and Abigail L. Smith. Elsevier, 2007.
4. The Laboratory Rat, second edition, American College of Laboratory Animal Medicine. eds. Suckow, weisbroth and Franklin. Elsevier, 2006.
5. Handbook on Genetically Standardized Mice 6th Edition Ed. Joanne Curren, The Jackson Laboratory, Bar Harbor, Maine, 2009.
6. Laboratory Animal Medicine, 2nd Edition. American College of Laboratory Animal Medicine, eds. Fox, Anderson, Lowe, Quimby. Academic Press, 2002.
7. Percy, DH, Barthold, SW, 2007. Pathology of Laboratory Rodents and Rabbits, 3rd edition. . Blackwell Publishing Company.

REFERENCES

1. Nalinasundari, M.S. and R. Santhi, 2006. Entomology. MJP Publishers, Chennai.
2. Pelczar, Jr. M.J., E.C.S. Chan and N.R. Kreig, 1993. Microbiology McGraw-Hill Inc. New York.
3. Prescott, M., J.P. Harley and D.A. Klein, 1993. Microbiology, 2nd Edition. McGraw-Hill Inc. NY.
4. Roy, D.N. and A.W.A. Brown, 2003. Entomology – Medical and Veterinary. 1st Edition. Part – I, Biotech Books, New Delhi.
5. Warren, D. M., 2002. Small Animal Care and Management. 2nd Edition. Delmar – Thomson Learning, Columbia, NY.
6. Yadav, M., 2004. Applied Entomology. 1st Edition. Discovery Publishing House, New Delhi.

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: External: 100 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To study cell structure, functions of organelle and gain exposure on transportations through cell membrane and to focus on different receptors and model of signaling.
- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
- Students will understand how these cellular components are used to generate and utilize energy in cells.
- To gain the knowledge base in genetics, molecular biology and cell physiology.
- To engage the students in review of scientific literature in the areas of cell mediated biomedical studies.
- Conceptualize and describe protein structure, folding and sorting

COURSE OUTCOME

1. Students upon completion of this paper will have clear knowledge on various cellular functions such as transportation and signaling.
2. It will enable the students to enter into cellular function level research for their future.
3. Students will understand the cellular components underlying mitotic and meiotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function.
5. Students will get the knowledge of common and advanced laboratory practices in cell and molecular biology
6. Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation, enzyme engineering, Application of enzymes in large scale industrial processes

UNIT – I

Cell- Definitions and properties, cell theory. Ultrastructure of eukaryotic cell - plant and animal. Bacterial cell wall structure and composition and their functions.

UNIT – II

Plasma membrane - structure and functions. Transportaion – types and methods. Role of microtubules and microfilaments.

UNIT – III

Cell organelles – Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast, Ribosomes, Lysosomes, Peroxisomes, Nucleus and Vacuoles.

UNIT – IV

Mitosis – properties and significance, mitotic cell division and five phases of mitosis.

UNIT – V

Meiosis - properties and significance, Phases of meiosis and Cellular aging:

TEXT BOOKS

1. Stevo Najman. 2012. Current Frontiers and Perspectives in Cell Biology.
2. Twesigye, Charles K. Cell Biology and Genetics.
3. Geoffrey M. Cooper, Robert E. Hausman. 2007. The Cell: A Molecular Approach. 4th Edition: Sinauer Associates, Incorporated Publications
4. Ge Yang, 2011. Engineering Molecular Cell Biology. Garland Science Publishers.
5. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter 2002. Molecular Biology of the Cell. 4th Edition. Garland Science Publications.

REFERENCES

1. Albert, B., D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, 1989. Molecular Biology of the Cell, Garland Publishing Inc, London.
2. Sadava, D.E., 1993. Cell biology: Organelle structure and functions. 1st Edition, Jones and Bartlett Publishers. USA.
3. Karp, G., 1984. Cell biology, 2nd Edition, Mc Graw-Hill Publications. USA.
4. Gupta, M.L. and M.L. Jangir, 2001. Cell Biology: Fundamentals and Applications, 1st Edition, Agrobios, Jodhpur, India.
5. Verma, P.S. and V.K. Agarwal, 2005. Cell Biology, 24th Edition, S. Chand and Company Limited. India.

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 9 Hours

COURSE OBJECTIVES

- The general objectives of the lab will be to introduce immunology and basic serological techniques.
- To develop the skill in health clinic
- To enhance knowledge in research.
- To give employment opportunities.
- Technical skill of immunology techniques.
- To understand disease mechanisms.

COURSE OUTCOME (CO'S)

1. This practical is to provide the student with a basic knowledge and technical skill of immunology and make them to understand the significance to human disease.
2. Upon completion students will gain knowledge of immune system, cells involved along with complement system and autoimmunity
3. Develop understanding about immune system, antigen antibody interactions.
4. Gain theoretical knowledge of various diseased conditions generated due to interplay of immune system components.
5. After course completion, students can apply the knowledge in further studies and higher education.
6. Introducing the science of immunology and to study various types of immune systems their classification structure and mechanism of immune activation.

EXPERIMENTS

1. Separation of serum / plasma
2. ABO Blood grouping - Rh typing and cross matching. Estimation of hemoglobin content of human blood.
3. Agglutination tests.
 - WIDAL - slide and tube test
 - RA test.
 - RPR test.
 - ASO test.
 - CRP test.
 - \square -HCG test
4. ELISA- thyroid hormone analysis
5. Ouchterlony's Double Immunodiffusion test (ODD)
6. Counter immunoelectrophoresis (CIE)

REFERENCES

1. Ellenj O Baron and Sydneym Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, C V Mosby Company, St Louis.
2. Benson, H.J., 1998. Microbiological Application - Laboratory Manual in General Microbiology. 7th Edition. WCB McGraw – Hill, New York.
3. Talwar, G.P. and S.K. Gupta, 1993. A Handbook of Practical and Clinical Immunology, 2nd Edition. Vol. 2, CBS Publishers and Distributors, New Delhi.
4. Thomas J. Kindt, Barbara Anne Osborne, Richard A. Goldsby. 2007. Immunology. W.H.Freeman.
5. Coleman, R.M., Lombard, M.F. and Sicard, R.E. 1992. Fundamental Immunology, 2nd ed, Dubuque, Iowa: Wm. C. Brown.
6. Darla J. Wise, Gordon R. Carter. 2002. Immunology: a comprehensive review. Wiley-Blackwell.
7. Janeway, C.A., and Travers, P. 1997, Immunobiology: The immune system in health and disease, 3rd Edition. New York, Garland Publishing.
8. Kuby, J. 1997, Immunology, 3rd Edition. New York, W.H. Freeman.
9. Male, D., Champion, B., Cooke, A. and Owen, M. 1991. Advanced immunology. Mosby publication, Baltimore.
10. Roitt, I., Brustoff, J. and Male, D. 1999. Immunology, 5th Edition. Harcourt Brace and Co. Asia PTE Ltd.

Instruction Hours / week: L: 0 T: 0 P: 4 Marks: Internal: 40 External: 60 Total: 100**End Semester Exam: 9 Hours****End Semester Exam: 9 Hours****COURSE OBJECTIVE**

- This provides information on fermented food product production in food industries. To know the possible contamination of food products which may include bacteria and fungi.
- To develop the skill in Isolation of pathogen.
- To enhance knowledge in research.
- To give employment opportunities.
- Technical skill of industries techniques.
- To understand disease mechanisms.

COURSE OUTCOME (CO'S)

1. This practical adds a technical skill and good understanding of industrial microbiology
2. Students can develop the skills of an efficient microbiologist in food and beverage industries.
3. Provides necessary entrepreneurial information on the food, dairy Microbiology in safety and quality perspective.
4. It will help to study the importance in the prevention of contamination that might be caused by the microorganisms.
5. To Learn various methods for their isolation, detection and identification of microorganisms in food and employ in industries
6. Identify ways to control microorganisms in foods and thus know the principles involving various methods of food preservation

EXPERIMENTS

1. Production of enzymes – Solid state & Submerged fermentation – GUS assay – Amylase
2. Production of protease from submerged fermentation
3. Production of sauerkraut ,yoghurt, wine
4. Enumeration of Microorganisms from Food samples
5. Detection and enumeration of Microorganisms present in Utensils.
6. Analysis of Milk quality by MBRT
7. Detection of coliforms from water - MPN test
8. Isolation of plant pathogens – Bacteria and fungi
9. Citric acid production
10. Mushroom Cultivation
11. Immobilization technique (Sodium alginate method)
12. Bacterial endotoxin test (BET)

REFERENCES

1. Adams M. R. and Moss M. O. 2000 Food Microbiology. Royal Society of Chemistry. Cambridge, U.K.
2. Ahmed E.Y. and Carlstrom C. 2003. Food Microbiology: A Laboratory Manual, John Wiley and Sons, Inc. New Jersey.
3. Arora, B. and D.R. Arora, 2007. Practical Microbiology, 1st Edition, CBS Publishers and Distributors, Bangalore.
4. Cappucino, G.J. and N. Sherman, 2001. Microbiology A Laboratory Manual. 6th Edition. Benjamin Cummings, New York.
5. Demain, A.L. and Davies, J.E. 1999. Manual of Industrial Microbiology and Biotechnology IInd Edition. ASM Press, Washington.
6. Garg, N., Garg, K.L. and Mukerji, K.G. 2010. Laboratory Manual of Food Microbiology. I.K. International Publishing House. New Delhi.
7. Harry, W., Seeley, Jr. and Paul Van Denmark, 1984. Microbes in Actions: A lab Manual of Microbiology. D. B. Taraporwalla and Sons.
8. James M. Jay, Martin J. Loessner, David A. Golden 2005. Modern Food Microbiology. Springer Science, USA.
9. Julian E Davies and Arnold L Demain 2009. Manual of Industrial Microbiology and Biotechnology ASM Publisher, USA.
10. Richard H Baltz, Julian E Davies and Arnold L Demain 2010. Manual of Industrial Microbiology and Biotechnology 3e ASM Publisher, USA.

15MBP491

PROJECT VIVA VOCE

**Semester - IV
15C**

Instruction Hours / week: L: 0 T: 0 P: 0 Marks: Internal: 80 External: 120 Total: 200

Instruction Hours / week: L: 0 T: 0 P: 0

Marks: External: 100 Total: 100

End Semester Exam: 3 Hours

COURSE OBJECTIVES

- To study about the biofertilizers, plant disease and increasing soil fertility.
- To provide the knowledge on biomanure and biofertilizer and to become an entrepreneur in the field.
- To Provides detailed idea about biofertilizer production and plant disease.
- To provide the student knowledge about ecofriendly product which play a crucial role in determining its future use and applications in environmental management.
- The students will be able to make qualitative and quantitative description of the basic enzymatic phenomena and processes.
- To provide the student for entrepreneur.

COURSE OUTCOME (CO'S)

7. This course has been designed to provide the student knowledge about eco friendly product.
8. Product play a crucial role in determining its future use and applications in environmental management.
9. Provides detailed idea about biofertilizer production and plant disease.
10. To produce and impart training of ecofriendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.
11. To demonstrate the know-how technology pertinent to microbiological and physico-chemical analyses of soil samples and their assessment.
12. Provides detailed **entrepreneurial** idea about biofertilizer production and plant disease.

UNIT - I

Entrepreneurship- Meaning, concept, Definition and Characteristics of an entrepreneur. Entrepreneurship as Process. Scope of Entrepreneurship in India.

UNIT - II

Motivation of Entrepreneur, Factors responsible For Emergence of Entrepreneurship, Type of Entrepreneur. Barriers to entrepreneurship. Scope of microbiologist as entrepreneur.

UNIT - III

Food and beverage –production of wine, beer, saukart, yogurt, cheese. Types and methods of food preservation. Food packaging-types and methods. Food standards and pharmacopeia.

UNIT - IV

Single cell protein (SCP)- production, processing and application of Spirullina, Azolla, Azospirillum, Rhizobium, Cynobacterium. Role of SCP, Mushroom cultivation- medicinal mushrooms.

UNIT - V

Coir pith degradation – preparation of bed, layering, culture inoculation, product harvesting.
Vermicomposting – methods, types of worms, pit preparation, product isolation and separation, packaging.

TEXT BOOKS

1. Banwart, G.J., 2004. Basic Food Microbiology. 2nd Edition. CBS Publishers and Distributors New Delhi.
2. Casida, L.E. Jr., 2003. Industrial Microbiology, New Age International Publishers, New Delhi.
3. Doyle, M.P., R. L. Beuchat and T. J. Montuile, 2001. Food Microbiology – Fundamentals and Frontiers. ASM press.
4. Frazier, W.C. and D.C. Westhoff, 1995. Food Microbiology. Tata McGraw-Hill Publishing Company Limited. New Delhi.
6. Patel, A.H., 2003. Industrial Microbiology, Macmillan India Ltd. New Delhi.
7. Shuler, M.L. and F. Kargi, 2005. Bioprocess Engineering Basic Concepts. Pearson Education, New Delhi.
8. Mushroom Production Technology, 2000. 3rd Edition, New Age International (P) Limited Publishers, New Delhi

REFERENCES

1. Atlas, R.N. and Bartha, 2000. Microbial Ecology - Fundamental and Applications. 3rd Edition. Redwood City CA. Benjamin/Cumming Science Publishing Co., New Delhi.
2. Gould, G.W., 1996. New Methods of Food Preservation. Blackie Academic and Professional, Madras.
3. Jay, J.M., 2000. Modern Food Microbiology. CBS Publishers and Distributors. New Delhi.
4. Mansi, E.M.T. and C.F.A. Bryce, 2002. Fermentation Microbiology and Biotechnology. Taylor and Francis, New York.
5. Reed, G., (Editor) 2002. Prescott and Dunn's Industrial Microbiology. 5th Edition. CBS Publishers, New Delhi.
6. Stanbury, P.T. and A. Whittaker, 2005. Principles of Fermentation Technology. Pergamon Press, NY.

B.Sc. PHYSICS
CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus
2015 – 2016



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act 1956)

Eachanari Post, Coimbatore – 641 021

பாடத்திட்டப் பொதுநோக்கம்

- கீற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்.

பகுதி - I, தமிழ்

15LAU101 :

தமிழ் முதல் தாள்

பருவம் I

5-H,5-C

அலகு - I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் - பகைவனுக்கு அருள்வாய்.

கவிஞர் ந.பிச்சமூர்த்தி - கிளிக்கூண்டு

இயற்கை : பாவேந்தர் பாரதிதாசன் - அழகின் சிரிப்பு - ஞாயிறு.

சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் - இன்றைய நிலை

அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் - காலம்.

பெண்ணியம் : கவிஞர் சிவரமணி - வையகத்தை வெற்றிகொள்ள

சூழலியல் : அன்பாதவன் - மரணம்

காதல் : வைரமுத்து - காதல் உயில்

தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு - II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20

2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்

2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்

3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு - IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை

2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே

3. கந்தர்வன் - துண்டு

4. வாஸந்தி - வடிகால்

5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு - V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி

2. மொழிபெயர்ப்புப் பயிற்சி

பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Part I TAMIL 2015. Karpagam University, Coimbatore - 21.

Semester I**15ENU101****ENGLISH-I****L T P C**
4 - - 4

Course Objectives

- To enable the learners to acquire English language skills at a faster pace.
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature.
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar.

Course Outcomes

1. Learn to reflect on the literary works and communicate flexibly.
2. Reading and comprehending literary works
3. Genres of literature to provide moral education
4. Develop communication skills in business environment
5. Interpersonal skills will be developed.
6. Betterment of language competence

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt

Poetry: The Blind Pedlar – Osbert Sitwell

Short Story: A Garden So Rich – Christie Craig

Vocabulary: Prefixes, Antonyms, Sentence Completion

Grammar: Articles, Adverbs, Pronouns

Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan

Poetry: An Old Woman – Arun Kolatkar

Vocabulary: Suffixes, Analogies

Grammar: Nouns, Adjectives

Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry

Short Story: The Umbrella Man – Roald Dahl

One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan

Vocabulary: Synonyms, Euphemisms, Word Definitions

Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan

One-Act Play: While the Auto Waits- O' Henry

Vocabulary: Words Often Confused, Anagrams

Grammar: Prepositions, Voice- Active and Passive

Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird – Amar Jalil

One-Act Play: The Cellphone Epidemic – Claudia I. Haas

Vocabulary: Portmanteau Words, One Word Substitute

Grammar: Questions, Pronunciation

Composition: Letter Writing- Formal

Prescribed Texts:

1. Rao, G. Chandralekha and et al. Spring 2013. Emerald Publishers: Chennai.
2. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai
3. To enable the learners to acquire English language skills at a faster pace.
4. To train the learners to reflect on the literary works and communicate flexibly.

Semester – I**15PHU101****PROPERTIES OF MATTER AND MECHANICS****L T P C****6 - - 6****Course Objectives**

- To know how to use Newton's laws of motion
- To solve advanced problems involving the dynamic motion of mechanical systems and other advanced mathematics in the solution of the problems.
- To find the use of conservation of energy and linear and angular momentum
- To solve dynamics problems.
- To understand the concept of oscillations.
- To gain the knowledge on elasticity.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Understand the basic concepts of mechanics
2. Understand the concepts of simple harmonic motion
3. Define the motion of mechanical systems and their degrees of freedom.
4. Study the interaction of forces between solids in mechanical systems.
5. Application of the vector theorems of mechanics and interpretation of their results.
6. Analyse the mechanics as a systematic tool for problem solving.

UNIT-I

Gravitational fields and potentials: Nature of motion under central forces - Kepler's laws - Newton's law of gravitation - Gravitational potential and field - Gravitational potential and field due to (i) Spherical shell (ii) Solid sphere – Boys' method of determining 'G'

UNIT-II

Elasticity: Elastic constants of an isotropic solid - Relations connecting them - Poisson's ratio - Bending of beams - Uniform and non-uniform bending - Bending moment of a bent beam - cantilever - Static and dynamic methods - Torsion in a wire - Rigidity modulus determination by Static and dynamic methods.

UNIT-III

Surface tension: Surface tension and Surface energy- Pressure difference across a spherical surface- Pressure difference across a curved surface - Angle of contact - Angle of contact for water in a glass - Vapour pressure over a flat and curved surface - Variation of Surface tension with temperature - Jaegar's method - Quincke's method.

UNIT-IV

Viscosity: Streamline flow and Turbulent flow - Stoke's law - Stoke's method for the coefficient of viscosity - Poiseuille's method for the coefficient of viscosity - correction to Poiseuille's equation - Ostwald's viscometer - Variation of viscosity with temperature and pressure - Friction and Lubrication - Searle's viscometer - Viscosity of gases - Modification of Poiseuille's formula for gases - Rankine's method for determining the coefficient of viscosity of a gas.

UNIT-V

Motion of rigid body: Moment of inertia of a rod, disc, spherical shell, solid and hollow spheres - Theory of compound pendulum and Kater's pendulum - Determination of 'g' - Derivation of expressions for angular momentum and kinetic energy of a system of N particles.

Friction-Static Friction - Laws of Friction-Angle and cone of Friction - Motion up and down on a rough inclined plane.

Suggested Book

1. Mathur. D.S, 11th edition 2010, Elements of properties of matter, S. Chand .& company, New Delhi
2. Brijlal and N. Subramanyam, 1st edition 2004, Properties of matter, S. Chand & Company, NewDelhi.
3. Murugesan. R, Revised edition 2004, Properties of matter, S. Chand & Company, New Delhi.
4. Mathur.D.S., 2004 edition, Mechanics, S. Chand & Company, New Delhi.
5. Uppadahayay. J. C., 2003, Properties of Matter, Ram Prakash and Sons, Agra.
6. Katie Dicker 1st edition 2011 properties of matter Wind mills book ltd

	Semester – I	L T P C
15PHU111	PHYSICS PRACTICALS I	- - 5 3

Course Objective

- The objective of this course is to learn how to apply thermodynamic principles in order to interpret thermodynamic systems and predict their behaviors.
- To determine Stefan's Constant.
- To determine the coefficient of thermal conductivity of Cu by Searle's Apparatus.
- To apply the theoretical knowledge into the experiments and find the solutions.
- To apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
- To experience the practical difficulties to find the physical constant values

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Understand and analyze basic theory and principles of forces in mechanics and their relationship to engineering applications
2. Perform experiments on any material to identify the strength the given objects
3. Comment on the relation between frequency, length and tension of a stretched string under vibration.
4. Analyze motion, forces and motion, work and energy problems and their relationship to engineering applications.
5. Conduct experiments on wooden bar and to identify its the strength
6. Test a wire or cylindrical rod for its strength.

ANY TEN EXPERIMENTS

1. Thickness and length of a material – Vernier caliper & Screw gauge
2. Acceleration due to gravity – Simple pendulum
3. Acceleration due to gravity and moment of inertia – compound pendulum
4. Rigidity modulus – Torsional pendulum
5. Verification of laws of transverse vibration and frequency of fork – sonometer.
6. Young's modulus – non-uniform bending- pin and microscope
7. Young's modulus- non-uniform bending- optic lever
8. Young's modulus-cantilever
9. Co-efficient of viscosity-stoke's method.
10. Frequency of tuning fork- resonance column.

11. Surface tension of water- capillary rise
12. Stoke's formula- spectrometer.

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, PragathiPrakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, PragathiPrakashan, Meerut
4. Gupta S.L. and V.Kumar, 2002, Practical Physics, 25th Edition, PragathiPrakashan, Meerut

Semester – I**15PHU102****ALLIED MATHEMATICS - I****L T P C****6 2 - 4****Course Objectives**

This course enables the students to learn

- The concepts of Matrices and their properties.
- Techniques of differentiation and integration.
- The basic concepts of linear algebra.
- The concepts of principles of mathematical induction.
- The solution and application of linear systems.
- The application of matrix, inverse of matrix and system of linear equations.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Solve simultaneous equations with the help of matrices.
2. Mastery in the concepts of vector and scalar fields.
3. Gain the intellectual knowledge of complex functions and their applications.
4. Solve equations with the help of Complex variables.
5. Acquire fundamental knowledge in the techniques of differentiation.
6. Know the properties of definite integrals.

UNIT I

Matrices: Different types of matrices – Inverse of a matrix – Solution of simultaneous equations by matrix method- Cayley-Hamilton theorem(Statement only)-Verification.

UNIT II

Vector calculus: Concepts of vector and scalar fields- Derivative of a vector - The Del operator, Gradient – Divergence of a vector – Curl of a vector- Directional derivative – Formula involving ∇ operator. Laplacian Operator.

UNIT III

Complex variables: Analytical function –Cauchy –Reimann equations – The necessary and sufficient condition for $f(z)$ to be analytic – Polar form of C-R equation-Properties of analytic function – Construction of analytic functions – Milne Thomson method.

UNIT IV

Differential calculus: Differentiation- Curvature and radius of Curvature in Cartesian and Polar form – Evolutes – Involute.

UNIT V

Integral Calculus: Definite and Indefinite integrals – Methods of Integration – Integration by substitution – Integration by parts.

Suggested Books

1. Venkataraman. M. K.,1998. Engineering Mathematics, The National Publications & Co., Chennai. (Unit I , II)
2. Manickavasagam Pillai.T.K , and S. Narayanan, 2002.“Calculus”, Volume I, and Volume II S.V Printers & Publishers, Chennai.(Unit IV , V)
3. Sastry .S.S,2009, Engineering mathematics, PHI learning Pvt. Ltd, New Delhi(Unit III).
4. Singaravelu.A.,2011, Engineering Mathematics Vol 1&Vol 2 Meenakshi Publications, Arpakkam.
5. Venkataraman.M.K., 2001. Engineering Mathematics Vol 2, National Publishing Company, Chennai.

Semester – I**15FCA101****FOUNDATION COURSE A - VALUE EDUCATION****L T P C****2 - - 1****Course Objectives**

- To improve the integral development of human begins
- To train the students towards sustainable lifestyle
- To create awareness about the values and their significance and role
- To imbibe the concept of discipline and freedom

UNIT – I

Concept of Self, self-awareness, self-esteem and self-confidence. Concept of personality, determinants and disorganisation of it. Personality development – meaning.

UNIT – II

Goal setting – meaning and importance; steps in goal setting Manners and Etiquette – meaning need and importance; means to improve. Positive thinking.

UNIT – III

Discipline – meaning. Concept of Roles and Responsibility Time Management – Meaning and steps for effective time management.

UNIT – IV

Interpersonal relationship – meaning and importance; means to improve it. Healthy friendship.

UNIT – V

Family Relationship importance of it; Means to improve. Spiritualism – meaning. Its relationship with Altruism, sacrifice, self control, tolerance and truthfulness.

TEXT BOOKS

1. Karpagam University Study Material, 2015.

Semester – I**15SSD101****SOFT SKILL DEVELOPMENT - I****L T P C**
2 - - -**Course Objectives**

- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills.
- By practicing Quantitative Aptitude Objective Questions and Answers an individual for competitive exams, entrance exams, and interviews.
- Questions have practical as well as theoretical approach and discussion in forum option is good for explanations so that one can understand them easily and conceptually.
- Practice daily for good results and to learn and master various Quantitative Aptitude subjects.

Course Outcomes

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems.
3. To adopt new and faster methods of calculations.
4. Reinforcing competencies in soft skills which are crucial in a social setting.
5. Students can able to solve the complex problems.
6. Students can improve their English fluency by using different verbal's and vocabularies.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills.

பகுதி - I தமிழ்ப் பாடத்திட்டம்

(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - மூவர் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற 15 பாடல்கள்
2. வைணவம் - ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு - II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை: 1. இலை இல பிடவம், திணை - முல்லை,

ஆசிரியர் - விழிக்கட் பேதைப் பெருங்கண்ணனார்.

2. மடல் மா ஊர்ந்து, திணை - குறிஞ்சி, ஆசிரியர் - மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

2. யாரினும் இனியன், திணை - மருதம், ஆசிரியர் - வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுண்ணேர் புருவத்த, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. அவறொறுந் தேரை, திணை - முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து - ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

பரிபாடல் - வையை - திரை இரும் பனிப் பெளவம், ஆசிரியர் - மையோடக் கோவனார்.

கலித்தொகை - கடும் புனல் கால் பட்டு, திணை - பாலை, ஆசிரியர் - பெருங்கடுங்கோ.

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை - குறிஞ்சி, ஆசிரியர் - கபிலர்.

2. யான் எவன் செய்கோ தோழி, திணை - பாலை, ஆசிரியர் - நோய்பாடியார்.

- புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை - பொதுவியல்,
ஆசிரியர் - உறையூர் முதுகண்ணன் சாத்தனார்.
2. இளையரு முதியரும் வேறுபுலம் படா - ஆசிரியர் - கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை - கடையெழு வள்ளல்களின் சிறப்பு,
நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1. மணிமேகலை - பாத்திரம் பெற்ற காதை - தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை - மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1. திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.
2. தமிழர் வளர்த்த நுண்கலைகள்: சிற்பமும் ஓவியமும் - தொ.மு. பாஸ்கரத் தொண்டைமான்.
3. சமயமும் தமிழும் - பேராசிரியர் அ.ச.ஞானசம்பந்தன்.
4. தமிழில் அறிவியல் - ஒரு பார்வை - பேராசிரியர் சிவகுமார்.
5. இன்றைய நெருக்கடிப் பிரச்சனைகள் - நீர்வளம் - முனைவர் ச. முத்துக்குமரன்.

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1. எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்
 2. பொதுக் கட்டுரைகள்
- பாட நூல்: கற்பகச்சோலை - தமிழ் ஏடு. கற்பகம் பல்கலைக்கழகத் தமிழ்த் துறை வெளியீடு.

Semester – II

15ENU201

ENGLISH – II

L T P C
4 - - 4

Course Objectives:

- To enable the learners to acquire English language skills through literature.
- To familiarize them with English literature.
- To acquire Grammar knowledge.
- To help learners imbibe cultural values.
- To acquire skill of making correct sentences.
- To reflect originality on the application of soft skills and express in writing their views.

Course Outcomes:

1. Learn to enjoy the ecstasy of literature.
2. The select literary pieces will develop the confidence level of the learners.
3. To get the social values.
4. To know the importance of communication
5. Get sound knowledge in English
6. Trained to communicate well for business purpose.

UNIT I:**Prose:** The Unexpected- Robert Lynd**Poetry:** The Village Schoolmaster – Oliver Goldsmith**Short Story:** The Lion's Share – Arnold Bennett**Vocabulary:** Homonyms**Grammar:** Irregular Verbs**UNIT II:****Prose:** Travel by Train – J. B. Priestly**Poetry:** The Gift of India – Sarojini Naidu**Grammar:** Sentence patterns**Composition:** Reading Comprehension**UNIT III:****Prose:** Women's Education is Almost More Important than the Education of Boys and Men –
Indira Gandhi**Short Story:** The Necklace – Guy De Maupassant**One-Act Play:** The Referee – W.H. Andrews and Geoffrey Dearmer**Vocabulary:** Similes**Grammar:** Discourse Markers**Composition:** Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley

One-Act Play: The Pot of Broth- W.B. Yeats

Vocabulary: Collective Nouns

Grammar: Correction of Sentences

Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly– Pearl S. Buck

One-Act Play: The Bear – Anton Chekov

Vocabulary: Acronyms

Grammar: Question Tags

Composition: Drafting Advertisement

Prescribed Texts

1. Wings of Communication 2014. Board of Directors. Emerald Publishers: Chennai

Reference

2. Syamala, V. English for Communication. 2006. Emerald Publishers: Chennai.

Course Objectives

- The objective of this course is to give awareness on different laws of thermodynamics and its effect on different aspects in life.
- The aim of statistical mechanics is to give knowledge on the laws of classical thermodynamics for macroscopic systems using the properties of its atomic particles.
- To apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
- To apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.
- To give knowledge on the statistical mechanics and explain the applications of thermodynamics.
- To provide the correlation of thermodynamical problems with statistical concepts.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Differentiate the terms heat and temperature and measure temperature using thermometer and convert one scale of temperature to another scale.
2. Understand specific heat capacity of gas and the different theories on specific heat capacity
3. Differentiate between principles and methods to produce low temperature, liquefy air, helium and hydrogen
4. Define postulates of kinetic theory of gases and arrive at theorem of equipartition of energy and derive Van der Waal's equation.
5. Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.
6. Fermi-Dirac and Bose-Einstein distributions to solve problems in some physical systems.
7. Apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
8. Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems.

UNIT I

Definitions – Newton's law of cooling – specific heat of a liquid calendar and Barne's continuous flow method – two specific heats of a gas – specific heat of a gas by Joly's differential steam calorimeter – Regnault's method – Dulong and Petit's law – variation of specific heat ad atomic heat with temperature.

UNIT II

Transmission of heat : Conduction – Co-efficient of the thermal conductivity – Cylindrical flow of heat – determination of thermal conductivity of rubber and bad conductor – Lee's disc method. Conduction – Radiation – Black body – Wein's Law - Raleigh – Jean's Law – Stefan's law – Experimental Determination of Stefan's constant – Mathematical derivation of Stefan's law

UNIT III

Kinetic theory of gases: Maxwell's law of distribution of molecular velocities – Experimental verification – equilibrium speed distribution of velocities. Mean free path – transport phenomena – diffusion – viscosity and thermal conduction of gases – Vander walls equation – relation between Vander Wall's constant and critical constants.

UNIT IV

Laws of Thermodynamics: First law of thermodynamics – Isothermal and Adiabatic process – gas equation during an adiabatic process – Work done an adiabatic expansion of gas – equation of an adiabatic curve – isothermal processes – Determination of γ by Clement and Desorme's method – second law of thermodynamics – Carnot's engine- Working efficiency – Carnot's refrigerator – Carnot's Theorem.

UNIT V

Concept of entropy: Entropy Change in entropy in a reversible process and irreversible process – temperature entropy diagram – Entropy of a perfect gas – increase of entropy in any irreversible process – Thermo dynamics functions – Maxwell's thermodynamics

Text Books

1. Thermal Physics, R. Murugesan, I Edi, 2002 .S Chand & company
2. Heat & Thermodynamics, Brijlal& N. Subramaniam ;revised edition 2010; S Chand & company
3. Heat – M. Narayanamurthi and N. Nagaratnam; springer
4. Heat and Thermodynamics – Zemansky and R.H. Deltanann; 7th edition 1996; Mcgraw hill
5. Heat and Thermodynamics – D.S. Mathur, S. Chand & Co, 5th edition 2004.
6. Heat and Thermodynamics – Agarwal, Singhal, Sathyaprakash 18th edition 2006 pragathi prakashen
7. Thermal Physics — Agarwal, Sathyaprakash 25th edition 2013 pragathi prakashen

Semester-II**15PHU211****PHYSICS PRACTICALS II****L T P C****- - 5 3**

Course Objectives

- To establish a grounding in electromagnetism in preparation for more advanced courses.
- Assess the contributions of physics to our evolving understanding of global change and sustainability while placing the development of physics in its historical and cultural context.
- Basic definitions (stress, strain, Hooke's law and Poisson's ratio) of elasticity
- Stress – Strain Diagram
- Determination of rigidity modulus and time period.
- Moment of Inertia and calculating MI of an irregular body

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. To gain knowledge and develop skills in the basic concept of electric forces.
2. Deal with liquids based on their viscosity
3. Compare the thermal conductivity of solids
4. Analyze the heat capacity of liquids
5. To understand Gauss law and its applications.
6. Distinguish first order and second order spectrum.

ANY TEN EXPERIMENTS

1. Co-efficient of thermal conductivity-Lee's disc method
2. Temperature coefficient of resistance of a thermistor-Post office box
3. Newton's law of cooling
4. Specific heat capacity of liquid - Joule's calorimeter
5. Stephan's law
6. Copper voltameter
7. Co-efficient of viscosity of water-Poiseuille's method
8. Potentiometer - temperature co-efficient of material
9. Meter bridge
10. Young's modulus-uniform bending - Koieng's method
11. Young's modulus-non uniform bending - Koieng's method
12. Spectrometer - μ of prism
13. Spectrometer – wavelength of a spectral line by grating

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut

Course Objectives

This course enables the students to learn

- The Concept of Fourier analysis and solving boundary value problems.
- Techniques of Fourier and Laplace transform to solve differential equations.
- Numerical techniques of differentiation and integration.
- To find the solution for physical problems.
- To get mathematical foundation to formulate and solve problems arising in physics

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Appreciate the physical significance of Fourier series.
2. Understand the mathematical principles on transforms.
3. Apply mathematical foundation to formulate and solve problems arising in physics
4. Synthesize numerical techniques for practical problems
5. Apply their knowledge to find the solution for physical problems.
6. Solve the Fourier series problems and apply it for practical things.

UNIT I

Fourier series: Definition – Finding Fourier coefficients for a given periodic function with period 2π – Odd and Even functions – Half Range Series.

UNIT II

Fourier Transforms: Definition of Fourier Transform-Properties of Fourier Transform- Inverse Fourier transform-Convolution theorem-Finite Fourier Sine &Cosine Transform –Parseval's theorem.

UNIT III

Laplace Transforms: Definition of Laplace Transform - Properties of Laplace Transform, Inverse Laplace Transform. Application of Laplace Transform.

UNIT IV

Differential Equations: Types of Linear differential equations with constant coefficients – Simultaneous differential equations with constant coefficient.

UNIT V

Numerical methods: Solving simultaneous equations–Gauss Elimination method, Gauss Jordan method, Gauss – Seidel method. Numerical Integration – Trapezoidal Rule, Simpson's Rule.

SUGGESTED BOOKS

1. Sastry .S.S,2009. Engineering Mathematics, PHI learning Pvt. Ltd, New Delhi.
2. Kandasamy. P., K.Thilagavathy., and K.Gunavathy., 2003. Numerical methods, S. Chand & company Ltd , New Delhi.
3. Singaravelu.A.,2011,Engineering Mathematics Vol I &Vol II Meenakshi Publications, Arpakkam.
4. Venkataraman.M.K., 2001. Engineering Mathematics Vol II, National Publishing Company, Chennai.
5. Manicavachagom Pillay.T.K ,S.Narayanan,2000, “Calculus Vol II”, S. Viswanathan (Printers and Publishers), PVT., LTD.
6. Sundaram.V, R. Balasubramaniam, And K.A.Lakshminarayanan, 2001, Engineering Mathematics – Vol III, Vikas Publishing House PVT., LTD, New Delhi.

Semester II**15FCB201****FOUNDATION COURSE – B
ENVIRONMENTAL STUDIES****L T P C
2 - - 1**

Course Objectives

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To gain knowledge on environmental issues.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.

Unit - I: Eco system and natural resources: Environment – Definition – components - Ecosystem -Definition, Concept, Scope, importance, structure and functions of ecosystem. Energy flow, Ecological succession. Food chains and food webs. Classification of ecosystem. Natural resources: Forest resources; water resources

Unit - II: Environmental pollution: Cause, effects and control measures of Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards pollution. Solid waste management.

Unit - III: Biodiversity and its conservation: Introduction- Definition, genetic, species and ecosystem diversity, biogeographical classification of India- Value of biodiversity: Consumptive, productive uses; social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

Unit - IV: Social issues and the environment: Urban problems related to energy- water conservation and management -Rain water harvesting- water shed management. Resettlement and Rehabililisaion. Natural resources and associated problems and sustainable utilization. Environmental Education

Unit - V: Environment ethics: Environmental Ethics - Gender equity, ethical basis of environment education and awareness, conservation ethic and traditional value systems of India. Valuing nature, cultures, social justice, Human heritage, equitable use of resources, preserving resources for future generation, common property resources, Ecology and its uses and its degradation, Introduction to Environmental Protection Act (EPA).

Suggested Books

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta, India.
2. Kotwal, P.C. and S. Banerjee, 2002. Biodiversity Conservation – In Managed forest and protected areas, Agrobios, India.
3. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.
4. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.
5. Shaw, R and Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.
6. Sorokin Pitirim. A,1942. Man and Society In Calamity. New York: Dutton, 1942
7. Patrick L.Abbott, 2008. Natural Disasters, McGraw Hill, New York. Page: 1-7.

Semester – II**15SSD201****SOFT SKILL DEVELOPMENT – I****L T P C****2 - - 1****Course Objectives**

- To achieve the analytical and reasoning competencies and to improve their communication and presentation skills.
- By practicing Quantitative Aptitude Objective Questions and Answers an individual for competitive exams, entrance exams, and interviews.
- Questions have practical as well as theoretical approach and discussion in forum option is good for explanations so that one can understand them easily and conceptually.
- Practice daily for good results and to learn and master various Quantitative Aptitude subjects.

Course Outcomes

1. To impart knowledge on both Aptitude and Soft skills to the students
2. To critically evaluate and demonstrate various principles involved in solving mathematical problems.
3. To adopt new and faster methods of calculations.
4. Reinforcing competencies in soft skills which are crucial in a social setting.
5. Students can able to solve the complex problems.
6. Students can improve their English fluency by using different verbal's and vocabularies.

UNIT - I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT - II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest

UNIT – IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT - V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills.

Semester – III

		L T P C
15ENU301	ENGLISH – III (Communicative English)	4 - - 4

Course Objective:

- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop speech skills necessary for confident and intelligent participations in Group Discussions and develop skills related to teamwork in work places.
- To develop confidence to respond in English during situations where the use of English is imperative.
- To develop fluency in actual conversation in the English language.
- To develop knowledge about business communication.

Course Outcome

After successful completion of the course, the student is expected to

1. Students learnt the basics and purposes of listening skill.
2. Students understand importance of speaking.
3. Students developed the speaking skills on telephone, business and also in travel
4. Learnt some effective vocabulary learning strategies.
5. Students will able to communicate clearly and effectively and handle their day to day affairs well with their knowledge of language skills.
6. Students understand importance of learning communicative English.

UNIT I

Listening: Listening comprehension – Listening for Specific Information –Note Taking – Interpreting Charts and Diagrams.

UNIT II

Speaking: Essentials of effective communication – Greeting and Introducing – Making requests – Asking for permission – Giving and Denying Permission – Offering and Accepting Help – Asking for and Declining Help – Giving Instructions and Orders - Talking about likes and dislikes.

Telephone Skills – Understanding telephone conversation – handling calls – leaving messages – making requests - giving instructions and orders

Discussion Skills – Giving your opinion – agreeing and disagreeing – Making suggestions – Interrupting – questioning – reporting – Dealing with questions. (Completing dialogues)

UNIT III

Reading: Reading – Reading with a purpose – Skimming and Scanning – locating main points – reading critically – Sequencing of sentences – Reading comprehension.

UNIT IV

Writing: Paragraph Writing – Descriptive and Narrative. Safety Instructions/ Suggestions. Expansion of Abbreviations – Spellings- Report writing.

Translation- Translating short sentences and passages from English to Tamil and from Tamil to English.

UNIT V

Vocabulary: Improve English vocabulary: Synonyms – Antonyms – Prefixes – Suffixes – Idioms – Collocations – Different types of English – British and American (Choose the best answer type from a database of 50 words each for each topic)

Functional Grammar: Forming questions, getting answers – Articles – Parts of Speech – Punctuation – Common mistakes in English (Homophones)(Exercise based)

Suggested Books:

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M. Peter S.J. “Let's Communicate – Basic English for Everyone”, Vaigarai Publications, 1st edition, Dindigul 2007.

Semester – III**15PHU301****ELECTRICITY AND MAGNETISM****L T P C****5 - - 5****Course Objectives**

- To establish grounding in electromagnetism in preparation for more advanced courses.
- The major concepts covered are: the abstraction from forces to fields using the examples of the gravitational, electric and magnetic fields, with some applications; the connection between conservative forces and potential energy; how charges move through electric circuits; the close connection between electricity and magnetism, leading to the discovery of electromagnetic waves.
- To use electromagnetic theory and principles in a wide range of applications.
- To understand the calculus along with physical principles
- To effectively solve problems encountered in everyday life, further study in science, and in the professional world.
- To gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
2. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.
3. Use an understanding of calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world.
4. Be able to use electromagnetic theory and principles in a wide range of applications.
5. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.
6. To develop an understanding of the principles of electricity and magnetism.

UNIT - I

Electrostatics: Gauss theorem, application of Gauss theorem - Electric intensity at a point immediately adjacent to a charged conductor - Energy stored in unit volume of an electric field. Spherical Capacitor - Cylindrical Capacitor - Force of attraction between charged plates of a Capacitor - change in energy of a parallel plate Capacitor when the distance between the plates is altered and when a dielectric slab is introduced between the plates - types of Capacitors - Guard ring Capacitor - Electrolytic Capacitor - Variable Capacitor.

Polarization in dielectric materials - Parallel plate Capacitor and dielectric slab - Boundary conditions - depolarization factor

UNIT - II

Magnetism: Properties of the magnetic field B - Divergence of B - Curl of B - Magnetic vector potential - Electron theory of magnetism - Dia, para and ferromagnetism – Ferri and Antiferro magnetism – Domain Theory of Ferrimagnetism - Magnetic field (B)-magnetization (M) - Magnetic field intensity (H) - Magnetic susceptibility and magnetic permeability - Magnetic materials and magnetization- Magnetic hysteresis - Area of the hysteresis loop - Ferro magnets- Determination of susceptibility - Curie balance method - Guoy's method.

UNIT - III

Thermal effects of electricity: Seeback effect-Laws of thermo e.m.f - Peltier effect - Peltier coefficient - Determination of Peltier coefficient at a junction - Thermo dynamical consideration of Peltier effect -Thomson effect -Thomson coefficient - emf generated in a thermocouple taking both Peltier effect at the junctions and Thomson effect in metals - Thermo electric power - applications of thermodynamics to thermocouple - Thermoelectric diagrams and their uses.

UNIT - IV

Inductive and capacitive effects: Growth and decay of current in an inductive - Resistive circuit - charging and discharging of a capacitance through a resistance - Charging and discharging of a capacitance through an inductance and a resistance - Discharge of a capacitance through an inductance - Oscillatory circuits.

Analysis of the A.C circuits (with the vector diagrams) containing (i) resistance and inductance (ii) capacitance and resistance (iii) resistance, inductance and capacitance - LCR series resonance circuit - LC parallel and L, R and C parallel resonance circuits -power consumed by the above circuits - q factor and band width of response of a tuned circuit-sharpness of resonance.

UNIT -V

Electric induction: Induced emf, Faraday's Law and Lenz's Law -The emf induced in a rotating coil -search coil - Eddy current - Electromagnetic damping - Self and mutual inductances - expressions and determination by experiment - Energy stored in an inductor - Artificial external pacemakers - Electromagnetic measurement of blood flow.

Charged particles in a uniform and constant electric field - Charged particles in an alternating electric field - Charged particles in a uniform and constant magnetic field -magnetic focusing - charged particles in combined electric and magnetic field when the fields are parallel and are in mutually perpendicular directions.

Suggested Books:

1. Brijlal and Subramanyam, 1st editon; 2004, Electricity and magnetism, S. Chand & Company, New Delhi
2. Murugesan. R, 9th edition 2014 , Electricity and magnetism, S. Chand & Company, New Delhi.
3. Nagarathinam and Lakshminarayanan, 2002, Electricity and magnetism, 2nd Edition, The National Publishing Inc., New Delhi.
4. Tewari. T.K., 1st edition 2005, Electricity and magnetism, S. Chand & Company, New Delhi.
5. Mathur. D.S., 2004, electricity and magnetism, S.Chand & Company, New Delhi.
6. Vasudeva. D.N., 2004, Electricity and magnetism, S. Chand & Company, New Delhi.

Semester – III**15PHU302****SOLID STATE PHYSICS****L T P C****4 - - 4**

Course Objective:

- This course integrates theory of Solid State Physics with experimental demonstrations in the Physics Lab.
- The course will provide a valuable theoretical introduction and an overview of the fundamental applications of the physics of solids.
- It includes theoretical description of crystal and electronic structure, lattice dynamics, and optical properties of different materials (metals, semiconductors, dielectrics, magnetic materials and superconductors), based on the classical and quantum physics principles.
- To calculate thermal and electrical properties in the free-electron model.
- To gain a basic knowledge of crystal systems and spatial symmetries.
- To know what phonons are, and be able to perform estimates of their dispersive and thermal properties.

Course Outcomes

After successful completion of the course, the student is expected to

1. Account for interatomic forces and bonds.
2. Have a basic knowledge of crystal systems and spatial symmetries.
3. Account for how crystalline materials are studied using diffraction, including concepts like form factor, structure factor, and scattering amplitude.
4. Know what phonons are, and be able to perform estimates of their dispersive and thermal properties.
5. Calculate thermal and electrical properties in the free-electron model.
6. Explain superconductivity using BCS theory
7. Outline the importance of solid state physics in the modern society.

UNIT 1

Crystallography: Distinction between crystalline and amorphous solids – Different features of the crystal – Crystal lattice – Basis – Crystal structure – Unit cell – Number of lattice points per unit cell- Bravais lattices – Miller indices – Elements of Symmetry – Structure of KCl and NaCl crystal – Atomic Packing – Atomic radius – Lattice constant and density- Crystal structure.

UNIT 2

Bond theory of solids – Classification of solids – Basics of Bond theory – Optical properties of solids – Specific heat capacity of solids – Dulong and Pettit's law – Einstein's theory of specific heat of solids – Fermi levels.

UNIT 3

Magnetic properties of materials : Introduction – Langevin's theory of diamagnetism – Langevin's theory of paramagnetism – Ferromagnetism – Weiss theory of Ferromagnetism – Nuclear magnetic resonance – Ferro electricity – Ferroelectric crystals – Quantum theory of paramagnetism – Cooling by adiabatic demagnetization of a paramagnetic salt.

UNIT 4

Free electron theory – Drude Lorentz theory – Explanation of Ohm's law – Electrical conductivity – Thermal conductivity – Wide-Mann and Franz ratio – Sommerfield model – Schotcky effect – Hall effect – Hall voltage and Hall coefficient – Mobility and Hall angle – Importance of Hall effect – Experimental determination of Hall coefficient.

UNIT 5

Dielectrics- Dielectric constant and displacement vector- Clausius-Mossotti relation- Atomic or molecular polarizability – Types of polarizability -Super conductivity – Phenomena – magnetic properties – Super conductor – Meissner effect – Experimental facts – Isotopes effect – Thermodynamic effect.

Suggested Books:

1. Gupta and Kumar; pragthiprakashen; Solid State Physics;
2. R Murugesan; S.Chand & Co; 2004 1st edition Modern Physics
3. Charles Kittel, Introduction to Solid State Physics, 7th edi 2000; willey eastern ltd, new delhi
4. A J Dekker; 2000; rev edition; Mcmillan India ltd Solid State Physics

Semester–III**15PHU311****PHYSICS PRACTICALS III****L T P C****- - 4 2**

Course Objective

The aim of the course is to make them to

- Understand and working of polarimeter.
- Understand the resolving power of different optical instruments.
- The objective of this course is to learn how to apply thermodynamic principles in order to interpret thermodynamic systems and predict their behaviors.
- To determine Stefan's Constant.
- To determine the coefficient of thermal conductivity of Cu by Searle's Apparatus.
- To apply the theoretical knowledge into the experiments and find the solutions.
- To experience the practical difficulties to find the physical constant values

Course Outcomes

After successful completion of the course, the student is expected to

1. Demonstrate the effect of magnetic field on current carrying conductors
2. Examine the effect horizontal component of earth's magnetic field on magnetic materials
3. Analyze the effects of refractive index of a medium using optical instruments
4. Gain knowledge on various theories of light.
5. Predict the curvature of a transparent medium.
6. Acquire skills to identify and apply formulas of optics and wave physics.
7. Understand the properties of light like reflection, refraction, interference, and diffraction etc., and applications of diffraction and polarization.

ANY TEN EXPERIMENTS

1. Spectrometer - i - i' curve
2. Spectrometer - i - d' curve
3. Spectrometer – dispersive power of grating
4. Potentiometer – emf of thermocouple
5. Newton's ring
6. Air wedge
7. Tan A
8. Tan B
9. Low and high range voltmeter calibration
10. Focal length of concave lens

11. Focal length of convex lens
12. Current – voltage sensitivity- B.G
13. Mutual inductance of coil – B.G

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, PragathiPrakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, PragathiPrakashan, Meerut

Course Objectives

- The molecular orbital theory, preparation and properties of inorganic compounds.
- Theory of covalent bond, polar effects and stereochemistry of organic compounds.
- About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
- To understand types and structure of different compounds.
- To understand types and structure of inorganic carbon compounds.
- To distinguish between intra and inter molecular hydrogen bonding.
- To understand the electro chemistry of chemicals.

Course Outcome

After successful completion of the course, the student is expected to

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. Gain knowledge on bonding of elements, preparation of new compounds, properties of new materials, etc.,
6. Understand the concept of dye, properties of dye and their applications in day to day life.

Unit-I

Chemical Bonding: Molecular orbital theory-linear combination of atomic orbitals-bonding and antibonding molecular orbitals-energy level diagram-bond order- M.O. configuration of H_2 , N_2 and F_2 molecules. Diborane: Preparation, properties and structure. $NaBH_4$: Preparation and uses. Borazole: Preparation and properties. Interhalogen compounds: ICl , BrF_3 , IF_5 - preparation, properties, uses and structure. Basic properties of iodine. Compounds of sulphur: Sodium hydrosulphite- preparation, properties, uses and structure. Per acids of sulphur: Preparation, properties, uses and structure.

Unit-II

Industrial Chemistry: Silicones: Synthesis, properties and uses. Fuels gases: Natural gas-water gas-semi water gas-carbureted water gas-producer gas- oil gas (Manufacturing details not required). Fertilizers: NPK fertilizer-ammonium sulphate-urea-superphosphate of lime-triple superphosphate- potassium nitrate-ammonium nitrate. Pollution: Water, air and soil pollution-sources and remedies-acid rain-ozone hole-greenhouse effect.

Unit- III**Covalent Bond and Stereoisomerism:**

Covalent Bond: Orbital overlap, hybridization and geometry of CH_4 , C_2H_4 and C_2H_2 . Polar effects: Inductive effect- electromeric effect- mesomeric effect- steric effect- hyperconjugation.

Stereoisomerism: Elements of symmetry-polarised light and optical activity-isomerism in tartaric acid-racemisation- resolution- geometrical isomerism of maleic and fumaric acids-keto-enol tautomerism of acetoacetic esters.

Unit- IV**Dyes, Chemotherapy and Vitamins:**

Dyes: Terms used chromophore, auxochrome, bathochromic shift and hypsochromic shift-classification of dyes – based on chemical structure and application-one example each for azo, triphenylmethane, vat and mordant dyes- preparation.

Chemotherapy: Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of penicillins and chloromycetin.

Vitamins: Diseases caused by the deficiency of vitamins A, B_1 , B_2 , C and D-sources of these vitamins.

Unit- V**Elements of Photochemistry, Chemical Kinetics and Chromatography:**

Elements of Photochemistry: Photochemical laws-Beer Lambert's law-Grotthuss-Draper law-Stark-Einstein law (statement only).

Chemical Kinetics: Rate-order-molecularity-pseudo first order reactions-zero order reactions-determination of order of reaction-measurement of order and rates of reactions-effect of temperature on reaction rate-energy of activation.

Chromatography: Principles and applications of Column, Paper and Thin Layer Chromatography.

Suggested Books

1. V.Veeraiyan & A.N.S. Vasudevan, Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai (2005).
2. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, Shobanlal & Company Ltd., Jalandar (2002).
3. B.S.Bahl&ArunBahl, Advanced Organic Chemistry, S.Chand & Company Ltd., New Delhi (2005).
4. Puri, Sharma &Pathania, Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar (2003).
5. R.Gopalan&S.Sundaram, Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi (2003).

Semester – III**15PHU303B****ALLIED STATISTICS - I****L T P C****4 - - 4****Course Objectives**

This course enables the students to learn

- The Concept of Fourier analysis and solving boundary value problems.
- Techniques of Fourier and Laplace transform
- To solve differential equations.
- Numerical techniques of differentiation and integration.
- Basic concepts in probability theory and statistical measures.
- Commonly used probability distributions (both discrete and continuous).

Course Outcomes

After successful completion of the course, the student is expected to

1. Appreciate the physical significance of Fourier series
2. Understand the mathematical principles on transforms.
3. Apply mathematical foundation to formulate and solve problems arising in physics
4. Synthesize numerical techniques for practical problems.
5. Understand the mathematical concept of Regression.
6. Gain knowledge on Correlation apply it for interpretation.

UNIT I

Meaning and definition of statistics – sources of data – collection of data – primary and secondary data - methods of primary data collection –sources of secondary data – Classification of data . Diagrammatic representation– Bar diagram and Pie diagram – Graphic representation – Histogram, Frequency distribution, Ogives.

UNIT II

Measures of Central tendency - Arithmetic Mean, Median, Mode - problems on individual, discrete and continuous series, Harmonic Mean and Geometric Mean.

UNIT III

Measures of Dispersion – Range, Inter Quartile range, Quartile deviation, Mean Deviation, Standard deviation and Coefficient of variation – problems on individual, discrete and continuous series.

UNIT IV

Correlation – meaning and definition – types of Correlation – degrees of Correlation – Methods of finding Correlation coefficient – scatter diagram – Karl Pearson’s correlation coefficient – Rank correlation coefficient - Computation and interpretation.

UNIT V

Regression - meaning and definition - Regression equation Regression in two variables – two regression lines - X on Y and Y on X – properties of regression equation – problems using normal equations and regression coefficients.

Suggested Book

1. Pillai R.S.N., and Bagavathi V., 2002. Statistics , S. Chand & Company Ltd, New Delhi.
2. Dr.P.N.Arora, 1997, A foundation course statistics, S.Chand& Company Ltd, New Delhi.
3. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
4. Gupta S.C., and Kapoor V.K., 1999. Fundamentals of Mathematical statistics, Sultan Chand & Sons, Educational Publishers, New Delhi.
5. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

Semester – III**15PHU303C****ALLIED BIOINFORMATICS - I****L T P C****4 - - 4****Course Objectives:**

- The course aims to provide students with a foundation in the basic concepts of Biophysics.
- Topics will include canonical and non-canonical structures of nucleic acids, structure of proteins, enzymes etc.
- Fundamental concepts that underlie biomolecular interactions will be discussed
- Biophysical methods that are employed for the structural analysis of these systems will be introduced at an elementary level.
- To apply chemical reaction to formulate and solve problems arising in physics.

Course Outcome

After successful completion of the course, the student is expected to

1. Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.
2. Appreciate the physical significance of biomolecules.
3. Apply chemical reaction to formulate and solve problems arising in physics.
4. Understand the concept of Regression.
5. Gain knowledge on Comparative modeling and visualization of molecules.
6. Define the structural characteristics of nucleic acids and proteins and examine parameters that variously determine their stability and function(s).

UNIT-I

Introduction to Bioinformatics: Objectives, History of Bioinformatics, Human Genome Project, application of bioinformatics – Molecular medicine, biotechnology, agricultural, forensic analysis.

UNIT-II

Introduction to Biological databases-Types of databases, sequence databases-nucleic acid sequence databases-Gene bank, EMBL, DDBJ, protein sequence database- Swiss-Prot, PIR, PDB structural databases, Search and retrieval of Entrez, bibliographic databases-Pubmed.

UNIT-III

Sequence alignment-local, global, pairwise and multiple alignment, Similarity searching programs- BLAST, FASTA; Gene prediction strategies and programs- Genscan, Genemark.

UNIT-IV

Protein secondary structure prediction, three dimensional structure prediction, Comparative modeling and visualization of molecules. Visualization-Rasmol, Deep view.

UNIT-V

Source of data – Primary and secondary data. Classification and tabulation of data. Diagrammatic and graphic presentation of data. Measures of central tendency: arithmetic mean, median, mode. Measures of variation: range, quartile deviation, mean deviation, standard deviation (simple problems only).

Suggested Books

1. Palanichamy. 1999. Statistical methods for Biologists. 3rd edition. Palani Paramount Publications, Palani.
2. S.P.Gupta. 2007. Statistical methods. Sultan Chand and Sons Educational Publishers, New Delhi.
3. Ignacimuthu. S, 2013. Basic Bioinformatics, 2nd edition Alpha Science Intl Ltd Chennai.
4. S.C. Rastogi. 2009. Bioinformatics Concepts, Skills & Applications, CBS Publishers & Distributors, India.
5. Abraham Silberchatz Henry K.Forth and Sudharshan, 1997. “Database System Concepts” Tata McGraw Hill, New Delhi.
6. Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.
7. Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.
8. David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.
9. Sundararajan. S and R. Balaji, 2003. Introduction to Bioinformatics, Himalaya Publishing House, Mumbai.
10. Steve Selvin. 2005. Biostatistics. 1st edition. Pearson Education Pte Ltd., New Delhi.
11. Jerald H Zar. 2005. Biostatistical Analysis. 4th edition. Pearson Education Pte Ltd., New Delhi.
12. Daniel. 2006. Biostatistics: A Foundation for analysis in the health sciences. 7th edition. John Wiley and Sons, Inc., New York.
13. SundarRao. P.S.S., and J.Richard., 2012. 5th edition, Introduction to Biostatistics and Research Methods, PHI Publication, New Delhi.

Semester – III**15PHU311A****ALLIED CHEMISRY PRACTICALS - I****L T P C****- - 3 2****Course Objective**

- To make the student able to identify the elements and the functional groups present in an organic compound.
- The student on successful completion of the course should learn the principles of volumetric analysis.
- To estimate the compounds by acidimetry, alkalimetry and permanganometry.
- To acquire practical skills in volumetric analysis.
- To understand the basic principles of volumetric analysis.
- To estimate the Acidimetry & Alkalimetry by volumetric analysis

Course Outcome

After successful completion of the course, the student is expected to

1. Learnt about the qualitative analysis of organic compounds.
2. Learnt the detection of elements and functional groups present in an organic compound by systematic analysis.
3. Verify the presence compositions by experimentally.
4. Analyse the properties of different chemical compounds by experimentally.
5. Differentiate the chemicals such as aldehydes, Ketones, amines, diamides etc.,
6. Identify the chemical properties of different chemicals.

Contents

Systematic analysis of an organic compound, preliminary tests, detection of elements present, aromatic or aliphatic, saturated or unsaturated, nature of the functional group, confirmatory tests– aldehydes, ketones, amines, diamide, carbohydrates, phenols, acids, esters & nitro compounds.

Note: Each student should analyse minimum 6 compounds.

REFERENCE BOOKS:

1. R. Ramasamy, Allied Chemistry Practical Book, Priya Publications, Karur (2008).
2. A.O. Thomas, Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala (2010).
3. V.Venkateswaran, R.Veerarwamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition, S.Chand Publications, New Delhi (2004).

Course Objective

- Demonstrate knowledge of probability and the standard statistical distributions.
- Demonstrate knowledge of fixed-sample and large-sample statistical properties of point and interval estimators.
- Demonstrate knowledge of the properties of parametric, semi-parametric and nonparametric testing procedures.
- Demonstrate the ability to perform complex data management and analysis.
- Demonstrate the ability to apply linear, nonlinear and generalized linear models.
- Demonstrate understanding of how to design experiments and surveys for efficiency.

Course Outcome

After successful completion of the course, the student is expected to

1. Continue their higher studies and scientific research to analyze and solve complex problems in the field of computer science.
2. Design, develop and test the solutions using contemporary technologies with full participation in profession and society.
3. Communicate effectively in their work environment with multidisciplinary team for their lifelong learning, ethical and professional development.
4. Participate in national mission through technical expertise, leadership and entrepreneurship.
5. Demonstrate knowledge of classical and repeated measures multivariate methods and computational techniques.

List of Experiments

1. Using SPSS Package, draw bar diagram and pie diagram for discrete series.
2. Using Excel Package, draw bar diagram and pie diagram for discrete series.
3. Using SPSS Package, calculate the Mean for individual, discrete and continuous series.
4. Using Excel Package, calculate the Mean for individual, discrete and continuous series.
5. Using SPSS Package, calculate the Median for individual and discrete series.
6. Using SPSS Package, calculate the Mode for individual and discrete series.
7. Using SPSS Package, calculate the Standard deviation.
8. Using SPSS Package, calculate the Karl Pearson's Correlation.
9. Using SPSS Package, calculate the Rank Correlation Coefficient for Untied Rank.
10. Using SPSS Package, calculate the Rank Correlation Coefficient for Tied Rank.

Semester – III**15PHU311C****ALLIED BIOINFORMATICS PRACTICALS - I****L T P C****- - 3 2****Course Objective**

- The course aims to provide students with a foundation in the basic concepts of Biophysics.
- Topics will include canonical and non-canonical structures of nucleic acids, structure of proteins, enzymes etc.
- Fundamental concepts that underlie biomolecular interactions will be discussed
- Biophysical methods that are employed for the structural analysis of these systems will be introduced at an elementary level.

Course Outcome

After successful completion of the course, the student is expected to

1. Students will function successfully in the laboratory and use safe laboratory practices.
2. Students will critically evaluate data and design experiments to test hypotheses relevant to the practice of Biochemistry and Biophysics.
3. Students will demonstrate awareness of ethical issues in the practice of science.
4. Appreciate the physical significance of biomolecules.
5. Apply chemical reaction to formulate and solve problems arising in physics.
6. Understand the concept of Regression.

List of Practicals

1. Introduction to MS Office.
2. Analysis of databases
 - NCBI
 - EMBL
 - DDBJ
 - PIR
 - SWISS PROT
3. Retrieval of protein structures –PDB
4. Bibliographic Databases
 - Pubmed
 - Medline
5. Secondary structure prediction
 - SOPMA
6. Molecular Visualization and analysis
 - RASMOL
7. Sequence similarity search for a pair of sequences using
 - BLAST

- FASTA

8. Multiple sequence alignment

- CLUSTAL

REFERENCE BOOKS

1. Allen Bregman, 2001. Laboratory Investigations in Cell and Molecular Biology, Wiley..
- Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.
2. Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.
3. Dealtry G.B. and Rickwood D.. 1992, Cell biology-Lab Fax (1st edition) Black well Scientific Publishers, New Delhi.
4. David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.
5. Mani K., N. Vijayaraj. 2004. Bioinformatics- A practical approach, Aparnaa publication, India.
6. Rajan S. and Selvi Christy R, 2011. Experimental procedures in Life Sciences,
7. Published by Anjanna Book House, Chennai.

Semester-III

		L	T	P	C
15FCC301A	INTRODUCTION TO COMPUTERS	4	0	0	2

Course Objectives

This course enables the students

- To develop skills for quantitative estimation using computer language.
- To code various differentiation and integration methods in a modern computer language.
- To plot the graphs of function
- To develop an understanding of computer networking basics.
- To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Solve complicated matrix related problems like matrix inverse and matrix multiplication.
2. Acquire problem-solving skills through computer programming.
3. Plot various functions and parametric curves.
4. Understand the basic coding of MS Office Word.
5. Gain knowledge on Internet Terminology.
6. Apply their knowledge to solve the problems.

Unit-I

Introduction- Characteristics of computers- development of computers- generations of computers- classification of computers-the computer system- types of Input/ Output and memory devices-computer software-categories of software.

Unit-II

Starting with MS Office Word – Working with Text – working with tables-Checking spelling and grammar- adding graphics to document- Mail merge- printing a document – Advanced features of MS Office Word- Keyboard shortcuts.

Unit III

Starting with MS Office Excel- Working with Excel workbook-working with worksheet-formulas and functions-inserting charts-sorting-importing data-printing in excel- Advanced features of MS Office Excel.

Unit IV

Starting with MS Office PowerPoint – Working with PowerPoint- Working with different views- Designing Presentations- Slide Show.- Printing in PowerPoint.

Unit-V

The Internet-Evolution of Internet-Owner of Internet- Anatomy of Internet – Internet Terminology- Getting Connected to Internet- Web Brower- Electronic Mail- Search engines- Uses of internet to society.

Suggested Book

1. Fundamentals of Computers: For Undergraduate Courses in Commerce and Management, ITL Education Solutions. 2011. Pearson, New Delhi.
2. PradeepK.Sinha, PritiSinha. Computer Fundamentals, 2007, 6th Edition BPB Publications, New Delhi.
3. V. Rajaraman. Fundamentals of Computers, Prentice-Hall Of India Pvt. Limited, 2003.
4. Wallace Wang.Microsoft Office 2007 For Dummies,1st Edition Wiley Publishing Inc.

Semester III

		L T P C
15FCC301B	INTRODUCTION TO MULTIMEDIA	4 0 0 2

Course Objectives

This course enables the students

- To develop skills for quantitative estimation using computer language.
- Acquire basic knowledge on Multimedia devices.
- Understand current trends in multimedia by experiencing a variety of applications and development packages.
- To train and give idea about computer graphics.
- To gain the skills and project-based experience needed for entry into web design and development careers.
- To understand how the web pages are designed interactively.

Course Outcomes

After successful completion of the course, the student is expected to

1. This course in curriculum is an introduction to the multimedia and its applications.
2. This course enables students to understand how the web pages are designed interactively.
3. How to critically evaluate website quality, learn how to create and maintain quality web pages learn to create and manipulate images.
4. Gain the skills and project-based experience needed for entry into web design and development careers.
5. Gain knowledge on Computer based animation.
6. Apply knowledge to Creating animation.

UNIT - I

Multimedia – An overview: Introduction – Multimedia presentation and production – Characteristics of Multimedia presentation – Hardware and Software Requirements – Uses of Multimedia. Text: Types of text - Font - Text File formats. Image: Image data representation – Image file formats – Image processing software. Graphics: Advantages of graphics – Uses – Components of a graphics system.

UNIT - II

Audio: Sound waves – Types and properties of sound – Components of audio system – Digital audio - Musical Instrument Digital Interface (MIDI) – Audio file formats – Audio processing software. Video: Motion video – Television systems – Video file formats – Video processing software. Animation: Uses of animation – Computer based animation – Animation file formats – Animation software.

UNIT - III

Introducing Photoshop elements: About elements – Welcome screen – Create mode – Menu bar – Toolbox – Options bar – Panels. Organizing images: Obtaining images – Tagging images – Searching for images – Opening and saving images. Selecting Areas – Layers – Text and Drawing Tools.

UNIT - IV

Understanding Flash: Understanding Flash basic elements – Creating a simple animation. Learning Flash Toolbox: Learning the toolbox – Using tools. Learning Flash Panels: Understanding the panels. Using timeline and layers: Understanding how timeline works – Understanding layers. Drawing objects: Drawing lines and fills – Using colors – Rotating, skewing and scaling – Grouping objects.

UNIT - V

Creating animation – How animation works – Creating motion tweens – Creating shape tweens. Understanding masks – Creating masks. Creating symbols and using the library: Learning about symbols – Creating symbols – Using libraries. Learning Basic Action Script concepts: Action Script basics – Data type basics.

Suggested Books

1. Ranjan Parekh, 2013, Principles of Multimedia, 2nd Edition, Tata McGraw hill.
2. Nick Vandome, 2011, Photoshop Elements 9, Tata McGraw hill.
3. Brian Underdahl, 2002, Macromedia Flash MX – A Beginners Guide, Dreamtech Press.
Tay Vaughan, 2002, Fundamentals of Multimedia, 5th Edition, Tata McGraw-Hill.
4. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, Dream Tech Press, New Delhi

Semester – IV**15ENU401****ENGLISH – IV****L T P C****4 - - 4****Course Objectives:**

- To train the students in understanding the concepts of communication.
- To be familiar with the four basic skills of English.
- To train students in developing their written communication.
- To train students in developing their presentation skills.
- To acquire the skill of making grammatically correct sentences.
- To reflect originality on the application of soft skill views and express in writing their views.

Course Outcome:

1. Students have acquired proficiency in communication.
2. Students have become adept in written communication and presentation skills.
3. Developed the skill of writing in English and that of public speaking.
4. Establish and maintain social relationships.
5. Develop communication skills in business environment.
6. Enhanced communication competency through LSRW skills

UNIT I – Concept of Communication – Barrier to Communication –Body language – Personality Development – Etiquette and Manners- Soft Skills – Emotional Intelligence

UNIT II – Listening Comprehension – Reading Comprehension – Paragraph writing – Precis Writing – Writing Resume and Covering Letter -Speaking – Welcome Address, Vote of Thanks, Compering, Debates, Role Play, Dialogues – Vocal Communication Techniques. Voice, Quality, Volume, Pitch

UNIT III – Dicto Composition – Letter Writing (Informal, Letters to the Editor etc) – Term paper – Book reviews

UNIT IV – Business Correspondence – Layout of Business Letter – Formal Styles of Business Letters – Letters of Acceptance, Appointment, Resignation, Complaint, Sending E-mails.

UNIT V – Effective Presentation – Planning – Audience Analysis –Logical Sequencing – Timing of the Presentation – Conclusion – Answering Queries – Group Discussion – Interview.

Suggested Books:

1. Juneja. P. Om and AaratiMujumdar, “Business Communication -Techniques and Methods”, Orient Blackswan Pvt. Ltd., Hyderabad: 2010.
2. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
3. Balasubramanian M and G Anbalagan. Performance in English. 2007.Anuradha Publications: Kumbakonam
4. Mohan, Krishna and Meenakshi Raman.2008, Effective English Communication, Tata McGraw Hill: New Delhi.
5. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

Course Objective

- This is a basic course in Physics which deals with the phenomena taking place in the nuclear domain. Students will be given an insight into the dimensions of a nucleus.
- The aim is to tell them about the stability of nucleus and various other properties.
- The students will learn about various types of radiations and their interaction with matter.
- Students will learn the methods to find the mass and charge of any nucleus by using some instruments.
- To gain knowledge in the content areas of nuclear and particle physics.
- Students will learn the concept of nuclear reactions.

Course Outcomes

After successful completion of the course, the student is expected to

1. Determine the charge, mass of any nucleus by using various spectrographs.
2. They are able to understand the size of nucleus and all its properties.
3. Develop and communicate analytical skills in subatomic physics.
4. This course has led the students to understand interaction of various types of radiation with matter which they observe in their daily life. It's easy for them now to relate the theory to practical.
5. Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area.
6. Students now know various methods of accelerating various types of particles to perform scattering experiments.

UNIT - I

Basic nuclear structure: Classification of nuclei - Nuclear spin angular momentum - Nuclear magnetic dipole moment - Electric quadrupole moment - Nuclear size - Nuclear stability - Nuclear forces - Meson theory of nuclear forces - Theories of nuclear composition - Proton-electron hypothesis - Models of nuclear structure - Liquid drop model - Shell model.

Synchrocyclotron - Betatron - Electron Synchrotron and proton synchrotron.

UNIT - II

Radioactivity: Determination of e/m of alpha particles - Determination of the charge of alpha particles - Experimental measurement of range of alpha particles - Geiger and Nuttall experiment - Geiger Nuttall law - Alpha particle disintegration energy - Determination of e/m of beta particles - Origin of the line and continuous spectrum - Neutrino theory of beta decay - K-electron capture - Origin of gamma rays - Absorption of gamma rays - Natural radioactive series - Law of successive disintegration - Radioactive equilibrium and radioactive dating.

UNIT - III

Nuclear Models: Discovery of artificial transmutation - Rutherford's experiment - Bohr's theory of nuclear disintegration - Nuclear reactions - Energy balance in nuclear reactions and the Q-value. Transmutation by (i) Alpha particles (ii) Protons (iii) Deuterons and (iv) Neutrons. The scattering cross-section and its determination. Production of radioisotopes and their uses.

UNIT - IV

Nuclear Reactions: Nuclear fission - Energy released in fission - Bohr and Wheeler's theory of nuclear fission - Chain reaction - Multiplication factor - Natural uranium and chain reaction - Design of nuclear reactor - Breeder reactor - Nuclear fusion - Source of stellar energy - Thermonuclear reactions - Transuranic elements.

Ionization chamber – Geiger-Muller counter – Proportional counter – Wilson's cloud chamber – Bubble chamber – Their principles and working.

UNIT - V

Particle Physics: Baryons - Leptons - Mesons - Particles and antiparticles - concept of antimatter - strong interaction - Electromagnetic interaction - Weak interaction - Gravitational interaction - Elementary particle quantum numbers - Conservation laws and symmetry - Charge conjugation, parity and time reversal - CPT Quark model – Nuclear isotopes - Introduction to medical physics.

Suggested Books

1. Murugesan. R, 2000 edition, Nuclear Physics, S. Chand & Company, New Delhi.
2. Brijlal and Subramaniam, 1st edition 2001, Atomic and Nuclear Physics, S. Chand & Company, New Delhi.
3. Murugesan. R, 17th edition 2014, Modern Physics, S. Chand & Company, New Delhi.
4. Theraja. B.L., 2002, Modern Physics, S. Chand & Company, New Delhi.
5. Tayal. D.C. ,5th edition 2014, Nuclear Physics, Himalaya Publishing house, Mumbai.
6. Goshal. S. N, Atomic and Nuclear Physics Vol.1&2 2014, S.Chand& Company

Course Objective

- This course builds the ideas of harmonic motion to cover in depth concept of waves in physics with particular emphasis on light waves as an example.
- The foundation of the course is Fourier theory, which will then be used to understand dispersion of waves, image formation in optics and diffraction and other aspects of Fourier optics.
- Understand how the principle of superposition is applied when two pulses meet
- Define three terms to describe periodic waves: speed, wavelength, and frequency
- Explain the characteristics of transverse and longitudinal waves.
- Identify the relationship between the speed, wavelength, and frequency of a wave.

Course Outcome

After successful completion of the course, the student is expected to

1. To develop an understanding of the principles of optics.
2. Understand linear, time-invariant systems.
3. Understand the role of the wave equation and appreciate the universal nature of wave motion in a range of physical systems
4. To build connections between mathematical development and conceptual understanding.
5. Understand dispersion in waves and model dispersion using Fourier theory.
6. Understand optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model.

UNIT 1 - Geometrical Optics

Aberrations - Spherical aberrations in lens - coma - Astigmatism - chromatic aberration - dispersion by a prism - Cauchy's dispersion formula - dispersive power, achromatism in prism - deviation without dispersion - chromatic aberrations in a lens - circle of least confusion - achromatic lens - condition for achromatism of two thin lenses separated by a finite distances.

UNIT 2 - Physical Optics**Interference**

Fresnel's Biprism – Interference in thin films due to reflected light – Fringes due to wedged shaped thin film – Newton's rings – Refractive index of the Liquid – Michelson interferometer – Determination of a wave length of monochromatic light – difference in Wave length between two neighboring spectral lines – Fabry Perot Interferometer.

UNIT - 3 Diffraction

Fresnel's assumptions – rectilinear propagation of light – half period zone – Zone Plates – Action and Construction – comparison with a convex lens – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction at a Single light – Diffraction grating – Resolving power & Dispersive power of Grating.

UNIT 4 - WAVES AND OSCILLATIONS

Simple harmonic motion - free, damped, forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria.

UNIT-V- ULTRASONICS

Ultrasonic waves - Different modes - Characteristic properties - Behaviour - Focusing - Stationary waves and resonance - Attenuation - Diffraction - Sources of ultrasound. Piezoelectric crystal - Low frequency / high Intensity applications - high frequency - low intensity applications - clinical applications of different scans.

Suggested Books

1. A Text book of Optics Brijlal&Subramaniam; 25th edition 2014 S.Chand& co New delhi
2. Text book of sound by BrijLal&Subramaniam, N Vikas Publishing House, New Delhi, 2nd edition 2014
3. Text book of sound by M N Srinivasan – Himalaya Publications (1991).
4. Science and technology of Ultrasonics by Baldevraj, and V. Rajendran 1st edition 2009 Narosa (2004).
5. Optics and Spectroscopy R Murugesan 9th edition 2014 S.Chand& co.
6. Optics Ajoy Ghatak 5th edition 2014; Tata Mcgraw hill.
7. Optics 2nd edition 2011; Miller V Keiln; Thomas E. Furtak; CBS publishers.

Course Objectives:

- To familiarize the students with working, design and analysis of basic amplifier circuits.
- To design and analyze wave shaping circuits, rectifiers and power supply circuits
- Introduce the basic concept of qualitative and quantitative analysis of an instruments.
- Study the concept of separation science and its applications.
- To understand the concept of spectrometer
- To know about the resistance usages

Course Outcomes:

After successful completion of the course, the student is expected to

1. Handle any kind of process by framing it in block diagram, mathematical model and different process variables.
2. Use modern engineering tools and techniques in the practice of electronic devices.
3. Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.
4. Measure the thickness of thin material using optical means
5. Determine the wavelength of Mercury spectrum
6. Estimate the specific resistance of any conductor
7. Analyze frequency response of RLC circuit.

ANY TEN EXPERIMENTS

1. Spectrometer – hollow prism
2. Spectrometer- Cauchy's constant
3. M-Field along the axis of a circular coil carrying current
4. Elongation of spring
5. Calibration of high range ammeter-reduction factor-potentiometer
6. Energy band gap – Ge/ Si diode
7. PN junction diode characteristics
8. Characteristics of Zener diode
9. CRO
10. High resistance by charging – B.G

11. High resistance by discharging – B.G
12. B-H curve
13. Spectrometer – narrow angle prism

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, PragathiPrakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, PragathiPrakashan, Meerut

Semester – IV

15PHU403A

ALLIED CHEMISRY - II

L T P C

4 - - 4

Course Objectives

- To make the student to be conversant with the extraction of metals, coordination chemistry, preparation, properties uses and structure of naphthalene and heterocyclic compounds.
- To make the student acquire sound knowledge of electrochemistry, biological functions of amino acids and proteins, thermodynamic laws, entropy, enthalpy change and the principles of electroplating.
- To understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.
- To identify the new materials by different synthesis methods.
- To classify the proteins, amino acids, carbohydrates, etc

Course Outcome

After successful completion of the course, the student is expected to

1. The student understand the metallurgy of metals and the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.
2. Understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.
3. Understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.
4. Know the concept of Heterocyclic Compounds and their properties, synthesis methods.
5. Apply their knowledge to identify the new materials by different synthesis methods.
6. Classify the proteins, amino acids, carbohydrates, etc.

Unit-I**Metals and Coordination Chemistry:**

Metals: General methods of extraction of metals-methods of ore dressing-types of furnaces-reduction methods-electrical methods-types of refining-Van Arkel process-Zone refining.

Coordination Chemistry: Nomenclature-theories of Werner, Sidgewick and Pauling-chelation and its industrial importance-EDTA-haemoglobin-chlorophyll-applications in qualitative and quantitative analysis.

Unit-II**Aromatic Compounds and Heterocyclic Compounds:**

Aromatic Compounds: Aromaticity-Huckel's ($4n+2$) rule- aromatic electrophilic substitution in benzene- mechanism of nitration, halogenation, alkylation, acylation and sulphonation.

Naphthalene: Isolation, preparation, properties and structure.

Heterocyclic Compounds: Preparation and properties of pyrrole, furan, thiophene and pyridine.

Unit-III

Amino acids, Proteins and Carbohydrates:

Amino acids: Classification, preparation and properties. Peptides-preparation of peptides (Bergmann method only).

Proteins: Classification, properties, biological functions and structure.

Carbohydrates: Classification, preparation and properties of glucose and fructose- discussion of open chain and ring structures of glucose and fructose-glucose-fructose inter conversion.

Unit-IV

Energetics: Type of systems-processes and their types - isothermal, adiabatic, reversible, irreversible and spontaneous processes-statement of first law of thermodynamics-need for the second law of thermodynamics-heat engine-Carnot cycle-efficiency-Carnot theorem-thermodynamics scale of temperature-Joule-Thomson effect- Enthalpy- Entropy and its significance-Free energy change.

Unit-V

Electrochemistry: Kohlrausch law-conductometric titrations-hydrolysis of salts-galvanic cells-E.M.F.-standard electrode potentials-reference electrodes- electrochemical series and its applications-buffer solution-buffer solution in the biological systems-pH and its determination-principles of electroplating.

Suggested Books

1. V.Veeraiyan& A.N.S. Vasudevan, Text Book of Allied Chemistry (II Edition), Highmount Publishing House, Chennai (2005).
2. B.R.Puri and L.R.Sharma, Principles of Inorganic Chemistry, Shobanlal& Company Ltd., Jalandar (2002).
3. B.S.Bahl&ArunBahl, Advanced Organic Chemistry, S.Chand& Company Ltd., New Delhi (2005).
4. Puri, Sharma &Pathania, Physical Chemistry, Vishal Publishing Company Ltd., Jalandhar (2003).
5. R.Gopalan&S.Sundaram, Allied Chemistry (III Edition), Sultan Chand & Sons., New Delhi (2003).

Course Objectives

- To provide students with a repertoire of mathematical methods that are essential to the solution of advanced problems encountered in the fields of applied physics
- In addition, intended to prepare the student with mathematical tools and techniques that are required in advanced courses offered in the applied physics.
- Demonstrate the ability to perform complex data management and analysis.
- Demonstrate the ability to apply linear, nonlinear and generalized linear models.
- Demonstrate understanding of how to design experiments and surveys for efficiency.
- Statistics is a scientific discipline by which statisticians assist other scientists and researchers in making informed decisions in the face of uncertainty.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Communicate mathematical and statistical knowledge and ideas to the students.
2. Apply his/her knowledge and skills to carry out advanced tasks and projects.
3. Contribute innovations and application of basic research.
4. Know the concept of different test methods.
5. Obtain the knowledge on problem solving and explain their steps.
6. Understand the concept of time series, probability, distribution, etc.,

UNIT I

Probability – definitions – addition and multiplication rules (only statements), permutation and combination, diagrammatic representation of probability (Venn diagram) – simple problems.

UNIT II

Probability distribution - Binomial distribution – Poisson Distribution – properties, mean and variance, Normal distribution—characteristics of normal curve (No derivations) simple problems only.

UNIT III

Test of Significance: Basic concepts – Z-test for two means – Small sample tests- t- test for single mean, two means – Chi Square Test.

UNIT IV

Index numbers – meaning and definition – uses – methods of construction – Unweighted and weighted index number – Laspeyre's, Paasche's and Fischer's method – Tests for an ideal index number – Wholesale and Cost of living index .

UNIT V

Time Series: Meaning – Components – Models – Business forecasting – methods of estimating trend – graphic, semi average, moving average and least square method – Seasonal variation – Methods of Simple Average.

Suggested Book

1. Pillai R.S.N., and Bagavathi V., 2002., Statistics, S. Chand & Company Ltd, New Delhi.
2. Gupta S.C., and Kapoor V.K., 1999. Fundamentals of Mathematical statistics, Sultan Chand & Sons, Educational Publishers, New Delhi.
3. Dr.P.N.Arora, 1997, A foundation course statistics, S. Chand & Company Ltd, New Delhi.
4. Navnitham P.A , 2004, Business Mathematics And Statistics, Jai Publications, Trichy,
5. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.
6. Richard. I. Levin., & David. S. Rubin., 1998. Statistics for management, Seventh edition, Prentice hall of India, New Delhi.

Semester – IV**15PHU403C****ALLIED BIOINFORMATICS - II****L T P C****4 - - 4****Course Objective**

- This paper is aimed at giving idea to the students regarding the nature of human body and usage of different radiations for the treatment of body.
- To get introduced to the basic concepts of Bioinformatics and its significance in Biological data analysis.
- To explain about the methods to characterise and manage the different types of Biological data.
- Give an overview about pathway and enzyme databases, Sequence submission tools.
- To describe about Multiple Sequence Alignment, its significance, algorithms and tools used for MSA
- To classify and explain about tools used for genome sequence assembly

Course Outcomes

After successful completion of the course, the student is expected to

1. Gain knowledge on Different areas of research in bio Physics
2. Understand and apply key concepts specific to energy deposition for both ionizing
3. Know about the Gene therapy and Genetic variability.
4. Understand the concept of NCBI, DDBJ, and EMBL.
5. Analyse the Biological Database and its Types.
6. Gain knowledge on Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, et.,

Unit I

Data generation: Generation of large scale molecular biology data. (Through Genome sequencing, Protein sequencing, Gel electrophoresis, NMR Spectroscopy, X-Ray Diffraction, and microarray). Applications of Bioinformatics.

Unit II

Biological Database and its Types Introduction to data types and Source. Population and sample, Classification and Presentation of Data Quality of data, private and public data sources.

General Introduction of Biological Databases; Nucleic acid databases (NCBI, DDBJ, and EMBL).

Unit III

Data storage and retrieval and Interoperability Flat files, relational, object oriented databases and controlled vocabularies. File Format (Genbank, DDBJ, FASTA, PDB, SwissProt).

Introduction to Metadata and search; Indices, Boolean, Fuzzy, Neighboring search

Unit IV

Sequence Alignments and Visualization Introduction to Sequences, alignments and Dynamic Programming; Local alignment and Global alignment algorithm and example) Pairwise alignment (BLAST and FASTA Algorithm) and multiple sequence alignment (Clustal W algorithm)

Unit V

Gene Expression and Representation of patterns and relationship General introduction to Gene expression in prokaryotes and eukaryotes, transcription factors binding sites. SNP, EST, STS. Introduction to Regular Expression, Hierarchies, and Graphical models (including Markov chain and Bayes notes). Genetic variability and connections to clinical data.

Suggested Books

1. Palanichamy. 1999. Statistical methods for Biologists. 3rd edition. Palani Paramount Publications, Palani.
2. S.P.Gupta. 2007. Statistical methods. Sultan Chand and Sons Educational Publishers, New Delhi.
3. Ignacimuthu. S, 2013. Basic Bioinformatics, 2nd edition Alpha Science Intl Ltd Chennai.
4. S.C. Rastogi. 2009. Bioinformatics Concepts, Skills & Applications, CBS Publishers & Distributors, India.
5. Abraham Silberchatz Henry K.Forth and Sudharshan, 1997. "Database System Concepts" Tata McGraw Hill, New Delhi.
6. Arthur M. Lesk, 2014. Introduction to Bioinformatics, 4th edition. Oxford University Press, Oxford.
7. Attwood. K. and J. Parry-Smith, 2003. Introduction to Bioinformatics, Pearson Education, Singapore.
8. David W. Mount, 2013. Bioinformatics: Sequence and Genome Analysis. 2nd edition, Cold Spring Harbour Laboratory Press, New York.
9. Sundararajan. S and R. Balaji, 2003. Introduction to Bioinformatics, Himalaya Publishing House, Mumbai.
10. Steve Selvin. 2005. Biostatistics. 1st edition. Pearson Education Pte Ltd., New Delhi.
11. Jerald H Zar. 2005. Biostatistical Analysis. 4th edition. Pearson Education Pte Ltd., New Delhi.
12. Daniel. 2006. Biostatistics: A Foundation for analysis in the health sciences. 7th edition. John Wiley and Sons, Inc., New York.
13. SundarRao. P.S.S., and J.Richard., 2012. 5th edition, Introduction to Biostatistics and Research Methods, PHI Publication, New Delhi.

Course Objective

- This paper presents the basic Principles of quantitative analysis in Chemistry.
- Enable the students to learn about the fundamentals of Practicals in Chemistry.
- The student on successful completion of the course should learn the principles of volumetric analysis.
- To estimate the compounds by acidimetry, alkalimetry and permanganometry.
- To acquire practical skills in volumetric analysis.
- To understand the basic principles of volumetric analysis.
- To estimate the Acidimetry & Alkalimetry by volumetric analysis

Course Outcomes

After successful completion of the course, the student is expected to

1. Learnt about the quantitative analysis.
2. Learnt the estimation of sample present in a solution by volumetric analysis.
3. Analysis the volumetric of given samples.
4. Know the procedure of Permanganometry analysis.
5. Understand the basic knowledge on experimental procedurers.
6. Apply their theoretical knowledge and find the new materials by different reaction schemes.

List of Experiments**I. VOLUMETRIC ANALYSIS****A. Acidimetry&Alkalimetry**

1. Estimation of sodium carbonateusing standard sodium hydroxide.
2. Estimation of sodium hydroxide using standard sodium carbonate.
3. Estimation of sulphuric acid using standard oxalic acid.
4. Estimation of potassium permanganate using standard sodium hydroxide.

B. Permanganometry

1. Estimation of ferrous sulphate using standard Mohr's salt.
2. Estimation of oxalic acid using standard ferrous sulphate.
3. Estimation of calcium-direct method.

Suggested books

1. R. Ramasamy, Allied Chemistry Practical Book, Priya Publications, Karur (2008).
2. A.O. Thomas, Practical Chemistry for B.Sc. Main Students, Scientific Book Centre, Cannanore-1, Kerala (2010).
3. V. Venkateswaran, R. Veeraswamy and A. R. Kulandaivelu, Basic Principles of Practical Chemistry, 2nd Edition, S. Chand Publications, New Delhi (2004).

Course Objective

- The course is designed to provide students with transferable skills, to understand the uses of SPSS, as a tool to summarize and aid in the interpretation of research findings.
- Demonstrate knowledge of probability and the standard statistical distributions.
- Demonstrate knowledge of fixed-sample and large-sample statistical properties of point and interval estimators.
- Demonstrate knowledge of the properties of parametric, semi-parametric and nonparametric testing procedures.
- Demonstrate the ability to perform complex data management and analysis.
- Demonstrate the ability to apply linear, nonlinear and generalized linear models.

Course Outcome

After successful completion of the course, the student is expected to

1. Continue their higher studies and scientific research to analyze and solve complex problems in the field of computer science.
2. Design, develop and test the solutions using contemporary technologies with full participation in profession and society.
3. Communicate effectively in their work environment with multidisciplinary team for their lifelong learning, ethical and professional development.
4. Participate in national mission through technical expertise, leadership and entrepreneurship.
5. Demonstrate knowledge of classical and repeated measures multivariate methods and computational techniques.

List of Experiments

1. Using SPSS Package, hypothesis test using Z- test for two different populations.
2. Using SPSS Package, hypothesis test using Z- test for two different samples.
3. Using SPSS Package, hypothesis test using t- test for two different populations.
4. Using SPSS Package, hypothesis test using t- test for two different samples.
5. Using SPSS Package, hypothesis test using Chi Square Test.
6. Using Excel Package, Calculate Laspeyre's, method.
7. Using Excel Package, Calculate Paasche's method.
8. Using Excel Package, Calculate Fischer's method.
9. Using Excel Package, Calculate moving average and show the results in graph.
10. Using Excel Package, Calculate seasonal indices by the methods of simple average.

Semester – IV**15PHU411C****ALLIED BIOINFORMATICS PRACTICALS - II****L T P C****-- 3 2****Course Objective**

- The course is designed to provide students with transferable skills, to understand the uses of SPSS, as a tool to summarize and aid in the interpretation of research findings.
- To be comfortable using SPSS as a data analysis tool
- To understand how to work with SPSS
- To learn to use new features of SPSS on their own
- To acquire information (samples)
- To understand how to enter and reorganize information within SPSS
- To understand how to effectively summarize research finds using SPSS through the use of appropriate indexes and tables.

Course Outcome

1. be able to choose charts to successfully highlight their research results
2. be able to understand and interpret charts
3. understand the basic principles behind inferential statistics
4. be able to carry out inferential statistical analysis using SPSS
5. be able to integrate information and build models
6. be able to edit SPSS output
7. be able to use SPSS output to produce scientifically sound research reports

List of Experiments

1. Using SPSS Package, hypothesis test using Z- test for two different populations.
2. Using SPSS Package, hypothesis test using Z- test for two different samples.
3. Using SPSS Package, hypothesis test using t- test for two different populations.
4. Using SPSS Package, hypothesis test using t- test for two different samples.
5. Using SPSS Package, hypothesis test using Chi Square Test.
6. Using Excel Package, Calculate Laspeyre's, method.
7. Using Excel Package, Calculate Paasche's method.
8. Using Excel Package, Calculate Fischer's method.
9. Using Excel Package, Calculate moving average and show the results in graph.
10. Using Excel Package, Calculate seasonal indices by the methods of simple average.

Semester V**15PHU501****ATOMIC AND MOLECULAR PHYSICS****L T P C****5 - - 5****Course Objective**

- This paper explains the evolution of matter from electron to molecules, different properties of atoms and molecules, structure of molecules, radioactivity etc.
- The student knowledge of the basics of science atom and molecules
- Learn the basic atomic concepts and principles, and the basics of emission spectroscopy with a highlight on its practical and scientific significance.
- Describe the atomic spectra of one and two valance electron atoms.
- Explain the change in behaviour of atoms in external applied electric and magnetic field.
- Explain rotational, vibrational, electronic and Raman spectra of molecules.
- Describe electron spin and nuclear magnetic resonance spectroscopy and their applications.

Course Outcomes

After successful completion of the course, the student is expected to

1. To make the students understand the basics of atoms and molecules, molecular structure, different types energy transfer in molecules etc.
2. Understand the emergence of quantum concept.
3. Distinguish between different photo devices and working.
4. Understand different atom models.
5. Analyse the prerequisite in a molecule towards its Rotational and vibrational activity.
6. Gain knowledge on theory of diamagnetism and paramagnetism.

UNIT I

Discharge of electricity through gases – Cathode rays, positive rays, x-rays – Discovery of electron – Determination of e/m by Thomson's method – Determination of charge of electron – Thomson's experiment - Electron theory and applications – electrical conductivity in metals – Thermal conductivity – Thermo-electric effect – Langevin's theory of diamagnetism and paramagnetism – Thermionic emission – photoelectric emission – applications

UNIT II

The Thomson atom model – Rutherford atom model – Bohr atom model – Applications of Bohr's theory – excitation and ionization of atoms – X-ray spectra – Continuous and

Characteristic x-ray spectra – The Sommerfeld relativistic atom model – Vector atom model –
Electronic structure in atoms – Fine structure of spectral lines

UNIT III

Radioactivity – origin of radiation from natural radioelements – alpha disintegration – wave
mechanical theory – Beta disintegration – internal conversion of gamma rays – gamma ray
emission – origin of gamma rays

UNIT IV

Molecular Structure – General classification of molecules – Electronic structure in molecules –
linkage between atoms – electrovalent and covalent atomic molecules – wave mechanical theory
of covalent linkage – Van der Waals type of binding – metallic binding – electric moments of
molecules – size and shape of molecules – heat of disassociation – photo-chemical disassociation
– Frank Condon principle

UNIT V

Molecular spectra – experimental study – theoretical explanation – pure rotation spectra –
rotation-vibration spectra – Fortrat diagram – Peculiarities of certain band spectra – Isotopic
effect in molecular spectra.

Suggested Book:

1. Murugesan. R, 17th edition 2014, Modern Physics, S. Chand & Company, New Delhi.
2. Arutherbeiser ; 1st edition 1969 McGraw hill ; Prespective of morden physics.
3. J.B.Rajam, 'Atomic Physics', S.Chand& Co., New Delhi, 7th edition 2009.
4. White H.E., 'Introduction to Atomic Spectra', McGraw Hill Book Co., New York, 1934.
5. Banwell, 'Fundamentals of Molecular Spectroscopy', Tata McGraw Hill Education, 1994.

Course Objectives

- This paper explains the shortcomings of quantum mechanics in explaining different subatomic physics and the evolution of quantum mechanics.
- This course is part one of a two semester course focused on a rigorous exposition to the principles of Quantum mechanics.
- The Dirac bra-ket formalism will be introduced and used throughout to present the principles of Quantum Mechanics in a general context.
- We will discuss analytic solutions to the Schrodinger equation for a variety of potentials in one, two and three dimensions.
- The role of symmetries as the underlying principle of Quantum Mechanics will be emphasized throughout the course.
- The use of symmetry principles and operators methods will be discussed.

Course Outcome

After successful completion of the course, the student is expected to

1. Understand the interpretation of wave function of quantum particle.
2. Know the quantum phenomena are exposed to the student.
3. Understanding the behavior of quantum particle encountering a i) barrier, ii) Potential.
4. Gets exposed to solving non-relativistic hydrogen atom, for its spectrum and eigenfunctions.
5. Study of influence of electric and magnetic fields on atoms will help in understanding Stark effect and Zeeman Effect respectively.
6. Understand the difference between classical and quantum concept.
7. Use the superposition principle to predict experimental outcomes for measurement of observables on simple quantum systems.
8. Apply the uncertainty principle and heuristic arguments to obtain rough descriptions of quantum systems.
9. Describe generally the physical implications, such as possible bound states and un-bound states for any given hamiltonian.

UNIT - I

Introduction - Inadequacy of classical mechanics - Dual nature of light - Dual nature of matter; De-Broglie wavelength - Experimental detection of wave properties of material particles based on diffraction of electrons; Davisson and Germer experiment -Normal incidence and oblique incidence - G.P. Thomson's experiment - Wave velocity and Group velocity for De-Broglie waves - Wave packet-Relationship between particle velocity and Group velocity for De-

Broglie waves - relation between phase velocity and group velocity for a non-relativistic free particle.

UNIT - II

Introduction-statement of the uncertainty principle - Physical significance of Heisenberg's uncertainty relation - Illustration of uncertainty principle - Examples of position, momentum, uncertainty - Heisenberg's Gamma ray microscope. Diffraction of a beam of electrons by a slit - Application of the uncertainty principle - The non existence of the electron in the nucleus - The radius of the Bohr's first orbit of H₂ atom and energy in the ground state.

UNIT - III

Physical interpretation of the wave function - Equation of motion of matter wave (i) Time-independent Schroedinger equation (ii) Schroedinger equation for a free particle and (iii) Time dependent Schroedinger equation-Solution of the Schroedinger equation -Orthogonal, normalized and orthonormal of wave function - Expectation values of dynamical qualities, probability current density, particle flux-Ehrenfest's theorem. Eigen function, Eigen value and Eigen value equation - orthogonality of Eigen function - Reality of energy Eigen value.

UNIT - IV

Constraints and degrees of freedom-generalized coordinates-generalized displacement-velocity-acceleration-momentum-force-potential-D'Alembert's principle-Lagrangian differential equation from D'Alembert's principle-Application of Lagrangian equation of motion to linear harmonic oscillator, simple pendulum and compound pendulum.

UNIT - V

Phase Space - Hamiltonian function - Hamilton's variational principle - Hamilton's canonical equations of motion - Physical significance of H - Application of Hamiltonian equation of motion to simple pendulum, compound pendulum and linear harmonic oscillator.

Suggested Books

1. Aruldas G., 2009, Quantum Mechanics, 2nd Edition, Printice Hall of India, New Delhi
2. Gupta , Kumar, Sharma 19th edition, 2008, classical mechanics ; pragrathiprakeshan; Meerut.
3. SathyaPrakash and G.K. Singh, 2003, Quantum Mechanics, KedarNath&Ram Nath& Co, Meerut, New Edition.
4. Singh. S.P., 2nd edition 2013, Elements of Quantum Mechanics, M.K. Badge & Kamal Singh, S.Chand& Co, New Delhi.
5. SathyaPrakash, 2002, Mathematical Physics, 4th Edition, S. Chand & Company, New Delhi.
6. Leonard.I.Schiff, 1968, Quantum Mechanics, 3rd Edition, McGraw Hill International, Auckland.

15PHU503

LASER AND SPECTROSCOPY**L T P C****5 - - 5****Course Objectives**

- Laser is a versatile tool with applications in almost all fields from medical to astronomy, communications, welding, cutting etc.
- This paper explains the characteristics of lasers, different types of lasers and their construction. Applications of lasers in different fields are also explained.
- To give exposure to students about the characteristics of different lasers, their fabrication techniques, applications etc. To provide a basis of LASER.
- To develop the student should have had a knowledge on the different types of lasers ... radiation-Power radiated by a point charge Velocity and acceleration ...
- Spectroscopy; Basic principle of NMR and its Applications.
- Basic Laser principles, Laser behaviour, Properties of laser radiations, Different types of Lasers and Laser applications

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Absorption and spontaneous and stimulated emission in two level system, the effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification.
2. Know the operations and basic properties of the most common laser types, He-Ne, Argon-ion, and carbon-dioxide, ruby, titanium sapphire, neodymium YAG and glass, knowledge of other main laser types.
3. Classify fibers as single-mode, multimode step index and multi-mode graded index.
4. Understanding of the physics of lasers, their unique properties and potential for applications.
5. Understand the laser action phenomena, properties of laser.
6. Understand the fundamental processes that occur during the interaction of light and matter

UNIT-I**Laser physics**

Basic Principle of Laser - Einstein Coefficients - condition for light amplification - Population Inversion - Threshold Condition - Line shape function - Optical Resonators - Three level and four level systems.

UNIT-II**Types of lasers and output modulation methods**

Solid State lasers - Ruby and Nd-YAG Laser - Gas lasers - He-Ne and Co₂ lasers - semiconductor lasers - Heterojunction lasers - Liquid Dye lasers - Q switching and mode locking.

UNIT-III

Applications of LASER

Application of laser in industry - cutting and welding - Drilling - surface Hardening - Medical applications - laser as diagnostic and therapeutic tool - Holography - Theory of recording and reconstruction - application of Holography.

UNIT IV

Basic Elements of Spectroscopy:

Quantum of Energy-Regions of Spectrum-Representation of Spectrum-Basic Elements of Practical Spectroscopy-Signal to Noise Ratio-Resolving Power-Width & Intensity of Spectral Transitions

Microwave Spectroscopy

Classification of Molecules-Interaction of Radiation with Rotating Molecules Rotational Spectrum of Rigid Diatomic Molecule-Example of CO-Information derived from Rotational Spectrum

UNIT V

I.R spectroscopy: Practical aspects – Theory of I.R rotation vibration spectra of gaseous diatomic molecules – applications of I.R spectroscopy – Basic principles of F.T.I.R spectroscopy
Raman spectroscopy: Classical and Quantum theory of Raman effect - Rotation vibration Raman spectra of diatomic and polyatomic molecules – Applications - Laser Raman spectroscopy - Surface Enhanced Raman Scattering.

Suggested Books

1. Aruldas. G., 2008, Molecular Structure and Spectroscopy, 2nd Edition, Prentice Hall of India, New Delhi
2. Laser theory and applications by K. Thyagarajan and Ajoy Ghatak, 1st edition Cambridge University Press, 1999.
3. Introduction to laser Spectroscopy, D L Andrews and A Ademidov 2nd edition 2005, Springer
4. An Introduction to laser: Theory and Applications by M. N. Avadhanulu, S. Chand and Co., New Delhi 2nd edition 2015.

Course Objectives

- This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit.
- The aim of this course is to enable the students to design and trouble shoots the electrical circuits, networks and appliances through hands-on mode.
- To use Circuit Theory as a carrier of the fundamentals of Linear System and Continuous Signal Analysis so that the students are well-prepared to take up a detailed study of higher level subjects
- To apply their knowledge to analog and digital electronics, pulse electronics, analog and digital communication systems, digital signal processing, control systems, and power electronics at a later stage.
- To make the students understand coherence between theoretical and practical measurement.
- To use the techniques, skills and modern technical tools necessary for technical or engineering practice.
- The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis of instruments.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Apply concepts for the design of Regulators and Amplifiers.
2. Verify the theoretical concepts through laboratory and simulation experiments.
3. Implement mini projects based on concept of electronics circuit concepts.
4. Have basic knowledge of semiconductor diode, rectifier and filter circuits.
5. Understand transistor biasing and working principle of Amplifiers.
6. Explain feedback and oscillatory circuits.
7. An idea about Multivibrators and operational amplifiers.
8. Comprehend the operation and characteristics of FET, MOSFET, SCR and UJT.

UNIT I**Basic concepts of semiconductors**

P-N junction Diode-Diode Characteristics-Expression for Diode current (Expression without derivation)-Static and Dynamic resistances-Junction capacitance-Equivalent circuit-Avalanche and Zener breakdown-PIV -Voltage regulation-Line regulation and load regulation- Rectifiers-Half wave-Centre tapped full wave and Bridge rectifiers-Derivation of efficiency and ripple factor of half wave and full wave rectifiers,LED,SCR.

UNIT II**Transistors**

Transistors-Bipolar junction transistors-Mechanism of amplification in a transistor- Common base, common emitter and common collector configurations and their characteristics-Active, saturation and Cut-off regions-Current gain α , β , γ and their relationships-Experiment to draw the characteristics of transistor in the CB and CE modes-Leakage currents-Expressions for output currents in the three modes-Transistor as a switch,FET,MOSFET,UJT.

UNIT III**Amplifiers**

Different transistor amplifier configurations:- C-B, C-E, C-C, their characteristics, amplification factors, their relationships, Load line Analysis, Expressions for voltage gain, current gain and power gain of C.E amplifier, cut-off and saturation points, Transistor biasing, Different types of biasing - Base resistor, voltage divider bias method, single stage transistor amplifier circuit, load line analysis, DC and AC equivalent circuits.

UNIT IV**Operational amplifier**

Operational amplifier- Block diagram-characteristics-parameters- Applications of Op-amp: Inverting-Non-inverting-differentiator-integrator-comparator-adder-subtractor- Active filters using 741: high pass and low pass filters- band pass filter-Schmitt trigger.

UNIT V**Oscillators**

Oscillatory Circuits-LC, RC oscillators, tuned collector oscillator, Hartley, Colpitt's, phase shift Oscillators, Weinbridge oscillators. Multivibrators-Astable, monostable and Bistablemultivibrators(using 555 Timer)

Suggested Books

1. V.K. METHA Principles of Electronics S Chand & co Newdelhi 11th edition 2014
2. Solid State Electronics-B.L.Theraja: S.Chand C 5th edition 2014.
3. A Text Book of Applied Electronics-R.S.Sedha: S.Chand Co. Multi Colour Edn.
4. Malvino A.P. 7th edition 2013, Electronics Principles, Tata McGraw Hill, New Delhi
5. Milmann and Halkias, 48th reprint 2008, Integrated Electronics, Tata McGraw Hill, New Delhi.

Course Objectives

- Numerical methods is very important where large number of calculations are involved, and the original calculations from first principles is very difficult and complicated. In this paper, different methods are introduced for carrying out complicated calculations.
- This paper explains the different numerical methods of calculations which is of very much importance in the analysis of many problems in Physics.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Demonstrate basic knowledge of numerical methods.
2. Demonstrate an understanding of the applicability of numerical methods for modeling physical systems and its advantages and disadvantages.
3. Communicate mathematical and physical knowledge and ideas to the students.
4. Understand the relationship between observation and theory and their use in building the basic concepts of computing.
5. Gain the knowledge on curve fitting and plotting the data.
6. Know the processes of data analysis and interpretation of physical problems.

UNIT I

Principle of least squares - fitting a straight line - linear regression - fitting a parabola - fitting an exponential curve.

UNIT II

Bisection method - method of successive approximations - RegulaFalsi method - Newton-Raphson method - Horner's method - Euler's method - modified Euler's method - RungeKutta method (II & IV).

UNIT III

Gauss elimination method - Gauss-Jordan method - Gauss-Seidel method - computation of inverse of a matrix using Gauss elimination method - method of triangularisation.

UNIT IV

First differences - difference tables - properties of the operator A.E.D.
Linear interpolation: Newton forward interpolation formula and backward interpolation formula - Bessel's Formula.
Interpolation with unequal intervals: Lagrange's interpolation formula.

UNIT V

Trapezoidal rule - Simpson's 1/3 rule and 3/8 rule - practical applications - Weddle's rule
- Gaussian Quadrature formulae.

Suggested Books

1. E Balagurusamy 1st edition 2014 numerical methods Tata Mcgraw hills
2. Venkatraman, M.K., 1977, Numerical Methods in Science and Engineering, National publishing Company, Chennai.
3. Shastry, S.S, 2007, Introductory Methods of Numerical Analysis, Prentice Hall of India, Pvt. Ltd., New Delhi.
4. M K Jain, R K Jain, SRK Iyenger 6th edition 2014 Numerical methods for Scientific and Engineering Computation, New Age Publishers.

Course Objective

- To understand the various forms of conventional energy resources.
- To learn the present energy scenario and the need for energy conservation
- To explain the concept of various forms of renewable energy
- Give outline division aspects and utilization of renewable energy sources for both domestics and industrial application.
- To provide the awareness and need of renewable energy.
- To describe the uses, needs and applications of various renewable energy sources.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
2. Understand the concept of hydro energy resources and their classification.
3. Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc.
4. Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications.
5. Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications.
6. Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.

UNIT I**Solar Energy**

Review of energy resources, solar energy estimation of intensity of terrestrial radiation, solar radiation on inclined plane surface, estimation of monthly average, daily total radiation and diffused radiation on horizontal surface, solar collectors. Flat plate collector- Solar water heater- solar cooker & furnaces, solar greenhouse. Solar thermomechanical systems- thermal water pump- solar cell characteristics, solar cell module, panel and array construction, applications.

UNIT II**Wind and Ocean Energy**

Origin of winds, Factors affecting wind energy, Nature of winds, Variation of wind speed with height, Major applications of wind power, Wind turbine, Energy available in windpower extraction- Axial thrust or turbine, Torque developed by turbine, Dynamic matching for

maximum power extraction. Wind turbine operation and power versus wind speed characteristics, Wind energy Conversion Systems- Fixed speed drive scheme- Variable speed drive scheme. Tidal Energy-range power-tidal energy conversion schemes. Wave energy-Power in waves. Ocean Thermal Energy-OTEC

UNIT III

Biomass

Biofuels .Biomass resources-Biomass conversion Technologies. Urban waste to energy conversion. Biomass gasification. Biomass to Ethanol production. Biogas from waste Biomass. Biogas plants and operational parameters-Constant pressure and constant volume type Biogas plants-Comparison. Landfill reactors.

UNIT IV

Geo-thermal energy

Origin and distribution of Geothermal energy.Types of Geothermal resources.Hydro-thermal resources-dry steam system-wet steam system.Geopressured resources- hot dry rock resources-magma resourcesexploration and development of Geothermal resources. Environmental aspects.

UNIT V

Emerging trends in Renewable Energy Sources.

Fuel cell- Classification of fuel cells –Phosphoric acid Fuel cell(PAFC), Alkaline Fuel Cell(AFC) –Solid polymer Fuel cell(SPFC) Molten carbonate Fuel cell(MCFC) Solid oxide Fuel cell (SOFC) FUEL for FUEL cells-efficiency of a fuel cell- V I characteristics of Fuel cell. Chemical polarization- resistance polarization- concentration polarizationFuel cell power plant hydrogen energy- production- storage conversion to energy sources and safety issues, Hydropower resources, Magneto Hydrodynamic (MHD) power conversion, MHD generator-MHD system- Thermal electric power conversion, Thermo electric power generator.

Suggested Books

1. Rai G. D.: Non-conventional energy sources, Khanna Pub., 4th Edn, 2000.
2. B. H. Khan: 2nd edition Non-conventional energy resources, Tata McGraw-Hill, 2006.
3. Rao S. and B. B. Parulekar: Energy Technology, Non-Conventional, Renewable and Conventional, Khanna Publications, 3rd edn., 1999.
4. Gupta B. R., 6th edition 2013 Generation of electrical energy, S Chand & Co

Course Objectives

- Study of non-linear optical properties of materials is very important as many of such materials are used in different instruments etc.
- This paper gives basic knowledge about different nonlinear optical properties and their theoretical aspects.
- To be able to apply the fundamental concepts of optics in lasers, optical fiber communications and optoelectronics.
- Apply the concept of optical fiber, its construction and importance in communication physics.
- To analyze different laser systems and its applications in various fields.
- To identify few different applications of optics i.e. Laser, Fiber Optics, Optoelectronics and Non Linear Optics.
- To understand the basic lasing mechanism, types of Lasers, characteristics of Laser Light, types of Lasers,

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Know the absorption and spontaneous and stimulated emission in two level system, the effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification.
2. Know the operations and basic properties of the most common laser types, He-Ne, Argon-ion, and carbon-dioxide, ruby, titanium sapphire, neodymium YAG and glass, knowledge of other main laser types.
3. Classify fibers as single-mode, multimode step index and multi-mode graded index.
4. Describe modes in multimode fibers and mode field parameter in single-mode fibers.
5. Basic ideas about Non-linear equations and chaos.
6. Understand the difference between linear and nonlinear properties.

UNIT I

Review of the concepts of polarizability and dielectric tensor of a medium. Frequency dependence of the dielectric tensor – wave vector dependence of the dielectric tensor – electromagnetic waves in an isotropic dielectrics.

UNIT II

Introduction to non linear optics- Nonlinear dielectric response of matter – frequency variation of the nonlinear susceptibilities – properties of non linear susceptibilities- time domain description of optical non- linear susceptibilities- wave vector dependence of the nonlinear susceptibilities.

UNIT III

Second harmonic generation – perturbation theory – phase matching evolution of SHW under phase matching conditions. Four wave mixing spectroscopy – optical phase conjugation – nonlinear materials.

UNIT IV

Scattering of light – Raman scattering – Quantum theory of Raman scattering – Brillouin scattering. Interaction of atoms with nearly resonant fields – wave function under near resonant conditions. Bloch equations – self induced transparency.

UNIT V

Fibre optics – normal modes of optical fibres – nonlinear Schrodinger equations – linear theory. Basic concepts of solutions and non-linear periodic structures. Effect of fibre loss – effect of waveguide property of a fibre – conditions of generation of a solutions in optical fibres.

Suggested Books

1. D.L. Mills, 1st edition 1998 Basic Concepts of Nonlinear Optics ,Springer
2. F.Zernike and J.E. Midwinter, Applied Nonlinear Optics , revised edition 2006, Dover books
3. G.C. Baldwin, 1st edition 1969 An Introduction to Nonlinear Optics Tata McGraw Hills
4. Ajoy Ghatak & Tyagarajan 1st edition 2011, Introduction to Fibre Optics Tata McGraw Hills

Course Objective

- To gain knowledge on the applications of operational amplifier such as adder, subtractor, inverting and non-inverting amplifier, voltage follower.
- To gain knowledge on characteristics of transistors
- To gain knowledge on construct amplifiers
- To gain knowledge on oscillators using transistors and study their performance.
- To understand the various parameters of the Hysteresis loop
- Acquire the knowledge of semiconducting and dielectric materials.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Study the working of different electronic components/ circuits practically.
2. Learn to minimize contributing variables and recognize the limitations of equipment.
3. Design and construction of circuits using analog component and trouble shooting of the circuits.
4. Understand the Biasing network for BJT and FET, transient analysis and frequency response of BJT and FET in single stage and multistage amplifier.
5. Understand the frequency response feedback amplifier using BJT and FET and Tuned amplifier.
6. Understand the operation of Oscillators and waveform generators.

ANY TEN EXPERIMENTS

1. Transistor characteristics – CE & CB
2. JFET characteristics
3. UJT characteristics
4. Full wave & Half wave rectifier
5. Op-amp inverting & non- inverting circuits
6. High pass – op-amp
7. Low pass – Op-amp
8. Clipper circuits
9. Clamping circuits
10. CE amplifier
11. Hartley oscillator

12. Colpit's oscillator

13. Adder & subtrator Op-Amp

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, PragathiPrakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, PragathiPrakashan, Meerut

Semester–VI

		L T P C
15PHU601	DIGITAL ELECTRONICS AND MICROPROCESSOR	5 - - 5

Course Objectives

- Digital electronics is very important in present day life due to its applications in almost all fields of life.
- Any signals stored in memory are first digitized. So it is important to have knowledge about digital electronics.
- This paper is intended to give an insight into the theory and applications of digital electronics, design of circuits with digital devices, details of microprocessor and its applications.
- To apply their knowledge to analog and digital electronics, pulse electronics, analog and digital communication systems, digital signal processing, control systems, and power electronics at a later stage.
- To make the students understand coherence between theoretical and practical measurement.
- To use the techniques, skills and modern technical tools necessary for technical or engineering practice.
- The primary objective of this course is to provide a thorough understanding and working knowledge of design, implementation and analysis of instruments.

Course Outcomes (Cos)

After successful completion of the course, the student is expected to

1. Acquire the basic knowledge of digital logic levels and application of digital electronics circuits.
2. Perform the analysis and design of various digital electronic circuits.
3. Acquired knowledge about Microprocessors and its need.
4. Identify basic architecture of different Microprocessors.
5. Conversion between various number systems
6. Employ Logic gates for carrying out logic operations
7. Apply the concept of Boolean laws and employ a Karnaugh Map to reduce Boolean expressions.
8. Design various combinational and sequential circuits using flipflops.
9. Explain different types of memory used in computers.

UNIT - I

Decimal, binary, octal, hexadecimal - Conversion of number system - Conversion of decimal to binary, binary to decimal- decimal to octal - Octal to decimal - Octal to binary - Binary to octal -

Decimal to hexadecimal - Hexadecimal to decimal, hexadecimal to binary - Binary to hexadecimal.

Binary coded decimal - 8421 code - Alphanumeric codes ASCII code - EBCDIC code - Error detecting code – Parity - Even parity and odd parity method.

UNIT - II

Logic gates - AND, OR, NOT, NAND, NOR gates - Construction of circuit only I/C - Action truth table - Logic symbol.

Boolean operators - Logic expressions – Demorgan's theorems - Laws and rules of Boolean algebra - Truth table - Reducing Boolean expressions, K maps; logic diagrams of Boolean algebra expressions - Converting logic circuits to expressions.

UNIT - III

Flip-flop definitions; clocked flip-flop; S-R flip-flop: JK flip flop: T-flip flop; D flip flop; master slave J-K flip flop: construction circuits.

Ring counter; Ripple counter and mod counters

UNIT - IV

XOR gates half adder - Full adder - Full subtracter - Parallel binary adder - Parallel binary subtracter - Construction, action and truth table.

Magnetic tape - Magnetic disc - Floppy disc - Magnetic cores - Magnetic core logic, coincident memory - Memory addressing. MOS - random access memory - MOD read only memory PROM-EPROM.

UNIT - V

Brief history, organization of 8085 - Data and address bus, addressing the I/O devices, registers in the 8085, instruction set - Instruction types, and classification of instruction, simple programs.

Suggested Book

1. Floyd, 2003, Digital Fundamentals, 8th Edition, Pearson education, New Delhi.
2. Ramesh Gaonkar 6th edition 2013 Microprocessor Architecture, Programming and Applications with 8085 ,PENRAM International P Ltd.
3. Malvino and Leach, 1983, Digital Principles and Applications, 3rd Edition, Tata McGrawHill, New Delhi.
4. Aditya P. Mathur, 1995, Introduction to Microprocessor, 3rd Edition, Tata McGrawHill, New Delhi.
5. Morris Mano. M, 1st2002, Digital Logic and Computer Design, Prentice Hall, New Delhi.
6. Paul M.Julich and John Hilburn, 1st 1987, Microcomputers / Microprocessors, Prentice Hall of India, New Delhi.

Semester–VI**15PHU602****STATISTICAL MECHANICS****L T P C****5 - - 5****Course Objectives**

- To create a bridge between theory of the micro-world and macroscopic phenomena.
- To give explanation for the properties of macroscopic systems using the knowledge of the properties of individual molecules.
- To provide rigorous definitions of thermodynamic quantities and derivations of the laws of thermodynamics from the laws of quantum mechanics.
- The aim of statistical mechanics is to give knowledge on the laws of classical thermodynamics for macroscopic systems using the properties of its atomic particles.
- To apply the concepts and principles of black-body radiation to analyze radiation phenomena in thermodynamic systems.
- To apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.
- To give knowledge on the statistical mechanics and explain the applications of thermodynamics.
- To provide the correlation of thermodynamical problems with statistical concepts.

Course Outcomes

After successful completion of the course, the student is expected to

1. Understand the concepts of statistical mechanics
2. Know about different types of distributions, Maxwell-Boltzmann distribution, Fermi-Dirac distribution and Bose-Einstein distribution.
3. Different types of particles follow different distributions and hence it is necessary to have idea about these distributions.
4. Compare Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics and derive its outcomes.
5. Understand the classical and quantum theory of radiation.
6. Know the concept apply on the Thermodynamical problems.

UNIT I**Classical Statistics**

Entropy and Thermodynamic Probability. Maxwell-Boltzmann Distribution Law. Ensemble Concept. Partition Function. Thermodynamic Functions of Finite Number of Energy Levels. Negative Temperature. Thermodynamic Functions of an Ideal Gas. Classical Entropy Expression, Gibbs Paradox. Law of Equipartition of Energy – Applications to Specific Heat and its Limitations.

UNIT II

Statistical definition of temperature, pressure, entropy and chemical potential. Partition function of a system in thermal equilibrium with a heat bath.

Classical Theory of Radiation

Properties of Thermal Radiation. Blackbody Radiation. Pure Temperature Dependence. Kirchhoff's Law. Stefan-Boltzmann Law and Wien's Displacement law. Saha's Ionization Formula. Saha equation for thermal ionization and its application to astrophysics.

UNIT III**Quantum Theory of Radiation**

Stefan-Boltzmann Law: Thermodynamic Proof. Radiation Pressure. Spectral Distribution of Black Body Radiation. Wien's Distribution Law and Displacement Law. Rayleigh-Jean's Law. Ultraviolet Catastrophe. Planck's Quantum Postulates. Planck's Law of Blackbody Radiation : Experimental Verification. Deduction of (1) Wien's Distribution Law, (2) Rayleigh-Jeans Law, (3) Stefan-Boltzmann Law and (4) Wien's Displacement Law from Planck's Law.

UNIT IV**Bose-Einstein Statistics**

B-E distribution law. Thermodynamic functions of a Completely Degenerate Bose Gas. Bose-Einstein condensation, properties of liquid He (qualitative description). Radiation as photon gas. Bose's derivation of Planck's law.

UNIT V

Fermi-Dirac Statistics Fermi-Dirac Distribution Law. Thermodynamic functions of an ideal Completely Degenerate Fermi Gas. Fermi Energy. Electron gas in a Metal. Specific Heat of Metals. White Dwarf Stars. Chandrasekhar Mass Limit.

Suggested Book

1. Lokanathan S. and R.S.Ganbhir, 'Statistical and Thermal Physics: an introduction', Printice Hall of India, New Delhi, 1991.
2. Reif F., 'Statistical Physics: Berkeley Physics Course', Volume 5, Tata McGraw-Hill Company Ltd, 2008
3. Patharia R.K., 'Statistical Mechanics', Oxford: Butterworth, 1996.
4. Haung K., 'Statistical Mechanics', K. Huang, Wiley, 1987.

Semester–VI**15PHU603A****MATHEMATICAL PHYSICS****L T P C****5 - - 5****Course Objectives**

- To provide students with a repertoire of mathematical methods that are essential to the solution of advanced problems encountered in the fields of applied physics and engineering.
- In addition, intended to prepare the student with mathematical tools and techniques that are required in advanced courses offered in the applied physics
- To communicate mathematical and physical knowledge and ideas to the students.
- To learn the fundamentals and applications of Complex Variable, Analyticity, Cauchy-Riemann and Cauchy's Integral.
- To contribute innovations and application of basic research.
- To get knowledge to find the relationship between observation and theory and their use in building the basic concepts of computing.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Communicate mathematical and physical knowledge and ideas to the students.
2. Get introduced to Special functions like Gamma function, Beta function, Delta function, Bessel functions and their recurrence relations
3. Learn the fundamentals and applications of Complex Variable, Analyticity, Cauchy-Riemann and Cauchy's Integral.
4. Build connections between mathematical development and conceptual understanding.
5. Understand the relationship between observation and theory and their use in building the basic concepts of computing.
6. Contribute innovations and application of basic research.

UNIT - I

Operations with Del operator - Gradient of scalar field, physical interpretation - Divergence of a vector function - curl of a vector - curl of the curl - The Laplacian operator - Line, surface and volume integrals - Important vector identities - Gauss divergence theorem - Problems in Gauss divergence theorem - Stoke's theorem and its proof with simple problems - Classification of vector fields - Orthogonal, curvilinear coordinates, differential operators in terms of orthogonal curvilinear coordinates - gradient, curl and Laplacian in spherical polar coordinates and cylindrical coordinates.

Tensors – Contravariant and covariant tensor

UNIT - II

Matrices-Special types of matrices -Transpose of a matrix - Conjugate of a matrix - Conjugate transpose of a matrix-symmetric and antisymmetric matrices - Hermitian and skew - Hermitian matrices - Determinant of a matrix - Adjoint of a matrix - Inverse of a matrix -Unitary matrices - Rank of a matrix and simple problems - Characteristic matrix and characteristic equation - Characteristic vector - Methods of finding the Eigen values and Eigen vectors of a matrix.

UNIT - III

Differential Equations: Introduction – Solution in simple cases of ordinary differential equations of second order – Simple problems from Physics – Partial Differential equations – Special types of differential equations arising in Physics.

Group Theory: Introduction in sets, mappings and binary operations – groups – elementary properties of groups – The centre of a group – Cosets or consents of a subgroup – cyclic group.

UNIT - IV

Functions of a complex variable – single and multivalued functions – Cauchy – Riemann differential equation – analytical – line integrals of complex function – Cauchy's integral theorem and integral formula – derivatives of an analytic function – Taylor's variable – Residue and Cauchy's residue theorem – application to the equation of definite integrals – conformal transformation – Invariance of the Laplacian.

UNIT – V

Arithmetic mean - Median - Quartiles - Deciles - Percentiles - Mode - Empirical relation between mean, median and mode - Geometric mean, harmonic mean - Relation between arithmetic mean, geometric mean and harmonic mean - Range - Range meanor average deviation - Standard deviation - Variance and mean square deviation.

Suggested Book

1. SathyaPrakash, 2002, Mathematical Physics, 4th Edition, S. Chand & Company, New Delhi.
2. Gupta. B.D., 2002, Mathematical Physics, 2nd Edition, Vikas Publishing house Pvt Ltd, New Delhi.
3. Gerald C.F., 1998, Applied Numerical Analysis, 5th Edition, Addison Wesley, California.
4. Rajput. B.S., 2003, Mathematical Physics, 16th Edition, PragatiPrakasan, Meerut.
5. Pipes L.A. and L.R. Harwill, 'Applied Mathematics for Engineers and Physicists', McGrawhill, 1970.

Semester–VI**15PHU603B****NANOTECHNOLOGY AND ITS APPLICATION****L T P C****5 - - 5****Course Objective:**

- This course covers the different classes of nanomaterials that have been developed in recent years in light of various technological applications.
- In order to understand the behavior of these nanomaterials, quantum phenomena and the limitations of basic physical laws that are important at the nanometer length scale are introduced and developed.
- In particular, properties that exhibit size effects (including electronic, magnetic, photonic, and mechanical) at the nanometer length scale will be presented so that nanomaterials becoming increasingly relevant to modern technologies can be better understood.
- The course will cover recent breakthroughs and assess the impact of this burgeoning field.
- Specific nanofabrication topics include epitaxy, beam lithographies, self-assembly, biocatalytic synthesis, atom optics, and scanning probe lithography.
- The course consists of topics in fundamental nanoscale science, plus an overview of areas in nanotechnology.

Course Outcome

After successful completion of the course, the student is expected to

1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
2. Apply engineering and physics concepts to the nano-scale and non-continuum domain.
3. Identify and compare state-of-the-art nanofabrication methods
4. perform a critical analysis of the research literature.
5. Design processing conditions to engineer functional nanomaterials.
6. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.

UNIT I

Structure: Size dependence of properties – Crystal Structures – Face centred nano particles – Particle size determination – Surface structure

UNIT II

Metal nano particles: Magic numbers – Theoretical model of nano particles – Geometric structure – Reactivity – Fluctuations – Magnetic clusters – Bulk to nano transitions
Semi conducting nano particles – optical properties – photo fragmentation – Coulombic explosion.

UNIT III

Semiconductors: sensors, electronic devices – brief explanation and examples – classification of nanomaterials as nanoparticles, nanorods, nanotubes, and nanowires – structure and applications of the above

UNIT IV

Instrumentation: Working principle, and applications of scanning electron microscope - transmission electron microscope - scanning tunneling microscope - atomic force microscope, and surface plasmon resonance – theories and principles of soft lithography, self assembled monolayers and multilayers

UNIT V

Polymers: Forming and Characterizing polymers – Polymerisation – Sizes of polymers – Nano crystals – Condensed ring types – Poly diacetylene types – Polymers – Conductive polymers – Supra molecular structures – Transition-metal mediated types – Dendritic molecules – Supra molecular dendrimers – Micellers

Suggested Book

1. Charles P. Poole Jr., Frank J.Owens, 1st edition 2003, Introduction to Nano-technology, Wiley India, New Delhi
2. Mick Wilson, Kamil Kannangara, 1st edition 2005 Geoff Smith, Michele Simmons, Burkhard Raguse, Nano technology, Overseas Press India(P) Ltd., New Delhi
3. Mark Ratner, Daniel Ratner, 1st edition 2009 Nano-Technology, A gentle introduction to the new big idea, Pearson Education (Singapore) (P) Ltd., New Delhi.
4. Jean-Marie Lehn, 1994, Supramolecular Chemistry, Journal of Chemical Sciences, Vol. 106, No.5, pages 915-922.
5. Jonathan Steed and Jerry Atwood, 2009, Supramolecular Chemistry, 2nd Edition, John Wiley & Sons, New York.
6. Jacob Israelachvili, 1992, Intermolecular and Surface Forces, 2nd Edition, Academic Press.
7. Jackie Ying, 1st edition 2001, Nanostructured Materials, Academic Press.
8. G. Timp, 1st edition 1999, Nanotechnology, Springer Verlag, New York.

Course Objectives

- Astronomy and Astrophysics is a very fundamental subject in Physics.
- Includes study of the solar system, evolution of stars, different physical processes going on stellar bodies, life cycle of stars etc.
- Be able to read technical articles efficiently for key concepts
- Have experience working and discussing in a group setting
- Be able to use analytical and mathematical skills to solve problems
- Acquire critical thinking skills by learning to evaluate the evidence behind a scientific theory

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Plan and engage in an independent and sustained critical investigation of a chosen research topic to generate new knowledge in an area of astronomy and astrophysics.
2. Systematically evaluate relevant theory and concepts in astronomy and astrophysics,
3. Relate these to appropriate methodologies and evidence and draw appropriate conclusions.
4. Demonstrate capacity for astronomy and astrophysics reasoning through analyzing, proving and explaining concepts from the chosen research area.
5. Have Peripheral ideas about astronomy and astrophysics.
6. Gain the knowledge on Astronomical instruments, Stellar Evolution, Theories of the universe, etc.,

UNIT- I

Astronomical instruments Optical telescope - reflecting telescope - types of reflecting telescope - advantages of reflecting telescope - Radio telescopes - astronomical spectrographs - photographic photometry - photo electric photometry - detectors and image processing.

UNIT-II

Solar system The sun-physical and orbital data - Photosphere - Chromosphere - corona - solar prominences - sunspot - sunspot cycle - theory of sunspots - solar flare - mass of the sun - solar constant - temperature of the sun - source of solar energy - solar wind. Other members of the solar system - Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune - Pluto - Moon - Bode's law - Asteroids - comets - Meteors.

UNIT-III

Stellar Evolution, Binary and variable stars Birth of a star - Death of a star - Chandrasekhar limit - white dwarfs - Neutron stars - black holes - Quasars - Nebulae - Supernovae Binary stars - Origin of Binary stars. Variable stars - Cepheid variables - RV Tauri variables - long period variables - irregular variables - flare stars.

UNIT-IV

Magnitudes, distance and spectral classification of stars Magnitude and brightness - apparent magnitude of stars - absolute magnitude of stars - relation between apparent magnitude and absolute magnitude of stars - Luminosities of stars - measurement of stellar distance - Geometrical parallax method - distance from red shift measurement - Harvard system of spectral classification .

UNIT-V

Theories of the universe, galaxies and star clusters Origin of the universe - the big bang theory - the steady state theory - the oscillating universe theory - Hubble's law. Galaxies - types of galaxies - Milky Way - star clusters - open clusters - globular clusters.

Text Books:

1. K.S. Krishnasamy, 'Astro Physics a modern perspective,' Reprint, New Age International (p) Ltd, New Delhi, 2002.
2. Baidyanath Basu, 'An introduction to Astro physics', second printing, prentice - Hall of India Private limited, New Delhi, 2001.
3. R. Murugesan, ' Modern Physics', Eleventh revised edition, S. Chand & Company Ltd, New Delhi, 2003.
4. S. Kumaravelu, 'Astronomy, Janki calendar corporation, Sivakasi, 1993
5. Baker and Fredrick, 'Astronomy, ninth edition, Van No strand Rein hold, Co, New York - 1964. 6. Illustrated World of Science Encyclopedia - Vol I and Vol VIII - Creative world publication - Chicago.

Semester–VI**15PHU604A****ELECTROMAGNETIC THEORY****L T P C****5 - - 5****Course Objective**

The aim and objective of the course

- The aim of this course is to provide the students with the fundamental principles of electrical energy (electro- magnetism).
- It is very important to understand the propagation of waves in different media, its transmission and reception.
- To understand the relation between electric and magnetic fields.
- To gain the knowledge on electromagnetic wave propagations.
- To describe simple models for electromagnetic interaction with media
- To experience the wave propagation in different media.

Course Outcome

After successful completion of the course, the student is expected to

1. Calculate electric and magnetic fields from stationary and dynamic charge and current distributions.
2. Use electromagnetic wave theory and principles in a wide range of applications.
3. Solve such problems in simple geometries using separation of variables and the method of images.
4. Define and derive expressions for the energy both for the electrostatic and magnetostatic fields.
5. Gain confidence in their ability to apply mathematical methods to understand electromagnetic problems to real-life situations.
6. Solve simple electrostatic boundary problems.
7. Describe simple models for electromagnetic interaction with media
8. Choose adequate models and solution methods for specific problems.

UNIT- I

Electrostatics: Electric intensity – Electric potential – Gauss Law - Dielectric and its polarization - Electric displacement D – Dielectric constant ϵ_r – Polarizability α - Clausius-Mossotti relation (Non-polar molecules) – The Langevin equation (Polar molecules) – Electrostatic energy

UNIT II

Magnetostatics: Current density J – Ampere’s law of force – Biot-Savart law – Ampere’s circuital law – Magnetic scalar potential ϕ_m (no applications) – Magnetic vector potential A –

Magnetisation and magnetization current – Magnetic intensity – Magnetic susceptibility and Permeability.

UNIT III

Maxwell's Equations

Maxwell Equations-Displacement Current-Vector and Scalar Potentials. Gauge Transformations: Lorentz and Coulomb Gauge. Boundary Conditions at Interface between Different Media. Wave Equations. Plane Waves in Dielectric Media. Poynting Theorem and Poynting Vector. Electromagnetic Energy Density. Physical Concept of Electromagnetic Field Energy Density, Momentum Density and Angular Momentum Density.

UNIT IV

Interaction of E.M.Waves with matter (Macroscopic): Boundary conditions at interfaces - Reflection and refraction – Frenel's laws-Brewster's law and degree of polarization - Total internal reflection and critical angle.

UNIT V

Interaction of E.M.Waves with matter (Microscopic): Scattering and Scattering parameters - Scattering by a free electron (Thomson Scattering) - Scattering by a Bound electron (Rayleigh scattering) – Dispersion Normal and Anomalous – Dispersion in gases (Lorentz theory)

Suggested Book

1. Chopra & Agarwal 2004, Electromagnetic theory, 6th Edition, Nath & Co, Meerut.
2. Jackson. J.D., 1998, Classical Electro dynamics, 3rd Edition, Wiley Eastern, New Delhi.
3. Schwartz. M. 1972, Revised edition, Principles of Electro dynamics, McGraw Hill, Auckland.
4. Jordon and Balmain 2nd edition 2002, EMW radiating systems, Prentice Hall of India Pvt Ltd, New Delhi.
5. Gupta, Kumar and Singh, 2007, Electro dynamics, 19th Edition, PragatiPrakasan, Meerut, New Delhi.
6. SatyaPrakash 10th edition 2003, Electromagnetic theory and Electro dynamics, Kedar Nath Ram Nath & Co, Meerut.
7. Griffiths D., 1998, Introduction to Electrodynamics, 3rd Edition, Printice Hall of India, New Delhi.

Course Objectives

- In the present day life, methods of communication have improved quite a lot.
- Optical communication where light is used as the carrier wave has become important due to its high frequency.
- This paper contains different techniques used in optical communication, like optical fiber, laser etc.
- This course provides basic of optical communication system.
- Students will learn about optical fiber transmission link with the functional description of each block, Point –to-point link –system considerations, Link power budget and rise.

Course Outcomes:

After successful completion of the course, the student is expected to

1. Explain the concept of amplitude and frequency modulation
2. Know fundamental of Optical sources and their uses.
3. Compare working principle of single mode and multimode optical fibres.
4. Distinguish Digital modulation (pulse code and Pulse amplitude modulation) types
5. Explain the fundamentals of nonlinear properties of optical fibers.
6. Know the optical waves in communication and the methods of implementation are explained in this paper.

UNIT I

Evolution of Optical Communication, Evolution of fiber types, guiding properties of fibers, crosstalk between fibers, dispersion properties of fibers, nonlinear properties of optical fibers, SRS, SBS, Intensity dependent refractive index. Characterization of materials for fibers, fiber preparation, cable structures, connectors, splicing.

UNIT II

Transmission characteristics of optical fibre, attenuation, absorption and scattering losses, nonlinear losses, wavelengths for communication, bend losses, dispersion effects in optical fibres- material and waveguide dispersions, modal birefringence and polarization maintaining fibres.

UNIT III

Optical sources- LED, structures, materials, quantum efficiency, power, modulation-Laser Diode, Modes and threshold conditions, laser diode rate equations, external quantum efficiency, resonant frequencies, laser diode structures and radiation patterns, single mode lasers, modulation of laser diodes, temperature effects.

UNIT IV

Photodetectors, photodetector noise, signal to noise ratio, optical receiver operation, error sources, receiver configuration, digital receiver performance calculations, pre amplifier types, High impedance and Trans impedance amplifiers, analog receivers.

UNIT V

Digital transmission systems, Point to point links, link power budget, rise time budget, line coding, coherent systems, heterodyne and homodyne detection, WDM concepts and components, operational principle of WDM, Optical Amplifiers, semiconductor optical amplifiers, Erbium Doped Fiber Amplifiers, Gain and Power Conversion Efficiency.

Suggested Book

1. Gerd Keiser, 'Optical Fiber Communications', 5th edition, Tata McGraw Hill, New Delhi, 2013.
2. Senior M., 'Optical Fiber Communications Principles and Practices', Prentice Hall India (1994)

Semester–VI**15PHU604C****BIOPHYSICS****L T P C****5 - - 5**

Course Objectives:

- The course aims to provide students with a foundation in the basic concepts of Biophysics.
- Biophysics is an interdisciplinary science that employs and develops theories and methods of the physical sciences for the investigation of biological systems.
- Topics will include canonical and non-canonical structures of nucleic acids, structure of proteins, enzymes etc.
- Fundamental concepts that underlie biomolecular interactions will be discussed and biophysical methods that are employed for the structural analysis of these systems will be introduced at an elementary level.
- To Understand the concept of life of molecules.
- The physical quantities such as temperature, energy, enthalpy, entropy, and free energy will be employed to understand why a biological system chooses particular state at conditions under study.

Course Outcome

After successful completion of the course, the student is expected to

1. Demonstrate knowledge of the fundamental concepts in physics and chemistry that underlie biological processes.
2. Define the structural characteristics of nucleic acids and proteins
3. Examine parameters that variously determine their stability and function(s).
4. Describe the principles that govern biomolecular interactions
5. Appreciate how established methods of research and enquiry are employed to analyze the different aspects of these interactions.
6. Understand the concept of life of molecules.

Unit I

Atoms and Molecules: Introduction – Physical and chemical properties of atoms and molecules – Internal structure of atom and molecule – Proton, neutron and electron – Chemical bonds – Orientation of bonds in space – Energy of atoms – Hydrogen bond – Molecular weight and mole – Bond energy.

Unit II

Matter and mechanics of cell: Materials of the cell – Celluloid – Kinetic molecular theory – Diffusion – Osmosis – Osmotic pressure and turgor pressure – Water potential – Methods for measuring osmotic pressure of cell – Permeability – Theories of cell permeability – Imbibition – Volume changes, energy relations and effect of temperature on imbibition.

Unit III:

Physics in biological systems: Breathing – Inspiration – Expiration – Other mechanical actions – Types of breathing – Artificial breathing – Lung air volume – Modified form of breathing – Periodic breathing – Coughing – Swallowing – Sneezing.

Unit IV

Molecular physics in plant physiology: Distribution of light – light on lens – Wavelength and energy – light in water – orientation – Central importance of light to the physiology of plants – Photochemistry – Electronic transition in atoms, molecules and crystals – Other transitions.

Unit V

Ultra sound: Generation of Ultrasound scanning – A mode scan – TM mode – Echoencephalograph (EEG) – Echo opthalmoscope – B mode scan – Gray scale imaging – Measurement of motion – Doppler technique – Ultrasonic technique – Methods & Instrumentation.

Suggested Books

1. Arora M.P., 'Bio Physics', 1st edition 2005, Himalaya Publishing House
2. Rodney Cotterill, 'Bio Physics – An Introduction', 1st edition 2014 Wiley Student Edition.

Semester - VI**15PHU691****PROJECT****L T P C****- - - 3**

Course Objectives

- The aim of the B.Sc. project work is to expose the students to preliminaries and methodology of research in Theoretical Physics and Experimental Physics.
- Students get the opportunity to participate in some ongoing research activity and development of a laboratory experiment.
- To explain the physics problem and its solution in both words and appropriately specific equations to both experts and non-experts.
- To understand the objective of a physics laboratory experiment, properly carry out the experiments, and appropriately record and analyze the results.
- To use computers in data acquisition and processing and how to use available software as a tool in data analysis.
- To think creatively about scientific problems and their solutions.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.
2. To apply his/her knowledge and skills to carry out advanced tasks and projects.
3. Apply their knowledge to develop the instruments.
4. Verify the basic principles and laws experimentally as a project.
5. Demonstrate knowledge of contemporary issues in their chosen field of research.
6. Demonstrate an ability to present and defend their research work.

Semester - IV**150EU401****ATMOSPHERE AND WEATHER****L T P C****- - - 3****Course Objective:**

- The aim of this course is not just to impart theoretical knowledge to the students but to enable them to develop an awareness
- To understand the causes and effects of different weather phenomenon and basic forecasting techniques.
- To know the role of air, water, and wind in weather systems.
- Assess variability and change within this expanded, extended and quality assured network.
- To explain what causes different types of weather.
- To understand the concept of Ecosystems and climate interactions

Course Outcomes

After successful completion of the course, the student is expected to

1. Demonstrate knowledge of cloud properties.
2. Demonstrate knowledge of the thermodynamic drivers of cloud development and evolution.
3. Demonstrate knowledge of basic atmospheric chemistry and its role in atmospheric phenomena.
4. Determine if the atmosphere is stable or unstable from a vertical temperature profile
5. Understand atmospheric general circulation and the basic principles of physical and applied climatology and climate change.
6. Explain the composition and structure of the atmosphere.

UNIT - I

Atmospheric composition - Laws of thermodynamics of the atmosphere - Adiabatic process - Potential temperature - The Clausius – Clapeyron equation - law of black body radiation - solar and terrestrial radiation - Albedo - Green house effect - Heat balance of earth atmosphere system.

UNIT - II

Fundamental force - Non-Inertial reference frames and apparent forces - Structure of static atmosphere - Momentum - Continuity and energy equations - Thermodynamics of the dry atmosphere - Elementary applications of the basic equations.

The circulation theorem - Vorticity, Potential Vorticity, Vorticity and potential Vorticity equations.

UNIT - III

Wind - Temperature and pressure distribution over India in the lower - Middle and upper atmosphere during pre, post and mid-monsoon season - Monsoon circulation in the meridional (Y-Z) and (X-Y) planes - Energy cycle monsoon - Dynamics of monsoon depressions and easterly waves - Intra-Seasonal and inter-annual variability of monsoon - Quasi-be weekly and 30-60 day oscillations - ENSO and dynamical mechanism for their existence.

UNIT - IV

Role of meteorology on atmospheric pollution - Atmospheric boundary layer, air stability, local wind structure, Ekman spiral, turbulence boundary layer scaling - Residence time and reaction rates of pollutants, sulphur compounds nitrogen compounds - carbon compounds, organic compounds, aerosols, toxic gases and radioactive particles trace gases.

UNIT - V

Basic meteorology - radar principles and technology - Radar signal processing and display - Weather radar-observation of precipitating systems - Estimation of precipitation radar observation of tropical cyclones - Use of weather radar in aviation, clear air radars - Observation of clear air phenomena - Other radar systems and applications.

Suggested Books

1. Frederick K.Lutgens and Edward J.Tarbuk, The atmosphere, Holton. J.R, 1992, Dynamic Meteorology, Academic press New York.
2. Keshvamuthy. R.N. and M.ShankarRao, 1992, The Physics of Monsoons, Allied Publishers, New Delhi
3. Haltiner. G.J. and R.T. Villians, 1980, Numerical Weather Prediction, John Wiley and sons, New Delhi.
4. Tom Lyons and Prillscott, Principles of Air Pollution Meteorology, CBS publishers and Distributors (P) Ltd.

SPECIAL PAPER I FOR B.Sc. (Hon.)**Semester V****L T P C****15PHU506****ADVANCED QUANTUM MECHANICS****- - - 5****Course Objectives**

- This paper explains the shortcomings of quantum mechanics in explaining different subatomic physics and the evolution of quantum mechanics.
- This course is part one of a two semester course focused on a rigorous exposition to the principles of Quantum mechanics.
- The Dirac bra-ket formalism will be introduced and used throughout to present the principles of Quantum Mechanics in a general context.
- We will discuss analytic solutions to the Schrodinger equation for a variety of potentials in one, two and three dimensions.
- The role of symmetries as the underlying principle of Quantum Mechanics will be emphasized throughout the course.
- The use of symmetry principles and operators methods will be discussed.

Course Outcomes :

After successful completion of the course, the student is expected to

1. Study the problems like scattering problem, relativistic quantum mechanics, quantum electrodynamics etc.
2. Calculate the de Broglie Wavelength of a wave associated with the particle.
3. Explain the importance of Field theory.
4. Explain the Angular momentum commutation relations and describe the applications.
5. Describe wave function and derive the Schrödinger equation and interpret the wave function and eigen value equation.
6. Describe the different types of potentials and derive the solutions of Schrödinger equation for the same.
7. Apply the variational principle and find the value of energy at ground state of helium.

UNIT - I

Wave Mechanics Matter waves – Uncertainty principle –Wave packet – Time-dependent and Time-independent Schrodinger equations for a free particle and particle in a potential – Linear vector space – Hilbert's space – Orthogonal and orthonormal functions – Linear operator – Eigen functions and Eigen values – Hermitian operator – Dirac's notation – Equations of motion – Schrodinger, Heisenberg and Interaction representation – Momentum representation.

UNIT - II

One dimensional potential well: Square-well potential with rigid walls – Square-well potential with finite walls – Square-well potential barrier – Alpha emission – Bloch waves in a periodic potential – Linear harmonic oscillator (Schrodinger method and operator method) – Free particle.

Three dimensional potential Well: Particle moving in a spherically symmetric potential – System of two interacting particles – Rigid rotator – Hydrogen atom – Hydrogenic orbitals – The free particle – Three-dimensional square-well potential - Deuteron

UNIT - III

Time-independent Perturbation theory: Basic concepts – Non-degenerate energy levels – First and Second order corrections for energy and wave functions – Ground state of Helium atom – Effect of electric field on the ground state of hydrogen atom (Stark effect) Degenerate energy levels – Effect of electric field on the $n=2$ state of hydrogen atom – Variational principle – Variation method for excited states – Application of variation method to ground state of helium – The WKB method

Time dependent perturbation theory: Introduction – First-order perturbation – Harmonic perturbation – Transition to continuum states (Fermi's Golden rule) – Absorption and emission of radiation – Transition probability – Selection rules

UNIT IV

Angular momentum: Angular momentum operators – Angular momentum commutation relations – Eigen values and Eigen functions of L^2 and L_z – General angular momentum – Eigen values of J^2 and J_z – Ladder operators (J_+ and J_-) – Angular momentum matrices – Matrices for J^2 , J_z , J_+ , J_- , J_x and J_y – Spin angular momentum – Spin $\frac{1}{2}$ systems – Spin vectors for spin $\frac{1}{2}$ systems – Addition of angular momentum – Clebsch-Gordan coefficients.

Scattering: Scattering cross-section – Significant number of partial waves – Scattering by an attractive square-well potential – Briet-Wigner formula – Scattering length – Expression for phase shift – Integral equation – The Born approximation – Scattering by screened coulomb potential – Validity of Born approximation - Laboratory and center of mass co-ordinate systems

UNIT V

Field theory: Introduction – Classical approach to field theory – Relativistic Lagrangian and Hamiltonian of a charged particle in an electromagnetic field – Field: Lagrangian and Hamiltonian formulations – Quantum equation for the field – Second quantisation – Quantisation of non-relativistic Schrodinger equation – Creation, annihilation and number operators.

Suggested Books

1. Aruldas. G, 2008, Quantum Mechanics, 2nd Edition, Prentice-Hall of India, NewDelhi.

2. Gupta, Kumar and Sharma, 2002, Quantum Mechanics, 22nd Edition, Jai Prakash Nath & Co, Meerut.
3. Satya Prakash, 2003, Quantum Mechanics, New Edition Kedar Nath & Ram Nath & Co, Meerut.
4. Leonard Schiff, 1968, Quantum Mechanics, 3rd Edition, McGraw Hill International, Auckland.
5. Engen Merzbacher, 1997, Quantum Mechanics, 3rd Edition, Wiley, Weinheim.
6. Mathews. P.M. and K. Venkatesan, 2002, Textbook of Quantum Mechanics, McGraw
7. Hill International, Weinheim.
8. Chatwal R.G. and Sk. Anand, 2004, Quantum Mechanics, Himalaya Publishing House, New Delhi
9. Thangappan. V. K., 1993, Quantum Mechanics, Tata McGraw Hill, New Delhi

SPECIAL PAPER I FOR B.Sc. (Hon.)**Semester VI****15PHU605****EMERGING TRENDS IN MATERIALS SCIENCE****L T P C****- - - 5****Course Objectives:**

- To give an exposure to students about different characteristics of materials, their importance, study of these characteristics, preparation of different materials.
- To review physics in the context of materials science & engineering.
- To describe the different types of bonding in solids, and the physical ramifications of these differences.
- To describe and demonstrate diffraction, including interpretation of basic x-ray data. Give an introduction to metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding.
- Give an introduction to the relation between processing, structure, and physical properties.
- Give the beginning student an appreciation of recent developments in materials science & engineering within the framework of this class.
- Give the beginning student an opportunity for teamwork in research Give the beginning student practice in basic expository technical writing

Course Outcomes

After successful completion of the course, the student is expected to

1. Different types of materials for new applications like solar cells, sensors etc. etc.
2. Know about various types of bonding.
3. Distinguish between various types of crystal imperfection.
4. Explain the basics of crystal growth.
5. An idea about basics of thin film technology and few deposition methods.
6. Describe nondestructive testing methods and its applications.

Unit I

Crystalline solids – space lattice – the basis and crystal structure; crystal translational vectors, symmetry operation primitive lattice cell and unit cell symmetry elements, Fundamental type of lattice, atomic packing, atomic radius, lattice constants and density, crystal structure other cubic structure – type of bonding – Ionic bonding – Energy of formation of NaCl molecules, Madelung constants – potential energy of diagram of ionic molecules – calculation of repulsive exponent – Born Haber cycle characteristics of ionic bond.

Unit II

Ionic conductivity – Normal and super ionic conductors – Mass transport in crystals – Diffusion – Atomic diffusion theory – Experimental determination of the diffusion constant – Ionic conduction – Experimental results – for ionic conduction – The Einstein relation – Dielectric loss in ionic crystals – Electronic conduction in ionic crystals – Excess conductors – Deficit conductors – Amphoteric semiconductor.

Unit III

Phenomenological Models – Huberman's Theory – Riechle Strassler Toom's Theory – Wele and Diene Theory – Lattice Gas theory – Free ion model – Domain Model – Riechle and Roth Theory – The Path Probability Method – The static variables – the Path variables – The path Probability – Stationary state condition – Classification of Superionic solids – Crystalline and Amorphous – Glasses – Dispersed solid Electrolytes – polymers – Ion exchange resins – biological basis resins – Classification over conducting ion species – mode and mechanism of conduction in each case and their corresponding criteria to be superionic conductors.

Unit IV

Structural characterization – XRD surface Analysis, EXAFS, IPS and Quasi neutron scattering – Thermo dynamical characterization – Differential scanning calorimetry, Differential Thermal Analysis, Thermo Gravimetric Analysis and Thermo electric power – Ion transport properties – Electrical conductivity – Two probe method – four probe method – Impedance spectroscopy – Dynamical conductivity – state conductivity – polarisation characteristic – determination of small electronic transport numbers – The permeation Technique (Static) – The polarization cell (Static) – the polarized cell technique (Dynamic) – The permeation technique (Dynamic).

Unit V

Application of superionic solid – Battery and Non-Battery application – conventional cells – fuel cells – Supercapacitors-sensors and partial pressure – gauges – Oxygen and non-Oxygen sensors – coulometers – timers – Diffusion coefficient measurement in solids and liquids – Electrochemic displays.

Suggested Books

1. Askeland D., 'Material Science and Engineering', Cengage Learning India Pvt Ltd (2010)
2. Khurmy R.S., 'Material Science', S.Chand Co., New Delhi, 2004
3. Lectures on solid state physics (Eds. G Bush and H Schade), international series on Natural Philosophy Vol. 79 Pergamon, press 1976
4. "Solid Electrolytes" (Eds. S Geller) Springer Verlag New York 1977
5. 'Importance Spectroscopy' (Eds. Joscher) Springer Verlag
6. 'Physics of Electrolytes – Transport Processes solid Electrolytes and in Electrodes (Eds. J Hladik) Academic press, New York 1972.

M.Sc. PHYSICS
CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus
2015 – 2016



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act 1956)

Eachanari Post, Coimbatore – 641 021

Course Objectives

- Studying the properties of materials is very important at all times, to choose the correct material for the correct use.
- To aware the students about the field of Condensed matter physics.
- This paper is intended to give the students an idea about importance of crystals and their properties.
- This paper enable the students to understand about the crystal structure, interaction with X-ray, lattice vibrations, defects, electronic properties and the magnetic properties etc.
- To explain the concept of energy bands and effect of the same on electrical properties.
- To learn the importance of different materials in a variety of applications

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Differentiate between different Lattice types and explain the concepts of reciprocal lattice and crystal diffraction.
2. Predict electrical and thermal properties of solids and explain their origin.
3. Explain the concept of energy bands and effect of the same on electrical properties.
4. Describe the dielectric properties of insulators.
5. Explain various types of magnetic phenomenon, physics behind them, their properties and applications.
6. Explain superconductivity, its properties, important parameters related to possible applications.
7. learn the importance of different materials in a variety of applications

UNIT – I

Inter planar spacing: Inter planar spacing for SC, FCC, BCC lattices - diamond cubic structure - NaCl structure - The reciprocal lattice and their properties - Bragg condition in terms of reciprocal lattice - Rotatory crystal method of X ray diffraction -Neutron diffraction – experiment.

Lattice: Vibrations of one dimensional diatomic linear lattice-acoustic and optical branches - Semi conductors and their properties - Hall effect - Dielectrics - Lorentz field in dielectrics - The Clausius –Mosotti equation - Ferro electric crystals - Ferro electric domains.

UNIT - II

Crystal defects: Classification of defects - Points defect - The Schottky defect - The Frenkel defect -colour centers - F center - other colour centers - Production of colour centers by X rays or practice irradiation – Defect and energy state.

Dislocations - Slip and plastic deformation - Shear strength of single crystals - Edge dislocation - Screw dislocation - Stress field around an edge dislocation.

Ultrasonics: Non destructive testing and applications.

UNIT - III

Heat capacity of the electron gas: Experimental electrical resistivity of metals – Free electron theory of metals – Debye's equation - superconductivity - Electron phonon interaction - Cooper pairs – BCS theory - Energy gap and its temperature dependence - London equation – Josephson effect and its applications.

Langevin theory of Para magnetism: Quantum theory of Para Magnetism - Curie law- Ferro Magnetism - Weiss molecular field theory - Domain theory - Anti Ferro magnetism - Neel theory - Ferri Magnetism – Ferrites – spin – waves - Experimental techniques to study the magnetic properties.

UNIT - IV

NANOSCIENCE

Structure: Size dependence of properties – Crystal Structures – Face centred nano particles – Particle size determination – Surface structure - Metal nano particles - Magic numbers – Theoretical model of nano particles – Geometric structure – Reactivity – Fluctuations – Magnetic clusters – Bulk to nano transitions Semi conducting nano particles – optical properties – photo fragmentation – Coulombic explosion.

Polymers: Forming and Characterizing polymers – Polymerisation – Sizes of polymers – Nano crystals – Condensed ring types – Poly diacetylene types – Polymers – Conductive polymers – Supra molecular structures – Transition-metal mediated types – Dendritic molecules – Supra molecular dendrimers – Micellers

UNIT - V

Instrumentation: Working principle, and applications of scanning electron microscope - transmission electron microscope - scanning tunneling microscope - atomic force microscope, and surface plasmon resonance – theories and principles of soft lithography, self assembled monolayers and multilayers.

Suggested Books

1. Kittel. C. 2005, Introduction to Solid State Physics, 8th Edition, Willey Eastern Ltd., New Delhi.
2. Saxena. B.S., R.C.Gupta and P.N.Saxena, 2012, Fundamentals of Solid State Physics, 15th edition, Pragati Prakashan, Meeru.
3. Charles P. Poole Jr., Frank J.Owens, 2003, Introduction to Nano-technology, 1st edition, Wiley India, New Delhi
4. Dekkar. A.J., revised edi, 2000, Solid State Physics, Macmillan India Ltd., New Delhi.
5. Keer. H.V. 1st edition , 2002, Principles of Solid State, New age international., New Delhi.
6. Pillai S.O., 2005, Solid State Physics, 4th Edition, New Age International Publishers Ltd.
7. Mark Ratner, Daniel Ratner, 1st edition ; 2009, Nano-Technology, A gentle introduction to the new big idea, Pearson Education (Singapore) (P) Ltd., New Delhi.
8. Jean-Marie Lehn, 1995, Supramolecular Chemistry – Concepts and Perspectives, Wiley-VCH, Weinheim, Germany Volume 106
9. Jonathan Steed and Jerry Atwood, 2st edition; 2009, Supramolecular Chemistry, Wiley Interscience, London.
10. <https://nptel.ac.in/courses/115/106/115106061/>
11. http://www-personal.umich.edu/~sunkai/teaching/Winter_2018/phys520.html

Course Objectives

- This paper contains details of basic electronic components, their characteristics and applications in the construction of different electronic instruments.
- Other than ordinary transistors and diodes special devices are also explained.
- To give an idea about the basics of electronics and electronic devices, which is very important for knowing the basics of any modern instrument.
- To analyze PN junctions in semiconductor devices under various conditions.
- To design and analyze simple rectifiers and voltage regulators using diodes.
- To understand the high frequency application of diodes.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Build, design and analyze analog to digital converter.
2. Design digital and analog systems.
3. Understand the basic operation and working of different diodes like FET, MOSFET, CMOS, etc.
4. Analyze PN junctions in semiconductor devices under various conditions.
5. Design and analyze simple rectifiers and voltage regulators using diodes.
6. Understand the high frequency application of diodes.

UNIT I

Electronic Devices and Applications - Transistor Biasing and Stabilization with design problems, h-parameters and their applications in transistor circuit analysis for CE, CB and CC configurations; FET and MOSFETs: Characteristics and Biasing, Design of biasing circuits, Design and analysis of amplifiers, Numerical problems.

UNIT II

Frequency response of amplifiers General concepts; bode plot; low frequency response: BJT and FET amplifiers; miller effect capacitance; high frequency response of BIT amplifiers; hybrid pie model: short circuit current gain, cut off frequency, and current gain with resistive load; high frequency response of FET amplifiers; frequency response of multistage amplifiers; square wave testing, Numerical problems.

UNIT III

Analysis of compound configurations Cascade connection; Cascade connection; Darlington connection; Bootstrapping principle; Bootstrapped Emitter Follower; Bootstrapped Darlington Emitter Follower; Feedback pair; . CMOS circuits; Current source circuits; Current mirror circuits; Differential amplifier circuits; Numerical problems.

UNIT IV

Power amplifiers Introduction, Series-fed Class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation, Class B amplifier distortion, Power transistor heat sinking, Class C and Class D amplifiers, Numerical problems.

UNIT V

Network theory, mesh and node analysis Kirchhoff's voltage and current law, Network Theorems- Thevenin's theorem, Norton's theorem, Superposition Theorem, Maximum power transfer theorem, Problems based on network theorems

Suggested Books

1. L. Boylestad and Louis Nashelsky, 10th edition, 2013, Electronic devices and circuit theory, Prentice-Hall of India, Delhi.
2. Millman and Halkias, 48th reprint, 2008, Integrated electronics, Tata McGraw-Hill, New Delhi.
3. Malvino A.P., Electronics Principles, 10th edition, 2013, Tata McGraw Hill, New Delhi
4. Mottershead, 1st edition, 1996, Electronic devices and circuits: An introduction, Prentice-Hall of India, New Delhi.
5. M. S. Ghausi 1st edition, 1995, Electronic devices and circuits, CBS.
6. Donald L. Schilling, Charles Belove, 3rd edition, 2009, Electronic circuits discrete and integrated, Tata McGraw-Hill, New Delhi.
7. Millman and Grabel, 2nd ed, 2001, Microelectronics; Tata McGraw-Hill, New Delhi.
8. T.F. Bogart and J.S. Beasley and G. Rizzo, 5th edition, 2000, Electronic devices and circuits, Prentice hall; New Delhi. Hall of India.
9. A. Nagor Kani, 1st edition, 2014, Circuit theory, RBA publications.
10. PC based instrumentation; Concepts & Practice, N. Mathivanan, 2007, Prentice-Hall of India.
11. <https://www.electronics-tutorials.ws/>
12. <https://www.electrical4u.com/>
13. <https://learn.careers360.com/physics/electronic-devices-chapter/>

Course Objectives

- Thermodynamics is an important branch of physics, which helps us to understand the different phenomena in the evolution of the universe.
- This paper gives a basic idea about the laws of thermodynamics and statistical processes.
- To apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
- To identify and formulate power production based on the fundamentals laws of thermal engineering.
- To instill upon to envisage appropriate experiments related to heat engines.
- To investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Identify and describe the statistical nature of concepts and laws in thermodynamics, in particular: entropy, temperature, chemical potential, Free energies, partition functions.
2. Apply the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
3. Identify and formulate power production based on the fundamentals laws of thermal engineering.
4. Investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind
5. Use the statistical physics methods, such as Boltzmann distribution, Fermi-Dirac and Bose-Einstein distributions to solve problems in physical systems.
6. Apply the concepts and laws of thermodynamics to solve problems in thermodynamic systems such as gases, heat engines and refrigerators etc.
7. Study important examples of ideal Bose systems and Fermi systems

UNIT I

Laws of Thermodynamics: Some consequences of the laws of thermodynamics – Entropy – Calculation of entropy changes in reversible processes. The principle of increase of entropy – Thermodynamic potentials – Enthalpy, Helmholtz and the Gibbs functions – Phase transitions – The Clausius-Clayperon equation – Van der Waals equation of state.

UNIT II

Kinetic Theory: Distribution function and its evolution – Boltzmann transport equation and its validity – Boltzmann's H-theorem – Maxwell-Boltzmann distribution – Transport phenomena – Mean free path- Conservation laws – Hydrodynamics (No derivation).

UNIT III

Classical Statistical Mechanics: Maxwell Boltzmann distribution law: Evaluation of constants - Maxwell's law of distribution of velocities - Most probable speed, Average speed, Root mean square speed - Principle of equipartition of energy - Partition function - Condition for applicability of M.B statistics - Non degenerate and degenerate systems - Maxwell velocity distribution in a given direction - Total internal energy of an ideal gas - Molar heat capacity of a gas at constant volume – Entropy - Helmholtz free energy - Pressure and equation of state of an ideal gas - Limitation of M.B method.

UNIT IV

Quantum Statistical Mechanics: B.E energy distribution for energies in the range E to $E + dE$ – Condition for B.E distribution to approach classical M.B distribution - Bose temperature - Bose Einstein condensation - Planck's law from B.E law - Fermi Dirac distribution law (no derivation) - FD law for the energies in the range E to $E+dE$ – Fermi energy - Effect of temperature - Energy distribution curve - Free electron in a metal - Fermi temperature and Thermionic emission - Richardson Dushman Equation - Comparison of MB, BE and FD statistics.

UNIT V

Applications of Quantum Statistical Mechanics: Ideal Bose gas : Photons – Black body and Planck radiation – Photons – Specific heat of solids – Liquid Helium.
Ideal Fermi gas : Properties – Degeneracy – Electron gas – Pauli paramagnetism
Ferromagnetism : Ising and Heisenberg models.

Suggested Books

1. Reif F., 2008, Fundamentals of Statistical and Thermal Physics, (Reprint), McGraw Hill International Edition, Singapore.
2. Gupta and Kumar, 1st edition, 1995, Elements of Statistical Mechanics, Pragati Prakashan, Meerut.
3. Huang K., 2nd edition, 2014, Statistical Mechanics, Wiley Eastern Limited, New Delhi
4. Agarwal B.K. and M. Eisner, 3rd edition, 2013, Statistical Mechanics, New age international Limited, New Delhi.
5. Sears N. and L. Salinger, 1989, Thermodynamics, 3rd Ed., Narosa Publishing House, New Delhi.
6. Greiner W., L. Neise and H. Stocker, 1st edition, 2007, Thermodynamics and Statistical Mechanics, Springer Verlag, New York.
7. Singh. K. and S.P. Singh 1st edition, 1984, Elements of Statistical Mechanics, S. Chand & Company Ltd., New Delhi.
8. <https://ocw.mit.edu/courses/physics/8-333-statistical-mechanics-i-statistical-mechanics-of-particles-fall-2013/lecture-notes/>
9. <https://sites.krieger.jhu.edu/jared-kaplan/files/2018/11/StatisticalMechanicsNotes.pdf>
10. <https://www.thphys.uni-heidelberg.de/~amendola/statphys/statphys.pdf>

Course Objectives

- It is necessary for a physics student to be familiar with different methods in mathematics.
- Give a basic idea about different methods of mathematics, used in Physics.
- To provide students with a repertoire of mathematical methods that are essential to the solution of advanced problems encountered in the fields of applied physics and engineering.
- In addition, intended to prepare the student with mathematical tools and techniques that are required in advanced courses offered in the applied physics
- To communicate mathematical and physical knowledge and ideas to the students.
- To learn the fundamentals and applications of Complex Variable, Analyticity, Cauchy-Riemann and Cauchy's Integral.
- To contribute innovations and application of basic research.
- To get knowledge to find the relationship between observation and theory and their use in building the basic concepts of computing.

Course Outcomes (COs)

1. Students will be able to apply integral transform (Fourier and Laplace) to solve mathematical problems of interest in physics, use Fourier transforms as an aid for analyzing experimental data.
2. Manipulating vectors as “atomic” entities without recourse to underlying coordinates
3. Sound grasp of the concept of a vector field
4. Ability to link this idea to descriptions various physical phenomena
5. Intuition of the physical meaning of the various vector calculus operators (div, grad, curl) Students can formulate and express a physical law in terms of tensors, and simplify it by use of coordinate transforms (example: principal axes of inertia).
6. Students will be able to solve some simple classical variation problems.

UNIT - I

Definition of vector space – Linear dependence – Linear independence – Basis – Dimension of a vector space – Representation of Vectors and linear operators with respect to basis – Schmidt orthogonalization process – Inner product.

Tensors : Transformation of coordinates – Summation convention – Contravariant Tensor – Covariant Tensor – Mixed Tensor – Rank of a Tensor – Kronecker delta symbol – symmetric and antisymmetric tensors – Invariant tensors.

UNIT - II

Functions of a complex variable – single and multivalued functions – Cauchy-Riemann differential equation – analytical – line integrals of complex function – Cauchy's integral theorem and integral formula – derivatives of an analytic function – Liouville's theorem - Taylor's series – Laurent's series - Residues and their evaluation - Cauchy's residue theorem – application to the evaluation of definite integrals.

UNIT - III

Fourier Transform – Properties of Fourier transform – Fourier transform of derivatives – Fourier sine and cosine transforms of derivatives – Fourier transform of functions of two or three variables – Finite Fourier transforms – Simple Applications of FT

Laplace transform – Properties of Laplace transforms – Laplace Transform of derivative of a function – Laplace transform of integral – Laplace transform of periodic functions - Inverse Laplace Transform – Fourier Mellin Theorem - Properties of inverse Laplace Transform – Convolution theorem – Evaluation of Laplace Transform using Convolution theorem.

UNIT - IV

Fourier series – Dirichlet's theorem – change of interval – complex form – Fourier series in the interval $(0, T)$ – Uses of Fourier series - Legendre's polynomials and functions – Differential equations and solutions – Rodrigues formula – Orthogonality – relation between Legendre polynomial and their derivatives – recurrence relations – Laguerre Polynomials – recurrence relations

UNIT - V

Bessel's functions – differential equation and solution – generating functions – recurrence relations – Bessel function of second order – Spherical Bessel function - Hermite differential equation and Hermite polynomials – Generating function of Hermite polynomials – Recurrence formulae for Hermite polynomials – Rodrigue's formula for Hermite Polynomials – Orthogonality of Hermite Polynomials – Dirac's Delta Function.

Suggested Book

1. Satya Prakash., 2002. Mathematical Physics , 4th edition, S.Chand & Co, New Delhi.
2. Gupta.B.D., 2002, .Mathematical Physics, 2nd edition, Vikas publishing company, New Delhi.
3. Singaravelu.V., 1995. Numerical methods, 2nd edition, Meenakshi publications, Sirkali.
4. Rajput.B.S., 2003. Mathematical Physics, 16th edition, Pragati Prakashan, Meerut.
5. Gupta. P.P., Yadav., and Malik., 1997. Mathematical Physics, Kedar Nath & Ram Nath, Meerut.
6. Venkataraman.M.K., 1999. Numerical methods in Science & Engineering, 5th edition, The National Publishing Company, Chennai.
7. Butkov, 1968, Mathematical Physics, Addison Wesley, New York
8. A.W. Joshi, 1995, Tensors and Matrices, 3rd Edition, Wiley Interscience, New York.
9. <https://nptel.ac.in/courses/115/103/115103036/>
10. https://www.physics.uu.se/digitalAssets/405/c_405910-l_1-k_notes_v3_0.pdf

Course objective

- Studying Classical Mechanics will give an idea about how classical physics deal with matter and energy.
- Have a deep understanding of Newton's laws
- Be able to solve the Newton equations for simple configurations using various methods,
- To give an insight into the classical methods of physics.
- The emphasis of the course is on applications in solving problems of interest to physicists.
- Students are to be examined on the basis of problems, seen and unseen.
- To demonstrate knowledge and understanding of the following fundamental concepts in the dynamics of system of particles, motion of rigid body, Lagrangian and Hamiltonian formulation of mechanics.
- To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.
- To develop math skills as applied to physics.
- They will use critical thinking skills to formulate and solve quantitative problems in applied physics.

Course Outcomes (Cos)

- Students can understand the classical laws of motion.
- Competency in using the essential mathematical skills needed for describing mechanics and special relativity
- Understanding of significance of conservation of various physical quantities to discuss the motion of dynamical system.
- Understanding of constraints and their significance to solve the equations of motion of the dynamical system.
- Understanding of necessity of Lagrangian and Hamiltonian formulations for simplified treatments of many complex problems in classical mechanics.
- They can develop problem solving skills.

UNIT - I

Conservation laws: Mechanics of a system of particles – Conservation laws: linear momentum, angular momentum, energy – Constraints, Degrees of freedom – Generalised co-ordinates – Generalized notations – Brachistocrone problems – Atwood's machine. Hamilton's variational principle – Lagrange's equation of motion from Hamilton's principle, D'Alembert's principle – Applications of Lagrange's equation of motion – Linear harmonic oscillator – Simple pendulum – particle moving under a central force – particle moving on the surface of earth, cylinder rolling on inclined plane, electric circuit – Superiority of Lagrange's approach over Newtonian's approach.

UNIT – II

Phase space: Hamiltonian – Hamilton's canonical equations of motion – Physical significance of H – Advantage of Hamiltonian approach – Hamilton's canonical equation of motion in different coordinate systems – Hamilton-Jacobi method – Kepler's problem solution by Hamilton-Jacobi method – Action and angle variables – Solution of Harmonic oscillator by action angle variable method – canonical or contact transformation – Condition for a transformation to be canonical.

Poisson brackets – Invariance of Poisson brackets with respect to canonical transformation – Equations of motion in Poisson bracket form – Lagrange's bracket – Relation between Lagrange and Poisson brackets

UNIT – III

General features of central force motion – General features of orbits – Centre of mass and laboratory coordinates – Virial theorem – Stable and unstable equilibrium – Properties of T, V and ω for small oscillations – Normal coordinates and normal frequencies of vibrations – Parallel pendula – Double, Triple pendula – Linear triatomic molecule.

Generalized coordinates for rigid body motion – Euler's angles – Angular velocity, momentum of rigid body – moment and products of inertia – Principal axis transformation – rotational kinetic energy of a rigid body – Moment of inertia of a rigid body – motion of a symmetric top under action of gravity.

UNIT - IV

Special Theory of Relativity: Introduction – Galilean transformation and invariance of Newton's laws of motion – Non variance of Maxwell's equations – Michelson Morley experiment and explanation of the null result.

Concept of inertial frame – Postulates of special theory – simultaneity – Lorentz transformation along one of the axes – length contraction – time dilatation and velocity addition theorem – Fizeau's experiment – Four vectors – Relativistic dynamics – Variation of mass with velocity – Energy momentum relationship.

UNIT - V

General theory of Relativity: Introduction – Limitation of special theory of relativity and need for a relativity theory in non-inertial frames of reference. Concept of gravitational and inertial mass and the basic postulate of GTR, gravitation & acceleration and their relation to non-inertial frames of reference – principle of equivalence of principle of general co-variance – Minkowski space and Lorentz transformation.

Suggested Book

1. Goldstein.H.A. 2000, Classical Mechanics, 2nd Edition, Wesley Publishing Company, London.
2. Gupta. S. L., V.Kumar and H.V.Sharma, 2008, Classical Mechanics, 19th Edition, Pragati Prakashan, Meerut.
3. Banerji Sriranjana and Asit Banerjee, 2nd Edition 2013, The Special Theory of Relativity, Printice-Hall of India, New Delhi
4. Aruldas G., 1st edition, 2008, Classical Mechanics, Printice Hall of India, New Delhi

5. Sardesai D.L., 1st edition, 2004, A Primer of Special Relativity, New Age International Publishers, New Delhi
6. Hartle B. James, 1st edition ,2009, Gravity, An Introduction to Einstein's General Relativity, Dorling Kindersley (India) Pvt. Ltd., Delhi.
7. Solved Problems in classical Mechanics, O.L. Delange and J. Pierrus, 2010, Oxford Press
8. <https://ocw.mit.edu/courses/physics/8-09-classical-mechanics-iii-fall-2014/lecture-notes/>
9. <https://ocw.mit.edu/courses/physics/8-011-physics-i-classical-mechanics-fall-2005/lecture-notes/>
10. <https://iopscience.iop.org/book/978-0-7503-1398-8>

Course Objective

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- To experience the practical difficulties to find the physical constant values.
- To apply the theoretical knowledge into the experiments and find the solutions.
- Students will be observe the readings practically.
- Students will experience the phenomena of reflection, refraction, etc.,

Course Outcomes (COs)

1. The course is designed to train the students so that they can efficiently handle various instruments.
2. Students will verify laws studied in the different theory course.
3. Students will measure different properties of materials.
4. Capable to classify the materials with the properties
5. Will overcome the fear of experimental skill
6. Capable to built his own equipments for measuring the properties of materials

ANY TWELVE EXPERIMENTS

1. Viscosity of liquid – Mayer’s oscillating disc method.
2. Michelson Interferometer – Determination of λ and $d\lambda$.
3. ‘e/m’ by Thomson’s method and Magnetron method.
4. Fresnel’s biprism - Determination of Wavelength of monochromatic source.
5. Determination of Plank’s constant using Photo cell.
6. Forbe’s method – Thermal conductivity.
7. ‘e’ by Millikan’s method.
8. Ferguson’s method - Specific heat of a liquid.
9. Faraday effect – Determination of Verdet constant using He-Ne laser.
10. Young’s Double slit – Determination of Wavelength of monochromatic source.
11. Regulated dual power supply construction.
12. Astable, monostable and bistable multi-vibrators, using discrete components.

13. Analog computer setup – Solving simultaneous equations.
14. UJT characteristics and relaxation oscillator.
15. FET characteristics and Source follower

Suggested Book

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut
4. Gupta S.L. and V.Kumar, 2002, Practical Physics, 25th Edition, Pragathi Prakashan, Meerut

Course Objectives

- Quantum mechanics is the most important branch of physics, as it has got application in any other branch of physics.
- It has revolutionized the whole science, important for any physics student to know the basics of quantum mechanics.
- This paper gives an idea about the development of quantum mechanics.
- This paper explains the shortcomings of quantum mechanics in explaining different subatomic physics and the evolution of quantum mechanics.
- This course is part one of a two semester course focused on a rigorous exposition to the principles of Quantum mechanics.
- The Dirac bra-ket formalism will be introduced and used throughout to present the principles of Quantum Mechanics in a general context.
- We will discuss analytic solutions to the Schrodinger equation for a variety of potentials in one, two and three dimensions.
- The role of symmetries as the underlying principle of Quantum Mechanics will be emphasized throughout the course.
- The use of symmetry principles and operators methods will be discussed.

Course Outcomes (COs)

After the completion of course, students should be able to understand and grasp

1. The basic concepts of quantum mechanics including the solution of wave equation, interpretation of dynamical variables and applying wave mechanics to various situations in terms of boundary value problems so as to understand the quantum well, barriers and particle motion in different types of force field (potentials).
2. Applying special functions as the solutions of differential equation as the wave function/state functions and understanding the physical situations where these can be applied.
3. Calculating states of electrons in hydrogen atom and harmonic oscillators and the interpretation of quantum states.
4. Applying the stationary perturbation problems to various problems including particle states splitting in electric and magnetic field.
5. interpret the wave function and apply operators to it, to obtain information about a particle's physical properties such as position, momentum and energy
6. Be able to solve the Schrodinger equation to obtain wave functions for some basic, physically important types of potential in one dimension, and estimate the shape of the wavefunction based on the shape of the potential

7. Be able to understand the role of uncertainty in quantum physics, and use the commutation relations of operators to determine whether or not two physical properties can be simultaneously measured

UNIT - I

Quantum Theory: Introduction – Limitation of classical physics – Origin of quantum theory – Planck's quantum hypothesis – Einstein's theory of Photoelectric effect – Bohr model of hydrogen atom – Inadequacy of quantum theory.

Wave Mechanics Matter waves – Uncertainty principle – Wave packet – Group and phase velocity – Time-dependent and Time-independent Schrodinger equations for a free particle and particle in a potential – Linear vector space – Hilbert's space – Orthogonal and orthonormal functions – Linear operator – Eigen functions and Eigen values – Hermitian operator – Dirac's notation – Equations of motion – Schrodinger, Heisenberg and Interaction representation.

UNIT - II

One dimensional potential well: Square-well potential with rigid walls – Square-well potential with finite walls – Square-well potential barrier – Alpha emission – Bloch waves in a periodic potential – Linear harmonic oscillator (Schrodinger method and operator method) – Free particle.

UNIT - III

Three dimensional potential Well: Particle moving in a spherically symmetric potential – System of two interacting particles – Rigid rotator – Hydrogen atom – Hydrogenic orbitals – The free particle – Three-dimensional square-well potential - Deuteron

Matrix mechanics: Matrix representation of wave function – Matrix representation of operator – Properties of matrix elements – Schroedinger equation in matrix form – Eigen value problem – Unitary Transformations – Linear harmonic oscillator, Matrix method

UNIT - IV

Time-independent Perturbation theory: Basic concepts – Non-degenerate energy levels – First and Second order corrections for energy and wave functions – Ground state of Helium atom – Effect of electric field on the ground state of hydrogen atom (Stark effect) – Degenerate energy levels – Effect of electric field on the $n=2$ state of hydrogen atom

UNIT - V

Variational method & WKB Approximation: Variational principle – Variation method for excited states – Application of variation method to ground state of helium – The WKB method

Time dependent perturbation theory: Introduction – First-order perturbation – Harmonic perturbation – Transition to continuum states (Fermi's Golden rule) – Absorption and emission of radiation – Transition probability – Selection rules

Suggested Book

1. Aruldas. G, 2009, Quantum Mechanics, 2nd Edition, Prentice-Hall of India, New Delhi.
2. Schiff Leonard, 1968, Quantum Mechanics, 3rd Edition, McGraw Hill International, Auckland

3. Gupta, Kumar and Sharma, 2002 – 2003, Quantum Mechanics, 22nd Edition, Jai Prakash Nath & Co, Meerut.
4. Satya Prakash, New Edition, 2003, Quantum Mechanics, Kedar Nath & Ram Nath & Co, Meerut.
5. Engen Merzbacher, 1997, Quantum Mechanics, 3rd Edition, Wiley, Weinheim
6. Mathews. P.M. and K. Venkatesan, 2nd Edition, 2013, Textbooks of Quantum Mechanics, McGraw Hill International, Weinheim.
7. Chatwal R.G. and Sk. Anand, 4th edition, 2004, Quantum Mechanics, Himalaya Publishing House, New Delhi
8. Thangappan. V. K., 2nd Edition, 1993, Quantum Mechanics, Tata McGraw Hill, New Delhi
9. <http://wcchew.ece.illinois.edu/chew/course/QMALL20121005.pdf>
10. <https://ocw.mit.edu/courses/physics/8-04-quantum-physics-i-spring-2016/lecture-notes/>
11. <http://pages.physics.cornell.edu/~ajd268/Notes/QM-Notes.pdf>
12. <http://stanford.edu/~oas/SI/QM/papers/QMGreensite.pdf>
13. https://www.ks.uiuc.edu/Services/Class/PHYS480/qm_PDF/QM_Book.pdf

Course Objectives

- Nuclear physics is one of the fundamental subjects of physics. It is important to know about the physics of nuclei and the different energies involved in the nuclear processes.
- The aim is to tell them about the stability of nucleus and various other properties.
- The students will learn about various types of radiations and their interaction with matter.
- Nuclear energy is one of the major sources of energy, which, with proper careful usage, can solve the energy crisis to a large extent.
- This paper is intended to give an insight into the different nuclear processes and the fundamental particles, which are the real building blocks of the universe.
- To understand the operation of G.M. counter.
- To study the general properties of nucleus, nuclear forces and nuclear reactions.
- To analyse the B-H curve and their concepts practically.
- To introduce the concept of elementary particles practically.

Course Outcomes (COs)

Students who have completed this course should

1. Understand the relation between the standard model and QCD
2. Understand the importance of models in describing the properties of nuclei and nuclear collisions
3. Be able to make quantitative estimates of phenomena involving nuclei.
4. Students understand the basic principle, type of accelerators, working and operation of Accelerators.
5. Students learn the basic of ion sources, beam transport and application of accelerator in different branches of science.
6. Training given to students and researchers of the Universities to handle such complicated machine.
7. Acquire knowledge in the content areas of nuclear and particle physics, focusing on concepts that are commonly used in this area.

UNIT - I

Nuclear mass and charge: Distribution of nuclear charge - Nuclear mass and binding energy of a nucleus – semi-empirical mass formula – Nature of nuclear force – form of

nucleon-nucleon potential – charge independence and charge symmetry of nuclear forces - Bound states of two nucleons-Ground state of Deuterium - Wave mechanics of ground state of Deuterium-Spin states –Pauli’s exclusion principle -Tensor force - Exchange force - Low energy Nucleon - Nucleon scattering

UNIT - II

Radioactivity:

Alpha decay: Properties of α particles - Velocity and energy of α particles - Gamow’s theory of α particles- Geiger - Nuttall law- α ray energies and fine structure of α rays - α disintegration energy-Low range α particles

Beta decay: Properties of β particles - General features of β ray spectrum – Pauli’s hypothesis - Fermi’s theory of β particles - Forms of interaction and selection rules - Fermi’s and Gamow teller transition

Gamma decay: The absorption of γ rays by matter - Interaction of γ rays with matter - Measurement of γ ray energies - Dumont bent crystal spectrometer method-internal conversion –Applications.

UNIT -III

Nuclear models: Liquid drop model - Bhor Wheeler theory of fission - Condition for spontaneous fission - Activation energy-Seaborg’s expression

Shell model: Explanation for magic numbers - Prediction of shell model -Prediction of spin and parity - Nuclear statistics - Magnetic moment of nuclei - Schmidt lines-Nuclear isomerism

Collective model: Explanation of Quadrupole moments - Prediction of sign of electric quadrupole moments. Optical model: Nilsson model - Elementary ideas

UNIT - IV

Nuclear reactions: Nuclear fission and fusion - Kinds of reaction and conservation laws - energetics of nuclear reaction – Applications of Nuclear Energy – Nuclear Reactors - Isospin - Reaction cross section-Continuum theory of nuclear reaction - Resonance - Briet Wigner Dispersion formula - Stages of nuclear reaction - Statistical theory of nuclear reaction - Evaporation probability and cross section – Kinematics of stopping and pickup reaction - Surface reaction

UNIT -V

High energy physics : Types of interaction in nature-typical strengths and time-scales, conservation laws, charge-conjugation, Parity and Time reversal, CPT theorem, GellMann-Nishijima formula, intrinsic parity of pions, resonances, symmetry classification of elementary particles, quark hypothesis, charm, beauty and truth, gluons, quarkconfinement, asymptotic freedom.

Suggested Books

1. Pandya. M.L. and R. P. S. Yadav, 2004, Elements of Nuclear Physics, 1st edition Kedar Nath Ram Nath, Meerut.
2. Dayal. D.C., 4th edition 1992, Nuclear Physics, Himalaya Publishing House, New Delhi.
3. Kenneth S.Karne, 1st edition, 1987, Introducing Nuclear Physics, John Wiley and Sons, New York.
4. Sharma. D.C 1992, Nuclear Physics, - K. Nath & Co, Meerut.

5. Bernard L. Cohen, 1st edition, 1978, Concept of Nuclear Physics, Tata Mc Graw Hill, New Delhi.
6. Devanathan V., 2nd edition, 2008, Nuclear Physics, Narosa Book Distributers Pvt. Ltd., New Delhi.
7. Kaplan Irving, 2002, Nuclear Physics, 2nd Edition, Narosa Book Distributers Pvt. Ltd., New Delhi.
8. <https://www.springer.com/gp/physics/particle-nuclear-physics>
9. <https://iopscience.iop.org/book/978-0-7503-1140-3>
10. <https://www.wiley.com/en-us/Nuclear+and+Particle+Physics%3A+An+Introduction-p-9780470035474>.

Course Objectives

- One of the main objectives of the course is to familiarize the students with the fundamental concepts of Materials Science and Engineering which will be used as background knowledge for the understanding of specialized courses in the field of Materials Science.
- Study of materials is always important, for any application, including fabrication of satellites.
- To introduce various methods available for characterizing the materials.
- The relationship between the properties, structure and processes of engineering materials is discussed
- The characterization of materials specifically addresses that portfolio with which researchers and educators must have working familiarity.
- This course provides the introduction to the field of materials science

Course Outcomes (COs)

1. The students are exposed with X-ray, thermal, microscopic, and electrical methods of characterization.
2. Understand and describe the fundamental principles behind the methods of characterization which are included in the curriculum
3. Analyze, interpret and present observations from the different methods.
4. Evaluate the uncertainty of observations and results from the different methods.
5. A thorough understanding of the history of materials science with basic understanding of metals, binary alloys, magnetic materials, dielectric materials and polymers
6. Concept of phase, phase diagram, phase boundaries, Invariant points and reactions leading to the understanding of the material synthesis and dependence of properties on thermodynamic parameters
7. Understanding nucleation, growth and phase transformation kinetics

UNIT - I

Nature of thin films: Deposition technology – Distribution of deposits – Resistance heating – Thermal evaporation – Flash evaporation.

Electron beam method – Cathodic sputtering – Glow discharge sputtering – Low pressure sputtering – Reactive sputtering – R. F. sputtering – Chemical and Physics vapour deposition – Chemical deposition.

Thickness Measurement Methods: Mass methods – Optical method – Photometric – Ellipsometry – Interferometry – Other methods – Substrate cleaning.

UNIT- II

Electron Diffraction Technique: Electron diffraction technique – High energy electron diffraction – Low energy electron diffraction – Electron microscopy – Scanning electron microscopy – X-ray photoelectron spectroscopy – Mass spectroscopy – Thermodynamics of nucleation – Nucleation theories – Film growth – Incorporation of defects, impurities etc. in film – Deposition parameters and grain size.

UNIT – III

Single Crystals: Significance of single crystals – Crystal growth techniques – The chemical physics of crystal growth – crystal growth phenomena – Nucleation – Gibbs Thomson equation – for vapour – for solution – Spherical nucleus – Heterogeneous nucleation – Cap shaped nucleus – Disc shaped nucleus – Characterisation techniques – XRD spectra and Analysis.

UNIT IV

Singular and rough faces: Models on surface roughness – The Kossel, Stranski, Volmer (KSV) theory – The Burton, Cabrera and Frank (BCF) theory – BCF theory of solution growth – Periodic Bond chain theory – the Muller – Krumbhaar Model.

The Bridgman and related techniques – Crystal pulling techniques – Convection in melts – Modeling and simulation of bulk crystal growth considering melt dynamics – Melt growth of oxide crystals for saw, piezo electric and non linear optical applications – Liquid encapsulated and Czochralski technique – Zone melting technique – Skull melting process – Heat exchanger method.

UNIT V

Nanotechnology: An introduction – Nanodevices – Carbon nanotubes – Types of Carbon Nanotubes: Single walled, Multiwalled, Torus – Properties: Hardness – Strength – Electrical – Thermal – Optical – Synthesis – Arc discharge – Laser Ablation.

Suggested Book

1. Goswami. A., , 1st edition 2014, Thin film fundamentals, New Age International Pvt Ltd, New Delhi.
2. Meissel. L.T and R. Glang., 1978, Hand book of thin film technology, Tata McGraw Hill, New Delhi.
3. Shalini Suri, , 1st edition 2006, Nano Technology: Basic Science to Emerging Technology, Aph Publishing Corporation.
4. Brice. J.C., , 1st edition, 1986, Crystal growth processes, John Wiley and Sons, New York.
5. Mark C. Hersam (2006), "MSE 376 Nanomaterials," <https://nanohub.org/resources/1914>.
6. <https://nanohub.org/resources/7313>.
7. https://ocw.mit.edu/courses/mechanical-engineering/2-674-micro-nano-engineering-laboratory-spring-2016/lecture-notes/MIT2_674S16_Lec7Nano.pdf
8. <https://nptel.ac.in/courses/118/104/118104008/>

Course Objectives

- Astronomy and Astrophysics is a very fundamental subject in Physics.
- Includes study of the solar system, evolution of stars, different physical processes going on stellar bodies, life cycle of stars etc.
- Students will learn the composition and nature of the universe, from our own solar system, to stars and stellar evolution, interstellar matter, galaxies, and clusters of galaxies.
- Students will explore historic astronomy, some fundamental physics such as Newton's laws and the nature of light, and discuss how astronomers discover the nature of the universe.
- To understand the fundamental methodology of science, including scientific inquiry, data gathering, analysis, generating hypotheses, and testing predictions.
- To connect observations of the Universe with the fundamental laws and principles that govern the behavior of the physical world.

Course Outcomes (COs)

Students will have understanding of

1. Plan and engage in an independent and sustained critical investigation of a chosen research topic to generate new knowledge in an area of astronomy and astrophysics.
2. Systematically evaluate the relevant theory and concepts in astronomy and astrophysics,
3. The theory to appropriate methodologies and evidence and draw appropriate conclusions.
4. Demonstrate capacity for astronomy and astrophysics reasoning through analyzing, proving and explaining concepts from the chosen research area.
5. Identify important constellations – orient in space.
6. Describe the planets of the solar system and their properties.
7. Explore the objects that comprise the solar system, with focus on chemical and atmospheric composition and how these interact to determine the changing nature of planetary environments.

UNIT - I**Astrophysics:**

Introduction - Astrophysics and Astronomy - Celestial coordinate systems (Sun-Earth system, Galactic Coordinate system)

UNIT - II

Stellar Structure and Evolution:

Star formation - Stellar Magnitudes - Classification of stars - H-D classification - Saha Equation of ionization - Hertzsprung-Russel (H-R) diagram - Gravitational energy - Virial theorem - Equations of stellar structure and evolution - Pre-main sequence evolution - Jeans criteria for star formation - fragmentation and adiabatic contraction - Evolution on the main sequence - Post main sequence evolution

UNIT - III

Nuclear Astrophysics:

Thermonuclear reactions in stars - pp chains and CNO cycle - Solar Neutrino problem - subsequent thermonuclear reactions - Helium burning and onwards - nucleosynthesis beyond iron - r- and s- processes

Stellar Objects & Stellar Explosions:

Qualitative discussions on: Galaxies – Nebulae – Quasars - Brown dwarfs - Red Giant Stars – Nova - Supernova.

UNIT - IV

Gravitational Collapse and relativistic Astrophysics:

Newtonian theory of stellar equilibrium - White Dwarfs - Electron degeneracy and equation of States - Chandrasekhar Limit - Mass-Radius relation of WD - Neutron Stars - Spherically symmetric distribution of perfect fluid in equilibrium - Tolman-Oppenheimer-Volkoff (TOV) equation – Mass - Radius relations of NS – Pulsars - Magnetars - Gamma ray bursts - Black holes - Collapse to a black hole (Oppenheimer and Snyder) - event horizon - singularity.

UNIT - V

Accretion disks:

Formation of Accretion Disks - Differentially rotation systems in Astrophysics - Disk dynamics - Steady Disks - Disk formation in close binary systems through mass transfer - Accretion onto compact objects.

Suggested Books

1. V.B.Bhatia, , 1st edition, 2001; Textbook of astronomy and astrophysics with elements of cosmology, Alpha science international.
2. K. D. Abhyankar, , 1st edition Astrophysics – Stars and Galaxies, University Press, 2001.
3. S.L.Shapiro and S.A.Teukolsky, , 1st edition Black Holes, White Dwarfs and Neutron Stars (John Wiley, 1983)
4. E.W.Kolb and M.S.Turner, , 1st edition, 2007, The Early Universe Sarth book house and distributors
5. J.V.Narlikar, , 3rd edition 2012 Introduction to Cosmology, Cambridge University Press.
6. A.K.Raychaudhuri, S.Banerji and A.Banerjee, General Relativity, Astrophysics and Cosmology – , 1st edition (Springer-Verla, 1992)

7. S. Banerji and A. Banerjee , General Relativity and Cosmology – , 1st edition (Elsevier, 2007)
8. <https://jila.colorado.edu/~pja/astr3730/>
9. https://www.slac.stanford.edu/econf/C0307073/papers/LNEA_complete.pdf

Semester – II

L T P C

15PHP203C

CRYSTAL GROWTH TECHNIQUES

5 - - 5

Course Objectives

- Will give knowledge on Crystals and its applications in electronics, energetics etc.
- Gives the general characteristics of crystals, methods of preparation etc.
- To give an idea about historical importance of crystals, methods of preparation and characterization of crystals etc.
- This interdisciplinary course unifies various aspects of the recent progress in the physical, chemical and mineralogical materials science.
- This course will provide the basic knowledge of the oxide thin film deposition and the oxide single crystal growth.
- In the latter parts, the basic theory of the single crystal growth and various single crystal growth methods will be explained.

Course Outcomes (COs)

1. The student will learn about the crystal growth mechanisms and techniques.
2. Various thin films deposition techniques and thin film characterization techniques are also covered in the course.
3. Gain the knowledge about phonons and its importance in thermal physics
4. Acquire the theoretical concept behind electrical and thermal properties of metals
5. Understand the fundamental theories to describe the energy bands in metals
6. Gain the knowledge about Semiconductor Crystals and their properties
7. Have the basic understanding of the thin film deposition process through vapor phase.
8. Have the understandings of the thin film deposition by PVD process and CVD process.
9. Have a brief knowledge of the characterization method for the thin film.

UNIT- I

Crystal Growth phenomena

The historical development of crystal growth – significance of single crystals - crystal growth techniques - the chemical physics of crystal growth - Theories of nucleation - Gibb's Thompson equation for vapour, melt and solution- energy of formation of spherical nucleus- heterogeneous nucleation - kinetics of crystal growth, singular and rough faces, KSV theory, BCF theory - periodic bond chain theory- The Muller- Krumbhaar model.

UNIT- II

Crystal Growth from Melt and Solution Growth

Growth from the melt - the Bridgmann technique – crystal pulling - Czochralski method- experimental set up - controlling parameters advantages and disadvantages.- convection in melts – liquid solid interface shape - crystal growth by zone melting - Verneuil flame fusion technique.

UNIT - III

Low temperature crystal growth

Low temperature solution growth - methods of crystallization - slow cooling - solvent evaporation, temperature gradient methods - crystal growth system - growth of KDP, ADP and KTP crystals - high temperature solution growth - gel growth.

UNIT - IV

Vapour Growth and Epitaxial Growth

Physical vapour deposition - chemical vapour transport – definition - fundamentals, criteria for transport, Specifications, STP, LTVTP & OTP - advantages and limitations of the technique, hydrothermal growth – design aspect of autoclave – growth of quartz, sapphire and garnet.

Advantages of epitaxial growth - epitaxial techniques - liquid phase epitaxy - vapour phase epitaxy - molecular beam epitaxy - chemical beam epitaxy and atomic layer epitaxy

UNIT - V

Materials for Semiconductor Devices

Semiconductor optoelectronic properties - band structure - absorption and recombination, semiconductor alloys - group III-V materials selection - binary compounds, ternary alloys - lattice mismatch - lattice mismatched ternary alloy structures - compositional grading, heteroepitaxial ternary alloy structure - Quaternary alloys - Semiconductor Devices - Laser diodes, light emitting diodes (LED) – photocathodes - microwave Field-Effect Transistors (FET).

Suggested Books:

1. R.A. Laudise, 1970, illustrated edi, The Growth of Single Crystal, Prentice Hall, NJ.
2. A.W. Vere, 1987 edition, Crystal Growth: Principles and Progres, Springer press.
3. P.S. Raghavan and P.Ramasamy, 2000, Hard cover edition. Crystal Growth Processes and methods, KRU Publications.
4. F.C. Auluck, A Short course in Solid State Physics, Vol. I, Thomson Press India Ltd.
5. B.R. Pamplin, 2nd edition Crystal Growth, Pergamon, (1980)
6. Heinz K Henish, , 1st edition 1970, Crystal Growth in Gel, Dover Publication
7. Milton Ohring, The Materials Science of Thin Films, Academic Press (2002)
8. S. Wolf and R.N. Tauber, Silicon processing for the VLSI Era: Vol.1-Process Technology, Lattice Press (1999).
9. <https://ocw.mit.edu/courses/chemistry/5-069-crystal-structure-analysis-spring-2010/lecture-notes/>
10. <http://xrayweb.chem.ou.edu/notes/xtalgrow.html>

Course Objectives

- Digital processing of signals has an extensive range of applications, from the military to the medical, from entertainment to mass production.
- In many areas of application the advent of these specially designed DSP devices has started a revolution in engineering which will pervade most areas of modern life.
- To give idea about different classifications of signals, different methods of recording and processing.
- This paper is to give knowledge to students about the theory of signal processing and the different methods involved in it.
- Apply the principles of discrete-time signal analysis to perform various signal operations
- Apply the principles of z-transforms to finite difference equations.
- Apply the principles of Fourier transform analysis to describe the frequency characteristics of discrete-time signals and systems
- To understand the digital filters and their classifications based on the response, design and algorithm.

Course Outcomes (COs)

The students can able to

1. Determine the spectral coefficients and the Fourier series components of discrete-time signals.
2. Determine the frequency response and the z-transform of discrete-time systems.
3. Determine the discrete Fourier transform of discrete-time signals.
4. Calculate the outputs of discrete-time systems in response to inputs.
5. Understand the characteristics field effect transistors
6. Analyze the characteristics of oscillators and wave shaping circuits

UNIT - I**Introduction:**

Signals and systems - Classification of signals - Concept of frequency in continuous time and discrete– time signals. Theory of A/D and D/A conversion - Sampling of analog signals - sampling theorem - Quantization of continuous amplitude signals - Quantization of sinusoidal signal - Coding of quantized – samples - Digital to analog conversion

UNIT - II

Discrete- time signals and systems:

Discrete - time linear time-invariant systems-Techniques of analysis of linear systems - Resolution of a discrete time signal into impulses - Response of LTI systems to arbitrary inputs : Convolution sum - Properties of convolution and the interconnection of LTI systems - Casual LTI systems Stability of LTI systems - Systems with finite duration and infinite duration impulse – response

UNIT - III

The Z-transform:

The Direct Z-Transform - The Inverse Z-Transform - Properties of Z-transform - Rational Z-transforms - Poles and zeros - Inversion of Z-transforms. The inverse Z-Transform by contour integration - Power series expansion - Partial fraction expansion – Decomposition of rational Z-transform – Analysis of linear time invariant systems in the Z-domain – one sided Z-Transform.

UNIT - IV

Frequency Analysis of Signals and Systems:

Frequency analysis of continuous - time signals. The Fourier Series for continuous Time Periodic Signals - Power Density Spectrum of Periodic Signals - The Fourier Transform of Continuous -Time Aperiodic Signals - Energy Density Spectrum of Aperiodic Signals - Frequency analysis of discrete time signals – The Fourier Series for discrete time Periodic Signals - Power Density Spectrum of Periodic Signals – Fourier transform for discrete time Aperiodic signal - Convergence of the Fourier Transform - Energy Density Spectrum of Aperiodic signals - Relationship of the Fourier Transform to the Z Transform.

UNIT - V

Discrete Fourier Transform:

Frequency domain sampling and reconstruction of discrete time signals – The Discrete Fourier transform – DFT as a linear transformation - Relationship of the DFT to the other transforms. Properties of DFT - Multiplication of two DFTs and Circular convolution - Linear filtering methods based on DFT - Frequency analysis of signals using the DFT – Discrete cosine transform - Computation of the Discrete Fourier Transform

Suggested Books

1. Oppenheim & Schaffer, , 1st edition, Digital Signal Processing, Prentice Hall India – 1995
2. Paulo S.R. Piniz, Eduardo A.B. De Silva and Sergio Netto, 2nd edition, 2010, Digital Signal Processing, Cambridge University Press
3. Rabiner & Gold, , 1st edition ,Theory and Applications of Digital Signal Processing, Prentice Hall India -1996.
4. Digital Signal Processing Video Prof. T.K. Basu IIT Kharagpur, <http://nptel.iitm.ac.in/video.php?subjectId=10810505520>.
5. Digital Signal Processing: Principles, Algorithms, and Applications by J. G. Proakis and D. G. Manolakis.
6. <https://www.sciencedirect.com/book/9780750689762/digital-signal-processing>.
7. <https://www.dspguide.com/pdfbook.htm>.

Course Objectives

- Computational physics may be broadly defined as 'the science of using computers to assist in the solution of physical problems, and to further physics research.
- Computers now play a role in almost every branch of physics like large scale
- Quantum mechanical calculations in nuclear, atomic, molecular and condensed matter physics, large scale calculations in such fields as hydrodynamics, astrophysics, plasma physics, meteorology and geophysics etc.
- The huge increase in the power of computers in recent years has made an impact on the role of computational physics.
- To use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.
- This paper gives idea about different types of computations involved in Physics, like curve fitting, interpolation, extrapolation, numerical calculations etc.

Course Outcomes (COs)

At the end of the course students should be able to:

1. The students programming tactics, numerical methods and their implementation like applying to problem in physics, including modeling of classical physics to quantum system as well as data analysis (Linear and non linear) will be improved.
2. Use analysis techniques for propagating error, representing data graphically. Create, solve and interpret basic mathematical tool.
3. independently program computers using leading-edge tools,
4. formulate and computationally solve a selection of problems in physics,
5. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.
6. Identify and describe the characteristics of various numerical methods.

UNIT - I**Curve Fitting**

The least squares method for fitting a straight line, parabola, power and exponential curves with the help of principle of least square fit.

UNIT - II**Interpolation**

Introduction to finite difference operators - Newton's forward and backward difference interpolation formulae - Lagrange's interpolation formula - Newton's divided difference formula with error term - interpolation in two dimensions - Cubic spline interpolation end conditions. Statistical tests - χ^2 - test and T-test.

UNIT - III

Numerical Differentiation and Integration

Numerical differentiation - errors in numerical differentiation - cubic spline method - finding maxima and minima of a tabulated function - Integration of a function with Trapezoidal Rule - Simpson's 1/3 and 3/8 Rule and error associated with each - Romberg's integration - Gaussian integration method - Monte Carlo evaluation of integrals - numerical double integration

Unit IV

Numerical Solution of Ordinary Differential Equations

Euler method - modified Euler method and Runge - Kutta 4th order methods - adaptive step size R-K method - predictor - corrector methods - Milne's method - Adam-Mouton method.

Numerical Solution of System of Equations

Gauss-Jordan elimination Method - Gauss-Seidel iteration method – Gauss elimination method and Gauss-Jordan method to find inverse of a matrix - Power method and Jacobi's method to solve eigenvalue problems.

Unit V

Numerical solutions of partial differential equations

Elementary ideas and basic concepts in finite difference method – Schmidt Method - Crank - Nicholson method - Weighted average implicit method - Concept of stability.

Suggested Books:

1. G. Shanker Rao, K. Keshava Reddy, Mathematical Methods, I.K. , 1st edition 2009, International Publishing House, Pvt. Ltd.
2. S.S. Sastry, 5th edition 2013, Introductory Methods of Numerical Analysis, PHI Pvt. Ltd.
3. Tao Pang, , 1st edition , 1997. An Introduction to Computational Physics, Cambridge University Press.
4. Gnuplot in action: understanding data with graphs, Philip K Janert, (Manning 2010)
5. Schaum's Outline of Theory and Problems of Programming with Fortran, S Lipsdutz and A Poe, 1986 Mc-Graw Hill Book Co.
6. Computational Physics: An Introduction, R. C. Verma, et al. New Age International Publishers, New Delhi (1999)
7. A first course in Numerical Methods, U.M. Ascher and C. Greif, 2012, PHI Learning
8. Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn., 2007, Wiley India Edition.
9. https://onlinecourses.nptel.ac.in/noc20_ph20/preview
10. <https://iopscience.iop.org/book/978-1-6817-4896-2>

Course Objectives

The objectives of this course are:

- Introduce physical concepts and mathematical tools used to describe surfaces, interfaces and thin films
- To develop an intuition for surface and thin film physical principles through plotting of functions using Maple
- Relate the mathematical results to practical applications and experiments Develop an appreciation of the mathematical basis for experimental techniques for deposition and analysis of thin films
- Understand physical phenomena that can be exploited for the deposition of thin films Demonstrate knowledge of different thin film deposition strategies.
- To analyse the behavior of the thin films by different characterization methods.
- To know the importance of use of thin films in application and research.

Course Outcomes (COs)

At the end of the course, the students will be able to understand

1. Discuss the differences and similarities between different vacuum based deposition techniques, evaluate and use models for nucleating and growth of thin films, asses the relation between deposition technique, film structure, and film properties, discuss typical thin film applications.
2. Motivate selection of deposition techniques for various applications.
3. The basic concepts about the thin film technology
4. The importance of use of thin films in application and research.
5. Acquire the knowledge of thin film preparation by various techniques.
6. Apply the knowledge to develop a device.

UNIT - I: Preparation of Thin Films

Spray pyrolytic process – characteristic feature of the spray pyrolytic process – ion plating – Vacuum evaporation – Evaporation theory – The construction and use of vapour sources – sputtering Methods of sputtering – Reactive sputtering – RF sputtering - DC planar magnetron sputtering.

UNIT - II: Thickness measurement and Nucleation and Growth in Thin Film

Thickness measurement: electrical methods – optical interference methods – multiple beam interferometry – Fizeau – FECO methods – Quartz crystal thickness monitor.
Theories of thin film nucleation – Four stages of film growth incorporation of defects during growth.

UNIT - III: Electrical properties of metallic thin films

Sources of resistivity in metallic conductors – sheet resistance - Temperature coefficient of resistance (TCR) – influence of thickness on resistivity – Hall effect and magneto resistance – Annealing – Agglomeration and oxidation.

UNIT - IV: Transport properties of semiconducting and insulating Films

Semiconducting films; Theoretical considerations - Experimental results – Photoconduction – Field effect thin films – transistors, Insulation films Dielectric properties – dielectric losses – Ohmic contacts – Metal – Insulator and Metal – metal contacts – DC and AC conduction mechanism .

UNIT - V: Optical properties of thin films and thin films solar cells

Thin films optics –Theory – Optical constants of thin films – Experimental techniques – Multilayer optical system – interference filters – Antireflection coating, thin films solar cells: Role, Progress, and production of thin solar cells – Photovoltaic parameter, thin film silicon (Poly crystalline) solar cells : current status of bulk silicon solar cells – Fabrication technology – Photo voltaic performance: Emerging solar cells: GaAs and CuInSe₂.

Suggested Book:

1. Meissel. L.T and R. Glang., 1978, Hand book of thin film technology, Tata McGraw Hill, New Delhi.
2. Anderson, J.C.1996 1st edition The use of thin films in physical investigation, Academic press
3. Berry,Hall and Harris.1968,illustrated edition Thin films technology,Van Nostrand Reinhold publishing
4. Chopra, K.L. 1st edition1969 Thin film Phenomena, Mc Graw hill
5. Chopra, K.L. and Das, S.R 1st edition2013 Thin films solar cells.springer
6. George Hass and others (Ed). Physics of thin films, vol. 12.Academic press 1970
7. Holland, L 1st edition 1966. Vacuum deposition of thin films.Weily Publication
8. <https://courses.lumenlearning.com/physics/chapter/27-7-thin-film-interference/>
9. <http://xrayweb.chem.ou.edu/notes/xtalgrow.html>
10. <https://www.dentonvacuum.com/what-is-thin-film-deposition/>

		Semester – II
		L T P C
15PHP204B	NANOSTRUCTURE AND CHARACTERIZATION	5 - - 4

Course Objectives

- This course introduces the fundamentals of nano-scale engineering and manufacturing.
- Current and future applications of nanostructured materials will be reviewed with respect to their impact in commercial products and technologies.
- The main physical forces controlling the nucleation and deposition of nanostructures will be presented allowing a better understanding of key design factors at the nano-scale.
- Well-established and novel synthesis/fabrication methods nanostructures will be critically discussed giving a broad overview of the state-of-the-art nano manufacturing processes.
- The course will cover recent breakthroughs and assess the impact of this burgeoning field.
- Specific nanofabrication topics include epitaxy, beam lithographies, self- assembly, biocatalytic synthesis, atom optics, and scanning probe lithography.
- The course consists of topics in fundamental nanoscale science, plus an overview of areas in nanotechnology.

Course Outcomes (COs)

At the end of the course, Students will understand and:

1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
2. Apply engineering and physics concepts to the nano-scale and non-continuum domain.
3. Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.
4. Design processing conditions to engineer functional nanomaterials.
5. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.
6. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.
7. Motivate selection of deposition techniques for various applications

UNIT - I

Low Dimensional Structures

Preparation of quantum nanostructures - size and dimensionality effects - size effects - potential wells - partial confinement - conduction electrons and dimensionality - Fermi gas and density of states - properties dependent on density of states - excitons - single-electron tunneling - Applications - infrared detectors - quantum dot lasers - superconductivity. Microelectromechanical Systems (MEMS) - Nanoelectromechanical Systems (NEMS) – Fabrication of nanodevices and nanomachines - Molecular and Supramolecular Switches.

UNIT - II

Carbon Nanostructures

Carbon Molecules - Nature of the Carbon Bond - New Carbon Structures - Carbon Clusters - Small Carbon Clusters - Carbon Nano tubes - Fabrication - Structure – Electrical Properties - Vibrational Properties – Mechanical Properties - Applications of Carbon Nano Tubes - Computers - Fuel Cells - Chemical Sensors - Catalysis – Mechanical Reinforcement - Field Emission and Shielding. Solid Disordered Nanostructures - Methods of Synthesis - Failure Mechanisms of Conventional Grain sized Materials – Mechanical Properties – Nano structured Multi layers -Electrical Properties – Porous Silicon - Metal Nano cluster - Composite Glasses.

UNIT - III

Thermal, Microscopic and Infrared Analysis

Thermal analysis – DTA, DSC and TGA – methodology of DTA, DSC and TGA and Instrumentation. Microscopy – Electron microscopy – Principles and instrumentation – resolution limit – scanning tunnelling microscopy – principles – scanning tunnelling microscope - SEM & TEM. Atomic force microscope

UNIT - IV

Instrumentation

IR spectrophotometers – Theory and Instrumentation- Applications. Fourier transform techniques – FTIR principles and instrumentation. Raman spectroscopy – Principles, Instrumentation and Applications. Microwave Spectroscopy -Instrumentation and Applications

UNIT - V

Mass Spectrometry, Resonance Spectroscopy

Mass Spectrometry - Principle – Instrumentation – Types of ions produced in a Mass spectrometer - Interpretation of Mass spectra – Applications. NMR – Principles and Instrumentation – Chemical shift - Spin-spin coupling - Applications of NMR - Electron spin resonance spectrometry – Theory of ESR –Instrumentation - Interpretation of ESR spectra - Applications.

Suggested Books:

1. Charles P. Poole, Jr. and Frank J. Owens, Ist edition 2003, Introduction to Nanotechnology, Wiley,
2. Cornelius T Leondes, MEMS/NEMS: micro electro mechanical systems/nano electromechanical systems Volume 1, Design Methods, Springer, (2006).

3. G. Chatwal & Sham Anand, 5th edition 2013 Instrumental methods of Chemical Analysis, Himalaya
4. Norman D Colthup, Lawrence H Daly and Stephen E Wiberley, 3rd edition 1990 Introduction to Infrared and Raman spectroscopy, Academic press, NY.
5. H.H. Willard, L.L. Meritt, J.A. Dean & F.A. Settle, 7th Instrumental methods of analysis, CBS Pub.
6. Mark C. Hersam (2006), "MSE 376 Nanomaterials," <https://nanohub.org/resources/1914>.
7. <https://nanohub.org/resources/7313>.
8. https://ocw.mit.edu/courses/mechanical-engineering/2-674-micro-nano-engineering-laboratory-spring-2016/lecture-notes/MIT2_674S16_Lec7Nano.pdf
9. <https://nptel.ac.in/courses/118/104/118104008/>

Course objective:

- It is an applied mathematics course designed to provide an introduction to the theory and basic concepts of Nonlinear Dynamics and Chaos.
- The course concentrates on simple models of dynamical systems, their relevance to natural phenomena.
- The main goal of the course is to introduce and describe nonlinear phenomena in physical systems by only using a minimum background in physics and mathematics.
- The computer exercises is mainly based on the use of MATLAB, but students will be free to use different software tools as desired.
- To make complex arguments that don't follow a pattern, and state the key components.
- Students will learn real-life examples illustrating the main ideas of the course (such as equilibria, stability, bifurcations)

Course Outcomes (COs)

At the end of the course, Students will understand and:

1. Students will be able to read a mathematical text and reproduce its main ideas.
2. Students will be able to make complex arguments that don't follow a pattern, and state the key components.
3. Will be able to give real-life examples illustrating the main ideas of the course (such as equilibria, stability, bifurcations)
4. Will be able to describe qualitatively the behaviour of the solution of a dynamical system without necessarily finding the exact solution.
5. Be able to prove existence of limit cycles using Poincaré Bendixon.
6. Identify gradient fields and use their special properties to obtain phase portrait.

UNIT - I**Basic Concepts**

What is Nonlinearity? Dynamical Systems: Linear and Nonlinear Systems - Linear Superposition Principle - Working Definition of Nonlinearity. Linear and Nonlinear Oscillators - Linear Oscillators and Predictability - Damped and Driven Nonlinear Oscillators - Forced Oscillations – Primary Resonance and Jump Phenomenon (Hysteresis) Secondary Resonances (subharmonic and superharmonic) Nonlinear Oscillations and Bifurcations

UNIT - II

Qualitative Features of non-linear systems

Autonomous and Nonautonomous Systems - Dynamical Systems as Coupled First-Order Differential Equations; Equilibrium Points ; Phase Space/Phase Plane and Phase Trajectories: Stability, Attractors and Repellers ; Classification of Equilibrium Points: Two-Dimensional Case - General Criteria for Stability; Limit Cycle Motion – Periodic Attractor- Poincaré–Bendixson Theorem. Higher Dimensional Systems - Lorenz Equations ; More Complicated Attractors - Torus - Quasiperiodic Attractor - Poincaré Map – Chaotic Attractor ; Dissipative and Conservative Systems -Hamiltonian Systems

UNIT - III

Chaos in Dissipative Systems

Bifurcations and Onset of Chaos in Dissipative Systems: Some Simple Bifurcations- Saddle-Node Bifurcation -The Pitchfork Bifurcation - Transcritical Bifurcation - Hopf Bifurcation ; Discrete Dynamical Systems ; The Logistic Map - Equilibrium Points and Their Stability – Periodic Solutions or Cycles -Period Doubling Phenomenon - Onset of Chaos – Lyapunov Exponent - Bifurcation Diagram - exact Solution at $a = 4$

UNIT - IV

Logistic Map: A Geometric Construction of the Dynamics – Cobweb Chaos in Dissipative Nonlinear Oscillators and Criteria for Chaos: Bifurcation Scenario in Duffing Oscillator - Period Doubling Route to Chaos - Intermittency Transition - Quasiperiodic Route to Chaos - Strange

Nonchaotic Attractors (SNAs) ; Lorenz Equations - Period Doubling Bifurcations and Chaos ; Necessary Conditions for Occurrence of Chaos - Continuous Time Dynamical Systems - Discrete Time Systems

UNIT - V

Chaos in Conservative Systems

Poincaré Cross Section ; Possible Orbits in Conservative Systems – Regular Trajectories - Irregular Trajectories - Canonical Perturbation Theory: Overlapping Resonances and Chaos; Hénon–Heiles System – Equilibrium Points - Poincaré Surface of Section of the System - Numerical Results; Periodically Driven Undamped Duffing Oscillator ; The Standard Map - 98

Linear Stability and Invariant Curves - Numerical Analysis: Regular and Chaotic Motions; Kolmogorov–Arnold–Moser Theorem (qualitative ideas only).

Suggested Books

1. M.Lakshmanan & S. Rajasekar, 1st edition 2003, Nonlinear dynamics: integrability, chaos, and patterns, Springer Verlag,
2. N. Kumar, 1st edition 1999, Deterministic Chaos, Universities Press.
3. R.C. Hilborn, 2nd edition 2002, Chaos and Nonlinear Dynamics, Oxford University Press.
4. G.L. Baker, and J.P. Gollub, 2nd 1996 Chaotic Dynamics: An Introduction, CUP.
5. H.G. Schuster, 4th edition 2005 Deterministic Chaos, Wiley, N.Y.
6. Chaos : Introduction to dynamical systems by K. T. Alligood, T. D. Sauer and J. A. Yorke

7. <https://ocw.mit.edu/courses/mathematics/18-385j-nonlinear-dynamics-and-chaos-fall-2004/lecture-notes/>
8. <https://ocw.mit.edu/courses/mathematics/18-385j-nonlinear-dynamics-and-chaos-fall-2004/lecture-notes/>
9. https://www.ioc.ee/~dima/YFX1520/LectureNotes_1.pdf

Semester – II

L T P C

5 - - 4

15PHP204D

QUANTUM FIELD THEORY

Course objective:

- The course gives an understanding of the Standard Model of particle physics, which describes the elementary particles and their interactions.
- To understand the basic concepts in quantum field theory and its importance in electromagnetic fields.
- Student will use effective field theory techniques to develop models at large scales
- Student will get knowledge on Path Integral Quantization of Gauge Fields and their applications.
- They can describe the origin of particles and forces.
- To apply Feynman rules to calculate probabilities for basic processes with particles.

Course Outcomes (COs)

Upon successful completion, students will have the knowledge and skills to:

1. Describe the reasons for the failure of relativistic quantum mechanics, such as the causality problem, and the need for quantum field theory
2. Describe the origin of particles and forces
3. Analyse the statistical distributions of identical particles and the repulsive/attractive nature of the forces as a function of spins
4. Apply Feynman rules to calculate probabilities for basic processes with particles (decay and scattering)
5. Obtain classical and/or non-relativistic limits of fully quantum and relativistic models, and identify the relativistic origin of effects such as the spin-orbit interaction
6. Use effective field theory techniques to develop models at large scales

UNIT - I

Path Integrals and Quantum Mechanics

Review of single particle relativistic wave equations – Klein- Gordon equation, Dirac equation, Maxwell and Proca equations; Path integral formulation of quantum mechanics; perturbation theory and the S matrix; Coulomb scattering; Functional calculus: differentiation, generating functional for scalar fields. Functional integration

UNIT - II

Path Integral Quantization of Scalar and Spinor Fields

Free particle Green's functions, Generating functional for interacting field; ϕ^4 theory – generating functional, 2-point function, 4-point function; generating functional for connected diagrams; fermions and functional methods, The S – matrix and reduction formula, pion-nucleon scattering amplitude, scattering cross-section

UNIT - III

Path Integral Quantization of Gauge Field Fields

Propagators and gauge conditions in QED; Non-abelian gauge fields and Faddeev - Popov method; Self-energy operator and vertex functions; Ward – Takahashi identities in QED, Becchi – Rouet – Stora transformations; Slavnov – Taylor identities.

UNIT - IV

The Weinberg – Salam Model

Field theory vacuum; the Goldstone theorem; Spontaneous symmetry breaking of gauge symmetries; superconductivity; Higgs boson; The Weinberg – Salam model; Experimental confirmation of the models

UNIT – V

The EPR Experiment And Bell's Theorem:

The EPR argument, The BKS theorem, The hidden variable theories, The Bell's theorem and its proof, Tests of Bell's inequalities, Alain Aspect's experiments.

Suggested Books

1. Lewis H. Ryder, Quantum Field Theory, 2nd Edn, Cambridge University Press, (1996)
2. An Introduction To Quantum Field Theory (Frontiers in Physics) Hardcover – 2 October 1995, by Michael E. Peskin (Author), Daniel V. Schroeder.
3. [https://plato.stanford.edu/entries/quantum-field-theory/#:~:text=Quantum%20Field%20Theory%20\(QFT\)%20is,matter%20physics%20and%20statistical%20mechanics](https://plato.stanford.edu/entries/quantum-field-theory/#:~:text=Quantum%20Field%20Theory%20(QFT)%20is,matter%20physics%20and%20statistical%20mechanics).
4. <https://www.damtp.cam.ac.uk/user/tong/qft/qft.pdf>
5. <https://web.physics.ucsb.edu/~mark/ms-qft-DRAFT.pdf>
6. Quantum Field Theory, 2nd Edition, Ryder Lewis H.

Course Objectives

- The aim of this course focuses to enable the students to understand optics and non-linear optics concepts in physics
- Optoelectronics is the science that deals with designing devices that can detect or emit light in any part of the spectrum.
- This paper gives an introduction to semiconductors and light.
- The application of optics in electronics, usage of optical waves in communications, optical fibers are explained in this paper.
- The term optoelectronics is a specific discipline of electronics that focuses on light-emitting or light-detecting devices.
- Optoelectronics is the communication between optics and electronics which includes the study, design and manufacture of a hardware device that converts electrical energy into light and light into energy through semiconductors.

Course Outcomes (COs)

1. The students are conversant with the application of optical properties and processes in semiconductor optical sources.
2. The students understand the operation of LEDs and lasers.
3. The students are familiar with the structures and performance of LEDs and lasers.
4. Apply the knowledge of laser in holography
5. Gain the knowledge in Fourier optics and Fourier transforming properties of lenses
6. Understand the concepts of nonlinear optics and harmonic generations.

UNIT - I**Semiconductor Science and Light Emitting Diodes**

Semiconductor energy bands - semiconductor statistics – extrinsic semiconductors – compensation doping – degenerate and non degenerate semiconductors – energy band diagrams in applied field - direct and indirect bandgap semiconductors, - p-n junction principles - open circuit- forward and reverse bias – depletion layer capacitance – recombination life time – p-n junction band diagram - open circuit - forward and reverse bias – light emitting diodes – principles - device structures - LED materials, heterojunction high intensity LEDs – double heterostructure – LED characteristics and LEDs for optical fiber communications - surface and edge emitting LEDs.

UNIT - II

Fiber Optics

Symmetric planar dielectric slab waveguide – waveguide condition – single and multimode waveguides – TE and TM modes – modal and waveguide dispersion in the planar waveguide – dispersion diagram – intermodal dispersion – intramodal dispersion – dispersion in single mode fibers – material dispersion – waveguide dispersion – chromatic dispersion – profile and polarization dispersion – dispersion flattened fibers - bit rate and dispersion – optical and electrical bandwidth – graded index optical fiber - light absorption and scattering – attenuation in optical fibers.

UNIT - III

Laser Principles

Laser oscillation conditions - diode laser principles - heterostructure laser diode – double heterostructure – stripe geometry – buried heterostructure – gain and index guiding - laser diode characteristics – laser diode equation - single frequency solid state lasers – distributed feedback –quantum well lasers - vertical cavity surface emitting laser - optical laser amplifiers.

UNIT - IV

Photodetectors and Photovoltaics

Principle of p-n junction photodiode - Ramo's theorem and external photocurrent - absorption coefficient and photodiode materials – quantum efficiency and responsivity - PIN-photodiode – avalanche photodiode – phototransistor - photoconductive detectors and photoconductive gain – noise in photo-detectors – noise in avalanche photodiode - solar energy spectrum - photovoltaic device principles – I-V characteristics - series resistance and equivalent circuit - temperature effects - solar cell materials, device and efficiencies

UNIT - V

Optoelectronic Modulators

Optical polarization, birefringence, retardation plates, electro-optic modulators – Pockels effect - longitudinal and transverse electro-optic modulators, Kerr effect, Magneto-optic effect, acousto-optic effect – Raman Nath and Bragg-types.

Non-linear optics

Wave propagation in an anisotropic crystal - polarization response of materials to light - second order non-linear optical processes – second harmonic generation - sum and frequency generation, optical parametric oscillation - third order non-linear optical processes - third harmonic generation - intensity dependent refractive index - self-focusing - non-linear optical materials, phase matching - angle tuning - saturable absorption - optical bistability - two photon absorption.

Suggested Books

1. Ajoy Ghatak & Thyagarajan 2nd edition, 2013, Laser Fundamentals and applications Laxmi Publications (P) Ltd
2. William T. Silfvast, Laser fundamentals, CUP 2nd Edn. 2009.
3. Pallab Bhattacharya, 2nd edition Semiconductor optoelectronic devices: Pearson(2008)

4. Jasprit Singh, 1st edition 2014 Optoelectronics: An introduction to materials and devices, Mc Graw Hill International Edn.
5. A. Yariv and P. Yeh, 1st edition 2003 Optical waves in crystals: Propagation and Control of Laser Radiation, John Wiley and Sons Pub.
6. <https://www.elprocus.com/optoelectronics-devices-with-their-applications/>
7. <https://www.allaboutcircuits.com/technical-articles/an-introduction-to-optoelectronics/>
8. <https://www.rp-photonics.com/optoelectronics.html>

Course Objective

- To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
- To learn the usage of optical systems for various measurements.
- Apply the analytical techniques and graphical analysis to the experimental data.
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.
- To make the students understand coherence between theoretical and practical measurement.
- The course as a whole outlines some ways of thinking about analog circuits that hopefully will help to develop intuition.
- To design, fabricate and test small electronic circuit.

Course Outcomes (COs)

1. The course is designed to train the students so that they can efficiently handle various instruments.
2. Students will verify laws studied in the different theory course.
3. Students will measure different properties of materials.
4. Gain the knowledge in quantization of electromagnetic fields.
5. Analyze the characteristics of oscillators and wave shaping circuits
6. Understand the basic concepts of amplifiers and operational amplifiers

ANY TWELVE EXPERIMENTS

1. Fabry – Perot interferometer – Determination of wavelength.
2. Arc spectra – Copper and Iron
3. Determination of V-I characteristics of a solar cell.
4. Susceptibility – Quinke's and Guoy's method
5. Hall Effect
6. Measurement of resistivity and conductivity of dielectric using Four-probe apparatus.
7. Compressibility of a liquid – Ultrasonic Interferometer, and verify with Ultrasonic Diffractometer
8. Determination of Stefan's constant.

9. Kelvin's double bridge – To measure low resistance.
10. Characteristics and an application of SCR
16. Schmidt trigger
17. Op – amp – V to I, I to V converter
18. Op-amp Log and Antilog amplifier.
19. Op – amp – Analog computation second order differential equation
20. Op – amp comparator – Zero crossing detector, Window detector, time marker

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut
4. Gupta S.L. and V.Kumar, 2002, Practical Physics, 25th Edition, Pragathi Prakashan, Meerut

Course Objectives

- The aim of this course is to make the students to understand the concepts of quantum physics and their applications in microscopic systems
- This is a continuation of Quantum Mechanics – I.
- More detailed study of problems like scattering problem, relativistic quantum mechanics, quantum electrodynamics etc, are added in this paper.
- To make the students capable of analyzing theoretical problems like interaction of particles, scattering of particles etc.
- to understand and evaluate modern research utilizing quantum theory in condensed matter, nuclear and particle physics.
- To know the basic knowledge on Eigen values and Eigen functions.

Course Outcomes (COs)

1. Students will get the knowledge of non-relativistic and relativistic quantum mechanics including time-dependent perturbation theory, scattering theory, relativistic wave equations, and second quantization.
2. Students will be able to understand concepts and to perform calculations of scattering of particles.
3. Students will be able to understand and evaluate modern research utilizing quantum theory in condensed matter, nuclear and particle physics.
4. Acquire the basic knowledge on eigen values and eigen functions
5. Apply the Schrodinger wave equation to get eigen values of bound systems Understand the matrix formulation in quantum mechanics
6. Acquire the basic knowledge on angular momentum of quantum mechanical systems

UNIT - I

Angular momentum: Angular momentum operators – Angular momentum commutation relations – Eigen values and Eigen functions of L^2 and L_z – General angular momentum – Eigen values of J^2 and J_z – Ladder operators (J_+ and J_-) – Angular momentum matrices – Matrices for J^2 , J_z , J_+ , J_- , J_x and J_y – Spin angular momentum – Spin $1/2$ systems – Spin vectors for spin $1/2$ systems – Addition of angular momentum – Clebsh-Gordan coefficients.

UNIT -II

Scattering: Scattering cross-section – Scattering amplitude – Partial waves – Scattering by a central potential: partial wave analysis – Significant number of partial waves – Scattering by an attractive square-well potential – Briet-Wigner formula – Scattering length – Expression for phase shift – Integral equation – The Born approximation – Scattering by screened coulomb potential – Validity of Born approximation - Laboratory and center of mass co-ordinate systems.

UNIT - III

Many Electron Problem: Indistinguishable particles, Pauli principle – Inclusion of spin – Spin functions for two electrons – Spin functions for three electrons – The Helium atom – Central field approximation – Thomas-Fermi model of the atom – Hartree equation – Hartree-Fock equation – Molecular orbital theory: Hydrogen molecule ion H_2^+ - Valence bond theory – Heitler-London theory of hydrogen molecule.

UNIT - IV

Relativistic quantum mechanics: Klein-Gordon equation – Interpretation of the Klein-Gordon equation – Particle in a coulomb field – Dirac's equation for a free particle – Dirac matrices – Covariant form of Dirac equation – Probability density – Negative energy states – Spin of the Dirac particle – Magnetic moment of the electron – Spin-orbit interaction – Radial equation for an electron in a central potential – Hydrogen atom – Lamb shift.

UNIT - V

Field theory: Introduction – Classical approach to field theory – Relativistic Lagrangian and Hamiltonian of a charged particle in an electromagnetic field – Field: Lagrangian and Hamiltonian formulations – Quantum equation for the field – Second quantisation – Quantisation of non-relativistic Schroedinger equation – Creation, annihilation and number operators.

Suggested Book

1. Aruldas. G, 2008, Quantum Mechanics, 2nd Edition, Prentice-Hall of India, NewDelhi.
2. Gupta, Kumar and Sharma, 2002, Quantum Mechanics, 22nd Edition, Jai Prakash Nath & Co, Meerut.
3. Satya Prakash, 2003, Quantum Mechanics, New Edition Kedar Nath & Ram Nath & Co, Meerut.
4. Leonard Schiff, 1968, Quantum Mechanics, 3rd Edition, McGraw Hill International, Auckland.
5. Engen Merzbacher, 1997, Quantum Mechanics, 3rd Edition, Wiley, Weinheim.
6. Mathews. P.M. and K. Venkatesan, 2nd edition 2013, Textbook of Quantum Mechanics, McGraw Hill International, Weinheim.
7. Chatwal R.G. and Sk. Anand, 4th editin 2004, Quantum Mechanics, Himalaya Publishing House, New Delhi
8. Thangappan. V. K., 2nd edition 1993, Quantum Mechanics, Tata McGraw Hill, New Delhi
9. [https://plato.stanford.edu/entries/quantum-field-theory/#:~:text=Quantum%20Field%20Theory%20\(QFT\)%20is,matter%20physics%20and%20statistical%20mechanics.](https://plato.stanford.edu/entries/quantum-field-theory/#:~:text=Quantum%20Field%20Theory%20(QFT)%20is,matter%20physics%20and%20statistical%20mechanics.)
10. <https://www.damtp.cam.ac.uk/user/tong/qft/qft.pdf>
11. <https://web.physics.ucsb.edu/~mark/ms-qft-DRAFT.pdf>
12. Quantum Field Theory, 2nd Edition, Ryder Lewis H.

Course Objectives

- Laser is a versatile tool with applications in almost all fields from medical to astronomy, communications, welding, cutting etc.
- This paper explains the characteristics of lasers, different types of lasers and their construction.
- Applications of lasers in different fields are also explained.
- To give exposure to students about the characteristics of different lasers, their fabrication techniques, applications etc.
- To classify fibers as single-mode, multimode step index and multi-mode graded index.
- To understand the concept of different type of lasers and their applications.

Course Outcomes (COs)

Students can understand

1. Acquire fundamentals and principles of Laser action CO2: Understand the basic concepts of different types of lasers
2. Absorption and spontaneous and stimulated emission in two level system, the effects of homogeneous and inhomogeneous line broadening, and the conditions for laser amplification.
3. operations and basic properties of the most common laser types, He-Ne, Argon-ion, and carbon-dioxide, ruby, titanium sapphire, neodymium YAG and glass, knowledge of other main laser types.
4. Classify fibers as single-mode, multimode step index and multi-mode graded index.
5. Describe modes in multimode fibers and mode field parameter in single-mode fibers.
6. They are able to explain the characteristics of lasers, different types of lasers and their construction.

Unit- I

Laser Characteristics: Spontaneous and stimulated emission, Einstein's quantum theory of radiation, theory of some optical processes, coherence and monochromaticity, kinetics of optical absorption, line broadening mechanism, Basic principle of lasers, population inversion, laser pumping, two & three level laser systems, resonator, Q-factor, losses in cavity, threshold condition, quantum yield.

Unit – II

Laser Systems: Solid state lasers- the ruby laser, Nd:YAG laser, ND: Glass laser, semiconductor lasers – features of semiconductor lasers, intrinsic semiconductor lasers, Gas

laser - neutral atom gas laser, He-Ne laser, molecular gas lasers, CO₂ laser, Liquid lasers, dye lasers and chemical laser.

Unit-III

Advances in laser Physics : Production of giant pulse -Q-switching, giant pulse dynamics, laser amplifiers, mode locking and pulling, Non-linear optics, Harmonic generation, second harmonic generation, Phase matching, third harmonic generation, optical mixing, parametric generation and self-focusing of light.

Unit – IV

Multi-photon processes; multi-quantum photoelectric effect, Theory of two-photon process, three- photon process, second harmonic generation, parametric generation of light, Laser spectroscopy : Rayleigh and Raman scattering, Stimulated Raman effect, Hyper-Raman effect, Coherent anti-stokes Raman Scattering, Photo-acoustic Raman spectroscopy.

Unit – V

Laser Applications – ether drift and absolute rotation of the Earth, isotope separation, lasma, thermonuclear fusion, laser applications in chemistry, biology, astronomy, engineering and medicine. Communication by lasers: ranging, fiber Optics Communication, Optical fiber, numerical aperture, propagation of light in a medium with variable index, pulse dispersion.

Suggested Books:

1. Ajoy Ghatak & Thyagarajan 2nd edition, 2013, Laser Fundamentals and applications Laxmi Publications (P) Ltd
2. Laud, B.B.: 1st Edition 1996 Lasers and nonlinear optics, New Age Int. Pub.
3. Thyagarajan, K and Ghatak, A.K.: 2nd Edition 1981: Lasers theory and applications Plenum press,
4. Ghatak, A.K. and Thyagarajan, K : 2nd edition 1999 Optical electronics Cambridge Univ. Press
5. Seigman, A.E.: Lasers (Oxford Univ. Press 1986 New edition)
6. Maitland, A. and Dunn, M.H.: 1st edition 1969 : Laser Physics N.H. Amsterdam.
7. Hecht, 1st edition 1986 Laser Guide book McGraw Hill, NY.
8. Demtroder, W. : Laser Spectroscopy (Springe series in chemical physics vol.5, Springe verlag, Berlin, 1981).
9. Harper, P.G. and Wherrett B.S. (Ed.): Non-linear-optics (Acad. press, 1977).
10. https://www.rp-photonics.com/laser_applications.html
11. <https://wiki.metropolia.fi/display/Physics/Laser+technology%2C+definition%2C+applications%2C+and+challenges#:~:text=Lasers%20are%20powerful%20beams%20of%20electromagnetic%20radiation.&text=Applications%20in%20Medical%20applications%2C%20welding,%2C%20barcode%20scanners%2C%20laser%20cooling.>
12. <https://www.physics-and-radio-electronics.com/physics/laser/applications of lasers.html>

Course Objectives

- This paper gives an insight into the theoretical and practical aspects of spectroscopy. it is used as a tool for non-destructive testing of samples. It is important to know the physical aspects of spectroscopy.
- The major objectives of this course are to integrate theory and practice and to bring together different branches of both Academic studies and Industrial Research through the presentation of critical aspects of modern Spectroscopy.
- The course will provide a valuable theoretical introduction and an overview of modern topics in spectroscopy, which are of current interest and importance in Semiconductor Industry and Biomedicine.
- To give an understanding of wide range of techniques including optical Nearfield spectroscopy, X-ray, Raman, and FTIR spectroscopy.
- To introduce optical spectroscopy methods that are widely used in physics, chemistry and biological sciences
- To teach the basic aspects of nuclear magnetic resonance (NMR) spectroscopy.

Course Outcomes

After successfully completed course, student will be able to

1. Student shows interest in the phenomenon of the interaction of light with matter in terms of the relationship with the molecular structure
2. Understand quantum chemical principles
3. Student will know the basic physical chemistry law that govern molecular spectroscopy
4. Student will know basic information on molecular methods (IR, Raman, UV-VIS, NMR, EPR)
5. Student will be able to select molecular spectroscopy methods suitable for solving given scientific problem
6. Student will be able to analyze results of measurements using molecular spectroscopy

UNIT- I

Atomic spectra: Hydrogen spectra – Angular momentum – Larmor precession – Spin-orbit interactions - Spectra of alkali metals – Energy level and spectral transitions of Helium - Normal Zeeman effect – Anomalous Zeeman effect – Paschen back effect – Inference of nuclear spin - Hyperfine structure of spectral lines – Stark effect – Characteristic X-ray spectra

Microwave spectra: Classification of molecules – Interaction of radiation with rotating molecule – Rotational spectra of rigid diatomic molecule – Isotopic effect – Non-rigid rotator – Linear, symmetric and asymmetric top molecules – Quadrupole hyperfine interaction – Microwave spectrometer

UNIT- II

I.R spectroscopy: Practical aspects – Theory of I.R rotation vibration spectra of gaseous diatomic molecules – applications of I.R spectroscopy – Basic principles of F.T.I.R spectroscopy

Raman spectroscopy: Classical and Quantum theory of Raman effect - Rotation vibration Raman spectra of diatomic and polyatomic molecules – Applications - Laser Raman spectroscopy - Surface Enhanced Raman Scattering.

UNIT -III

Electronic spectra: Electronic excitation of diatomic species - Vibrational analysis of diatomic molecules - Deslandre's table - Intensity distribution Frank Condon principle - Rotational structure of electronic bands - Resonance and Normal Fluorescence – Intensities of transitions - Phosphorescence population of triplet state and intensity- Experimental methods - Applications of Fluorescence and phosphorescence.

UNIT- IV

NMR Spectroscopy: Quantum mechanical and Classical description - The Bloch equation - Relaxation process - the experimental technique - Principle and working of high resolution NMR Spectrometer - Chemical shift – Applications of NMR

NQR Spectroscopy: Fundamental requirements - General principle - Experimental detection of NQR frequencies – Interpretation and chemical explanation of NQR spectroscopy – Applications of NQR

UNIT - V

ESR Spectroscopy: Basic principles of ESR - Experiments – ESR spectrometer reflection cavity and microwave bridge – ESR spectrum hyperfine structure - Study of free radicals – Applications of ESR

MOSSBAUER Spectroscopy: The Mossbauer effect- the recoilless emission and absorption of - Mossbauer spectrum – Experimental methods- Hyperfine interaction - Chemical Isomer Shift – Magnetic hyperfine and electric quadrupole interaction.

Suggested Books

1. Aruldas. G., 2008, Molecular Structure and Spectroscopy, 2nd Edition, Prentice Hall of India, New Delhi
2. Straughan.B.P. and S. Walker, 1976, Spectroscopy: Volume 1, Chapman and Hall Ltd, London. (for Unit I)
3. Straughan.B.P. and S. Walker, 1976, Spectroscopy: Volumes 2 & 3, Chapman and Hall Ltd, London.
4. Collen N.Banwell, 4th edition 1994, Fundamentals of Molecular Spectroscopy, Tata McGraw Hill, New Delhi.
5. Chatwall and Anand, 2004, Atomic and Molecular Spectroscopy, 5th Edition, Himalaya Publishing House, New Delhi.

6. Gordon M Barrow,1962, Introduction to Molecular Spectroscopy, McGraw-Hill Inc.,US
7. <https://nptel.ac.in/courses/104101099/>
8. <https://nptel.ac.in/courses/104102113/>

Semester III

L T P C

15PHP304A DIGITAL ELECTRONICS AND MICROPROCESSOR

4 - - 4

Course Objectives

- This paper is intended to give an insight into the theory and applications of digital electronics, design of circuits with digital devices, details of microprocessor and its applications.
- The objective of this paper is to give information about different analog electronic circuits and their applications.
- To understand operation of semiconductor devices Digital electronics is very important in present day life due to its applications in almost all fields of life.
- Any signals stored in memory are first digitized.
- It is important to have knowledge about digital electronics.
- To implement mini projects based on concept of electronics circuit concepts.

Course Outcomes (Cos)

At the end of the course, Students can

1. Acquire the basic knowledge of digital logic levels and application of digital electronics circuits.
2. Perform the analysis and design of various digital electronic circuits.
3. Acquired knowledge about Microprocessors and its need.
4. Ability to identify basic architecture of different Microprocessors.
5. Foster ability to write the programming using 8085 microprocessor.
6. Foster ability to understand the internal architecture and interfacing of different peripheral devices with 8085 Microprocessor.

UNIT I

Flip Flops : SR, JK, JK Master Slave, T Flip flop & D Flip Flop (Symbol and Truth table) Registers (Types, shift operations) - Counters (Types, Designing of MOD 5 synchronous Counter, Construction and truth table - verification of MOD 16 Asynchronous UP, Down counter) - Multiplexer And demultiplexer (16:1 and 1:16 description and truth table verification) - Decoders and encoders (Definitions, Seven segment decoder, decimal to BCD encoder)

UNIT II

Special Function ICs: Timer IC 555 (Block diagram, pin description) , Application as Astable, monostable, bistable multivibrator - VCO IC 566 (Block diagram and pin

description) - PLL IC 565 (Block diagram and pin description) - Fixed voltage Regulator ICs 7800 and 7900 series - Voltage Regulator IC 723 (description, designing for low and high voltage)

UNIT III

Microprocessor: Microprocessor Architecture, Pin out configuration of 8085-bus organization and timings –address bus, data bus, multiplexing address/data bus and control and status signal, Interrupts: maskable and non-maskable interrupt(concept),8085 interrupt.

UNIT IV

Programming Model of 8085 : Instruction set-Data transfer ,arithmetic, logical and branch instruction-Addressing modes -16 bit data transfer and memory related instructions-stack and subroutine instructions.

Simple Program: 8 bit addition-subtraction-multiplication- finding largest and smallest number, ascending and descending order, 16 bit addition,

UNIT V

Interfacing Peripherals and Applications: Interfacing concepts-peripheral I/O instructions-Interfacing programs- Data Converters, LED interfacing, stepper motor interfacing, Hex Keyboard Interfacing.

Text Book:

Ramesh Gaonkar,6th edition 2013 Microprocessor Architecture, Programming and Application with the 8085 ,Prenam international (P) Ltd.

Suggested Book

1. Floyd, 2003, Digital Fundamentals, 8th Edition, Pearson education, New Delhi.
2. Ramesh Gaonkar 6th edition 2013 Microprocessor Architecture, Programming and Applications with 8085 ,PENRAM International P Ltd
3. Malvino and Leach, 1983, Digital Principles and Applications, 3rd Edition, Tata McGrawHill, New Delhi.
4. Aditya P. Mathur, 1995, Introduction to Microprocessor, 3rd Edition, Tata McGrawHill, New Delhi.
5. Morris Mano. M, 1st 2002, Digital Logic and Computer Design, Prentice Hall, New Delhi.
6. Paul M.Julich and John Hilburn, 1st 1987, Microcomputers / Microprocessors, Prentice Hall of India, New Delhi.
7. Fundamentals of Digital Circuits, A. Anand Kumar, 2nd Edition, 2009, PHI Learning Pvt. Ltd.
8. OP-AMP & Linear Digital Circuits, R.A. Gayakwad, 2000, PHI Learning Pvt. Ltd.
9. <https://www.allaboutcircuits.com/textbook/direct-current/chpt-9/analog-and-digital-signals/>
10. <https://circuitglobe.com/digital-instrument.html>
11. <http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147076>.

		Semester III
		L T P C
15PHP304B	PHYSICS OF MATERIALS	4 - - 4

Course Objectives

- This course discusses the properties of materials that engineers need to be aware of.
- This includes mechanical, thermal, electrical, chemical and optical properties.
- All these properties are controlled by the microscopic structure of these materials, and this course will cover the quantum mechanics, atomic physics and thermodynamics that control what materials can do.
- The course will focus on the structure and properties of crystalline materials and on how these properties can be manipulated to create more capable materials.
- To describe a polymer's elastic behavior above and below the glass transition.
- To value and select suitable materials for different practical applications;

Course Outcomes (Cos)

Upon successful completion, students will have the knowledge and skills to:

1. Describe the mechanical, electrical, thermal and optical properties of materials;
2. Analyse the importance of material properties for a wide variety of engineering situations;
3. Evaluate and select suitable materials for different practical applications;
4. Recall typical values of the properties of common practical materials;
5. Understand the micro-physics and chemistry responsible for material properties, and analyse how they can be modified.
6. Be able to describe a polymer's elastic behavior above and below the glass transition.

Unit I

Vacuum Technology: Basic ideas about vacuum, Throughput, Conductance, Vacuum pumps : rotary pump, diffusion pump, ion pump, molecular pump, cryopump, Vacuum gauges : pirani gauge, penning gauge, ionization gauge (hot cathode ionization gauge, cold cathode ionization gauge).

Unit II

Thin Film and growth process, Influence of nature of substrate and growth parameters (substrate temperature, thickness, deposition rate). Thin film deposition, techniques: thermal evaporation, chemical vapor deposition, spray pyrolysis, sputtering. Epitaxial growth, Thin film thickness measurement techniques: film resistance method, optical method, microbalance method.

Unit III

Polymers, Ceramics, Liquid Crystals and Nanophase Materials: Characteristics, Application and Processing of polymers : Polymerization, Polymer types, Stress- Strain behaviour, melting and glass transition, thermosets and thermoplasts. Characteristics, Application and Processing of Ceramics, glasses and refractories, Liquid Crystals : classification and applications, Nanophase materials: synthesis and applications.

Unit IV

Synthesis of Nanomaterials: Introduction, particle size, particle shape, surface interaction of nanoparticles, DLVO theory, Classical nucleation theory for cluster formation. Physical methods: inert gas condensation, Chemical vapour deposition, sputtering , Arc discharge, PLD, mechanical milling, MBE, Electrodeposition, laser pyrolysis. Chemical methods: Introduction, Sol-gel process, Hydrothermal process, Solvothermal synthesis, Metal reduction method, Photochemical synthesis.

Unit V

Characterization of Materials

Powder and single crystal X-ray diffraction, Transmission electron microscopy, Scanning electron microscopy, Low Energy Electron Diffraction (LEED), Auger electron microscopy, Atomic force microscopy.

Suggested Books:

1. A. Roth 3rd edition 1990 Vacuum Technology: A. Roth-North Holland Pub. Co.
2. K.L. Chopra Reprint 1979 Thin Film Phenomena-R E Krieger Pub. Co.
3. K.L. Chopra 1st edition 1989 High Temperature Superconductors Subramanyam-Wiley,
4. W.D. Callister 6th edition 2002, WIE Material Science and Engg – Introduction Wiley,
5. J.C. Ying- 1st edition 2001 Nanostructured Materials: -Wiley-. Academic Press,
6. J.M. Walls 1st edition 1989, Methods of Surface Analysis- CUP Archive.
7. <https://nptel.ac.in/courses/113/106/113106039/>

		Semester III
		L T P C
15PHP304C	REACTOR PHYSICS	4 - - 4

Course Objectives

- The aim of the basic course on "Reactor Physics for reactor operators" is to provide the reactor operators with a basic understanding of the main concepts relevant to nuclear reactors.
- Seen the education level of the participants, mathematical derivations are simplified and reduced to a minimum, but not completely eliminated.
- The goal is for the students to develop a basic knowledge of the methods employed in veterinary hospitals and clinics to protect employees and the veterinarians themselves against radiation exposure.
- Discuss the difference between a rotating anode and a fixed anode.
- Discuss which types of machines today have fixed and which have rotating anodes.

Course Outcomes (Cos)

Upon successful completion, students will have the knowledge and skills to:

1. express the basic concepts of nuclear physics.
2. an express the radioactive decays
3. able to express Successive Decays
4. explain nuclear reactions
5. explain nuclear fission
6. Understand the guiding principles of reactor safety and the lessons learned from past accidents.

Unit I

Interaction of Neutrons with Matter in Bulk Transport and diffusion equations, transport mean free path, solution of diffusion equation for a point source in an infinite medium and for an infinite plane source in a finite medium, extrapolation length and diffusion length - the albedo concept.

Unit II

Moderation of Neutron Mechanics of elastic scattering, average logarithmic energy decrement, slowing down power and moderating ratio of a medium. Fermi's age theory, solution of age equation for a point source of fast neutrons in an infinite medium, slowing down length, Fermi age.

Unit III

Theory of Homogeneous Bare Thermal Reactor Critical equation, material and geometric bucklings, Neutron balance in a thermal reactor, four factor formula, typical calculations of critical size and composition in simple cases.

Unit IV

Homogeneous Natural Uranium Reactors: Advantages and disadvantages of heterogeneous assemblies, various types of reactors and a brief discussion of their design features.

Unit V

Problems of Reactor Control and Maintenance Role of delayed neutrons, Inhour formula, temperature effects, fission product poisoning, use of coolants and control rods Power Reactors : Fast breeder reactors, dual purpose reactors, concept of fusion reactors.

Text Books

1. The elements of Nuclear reactor Theory: Glasstone & Edlund-Vam Nostrand, 1st edition 1952.
2. Raymond L Murray 5th edition 2001 Nuclear energy – An introduction to concept systems and applications of nuclear process.

		Semester III
		L T P C
15PHP304D	PLASMA PHYSICS	4 - - 4

Course Objectives

- Basic theory of plasma, its occurrence in nature, producing plasma experimentally, and their detection are explained in this paper.
- The course covers basic principles on plasmas, waves in plasma, stability analysis of the equilibrium solutions of the equations. Examples are taken from the phenomena in the Earth's ionosphere and magnetosphere.
- To make a simplified model for the Earth's magnetosphere, and obtain analytical expressions for some characteristic quantities
- To have a very good knowledge on formulating and modifying the basic dynamic fluid equations to account for the dynamics of plasma media at different levels: from MHD to kinetic scales.
- To describe the propagation of waves in plasmas, and derive the dispersion relation for these waves.

Course Outcomes (Cos)

Upon successful completion, students will:

1. understand and use the basic mathematical formalism needed for describing the dynamics of continuous media.
2. have a very good knowledge on mathematical models for plasma and will be able to distinguish the dynamics of plasmas and neutral fluid media.
3. have a very good knowledge on formulating and modifying the basic dynamic fluid equations to account for the dynamics of plasma media at different levels: from MHD to kinetic scales.
4. be able to describe the propagation of waves in plasmas, and derive the dispersion relation for these waves.
5. have good insight into plasma instabilities and turbulence.
6. be able to make a simplified model for the Earth's magnetosphere, and obtain analytical expressions for some characteristic quantities

Unit I

Basics of Plasmas: Plasma - Definition, concepts of plasma parameter, Debye shielding, Motion of charged particles in an electromagnetic field - Uniform electric and magnetic fields, Boltzmann and Vlasov equations, their moments - Fluid equations, Plasma oscillations, Enough exercises.

Unit II

Occurrence of plasma in nature, definition of plasma, concept of temperature, Debye shielding and plasma parameter. Single particle motion in uniform E and B, nonuniform magnetic field, grid B and curvature drifts, invariance of magnetic moment and magnetic mirror. Simple application of plasmas.

Unit III

Plasma Waves: Plasma oscillations electron plasma waves, ion waves, electrostatic electron and ion oscillations perpendicular to magnetic field upper hybrid waves, lower hybrid waves, ion cyclotron waves. Light waves in plasma.

Unit IV

Boltzmann and Vlasov Equations: The fokker plank equation, integral expression for collision term zeroth and first order moments, the single equation relaxation model for collision term. Application kinetic theory to electron plasma waves, the physics of Landau damping, elementary magnetic and inertial fusion concepts.

Unit V

Non-linear Plasma Theories: Non-linear Electrostatic Waves, K dV Equations, Non-linear Schrodinger Equation, Solitons, Shocks, Non-linear Landau Damping.

Suggested Books

1. Introduction to Plasma Physics and Controlled Fusion: F. F. Chen-Springer, 2nd edition 2007
2. An introductory course of Plasma Physics: R. O. Dendy-Cambridge University Press, 1st edition 1995.
3. Ideal Magnetohydrodynamics: J. P. Friedberg-Springer edition, 1st edition 1987
4. Fundamental of Plasma Physics: S. R. Seshadri-American Elsevier Pub. Co., 1st edition 1973.
5. <https://ocw.mit.edu/courses/nuclear-engineering/22-611j-introduction-to-plasma-physics-i-fall-2003/lecture-notes/>
6. <http://www.physics.purdue.edu/~lyutikov/phys670/Gedalinplasma.pdf>

		Semester III
		L T P C
15PHP304E	GEOPHYSICS	4 - - 4

Course Objectives

- Geophysics is to expose students to a broad spectrum of geophysics, including resource exploration, environmental geophysics, seismology, and tectonics.
- Students in the major obtain a solid foundation in the essentials of mathematics, physics, and geology.
- To build upon that foundation with advanced course work in geophysics to develop the in-depth knowledge they need to pursue advanced graduate study and professional careers in government or the private sector.
- To demonstrate the ability to make observations using a variety of geophysical instruments and laboratory experiments and to reduce, model, and interpret their data and uncertainties
- To know the principles of geophysical measurements with physics-based mathematical models.
- Students will prepare for the research, analyze, and synthesize solutions to an original and contemporary geophysics problem

Course Outcomes (Cos)

Upon successful completion, the students can able

1. demonstrate a fundamental understanding of the physical processes governing the structure and evolution of Earth and planetary systems, including geophysical fluids, environmental hazards, and energy and freshwater resources.
2. demonstrate the ability to quantitatively describe the behavior of natural systems
3. ability to know the principles of geophysical measurements with physics-based mathematical models.
4. demonstrate the ability to make observations using a variety of geophysical instruments and laboratory experiments and to reduce, model, and interpret their data and uncertainties
5. demonstrate the ability to effectively communicate original scientific results as was as evaluate the published and presented results of others.
6. research, analyze, and synthesize solutions to an original and contemporary geophysics problem

Unit I:

The earth as a planet; different motions of the earth; gravity field of the earth, Clairaut's theorem, size and shape of earth; geochronology; seismology and interior of the earth; variation of density, velocity, pressure, temperature, electrical and magnetic properties of the earth; earthquakes-causes and measurements, magnitude and intensity, focal mechanisms, earthquake quantification, source characteristics, seismotectonics and seismic hazards; digital seismographs, geomagnetic field, paleomagnetism; oceanic and continental lithosphere; plate tectonics.

Unit II

Scalar and vector potential fields; Laplace, Maxwell and Helmholtz equations for solution of different types of boundary value problems in Cartesian, cylindrical and spherical polar coordinates; Green's theorem; Image theory; integral equations in potential theory; Eikonal equation and Ray theory. Basic concepts of forward and inverse problems of geophysics, Illposedness of inverse problems.

Unit III

'G' and 'g' units of measurement, absolute and relative gravity measurements; Land, airborne, shipborne and bore-hole gravity surveys; various corrections in gravity data reduction – free air, Bouguer and isostatic anomalies; density estimates of rocks; regional and residual gravity separation; principle of equivalent stratum; upward and downward continuation; wavelength filtering; preparation and analysis of gravity maps; gravity anomalies and their interpretation – anomalies due to geometrical and irregular shaped bodies, depth rules, calculation of mass.

Unit IV

Earth's magnetic field – elements, origin and units of measurement, magnetic susceptibility of rocks and measurements, magnetometers, Land, airborne and marine magnetic surveys, corrections, preparation of magnetic maps, upward and downward continuation, magnetic anomalies-geometrical shaped bodies, depth estimates, Image processing concepts in processing of magnetic anomaly maps; Interpretation of processed magnetic anomaly data.

Unit V

Conduction of electricity through rocks, electrical conductivities of metals, non-metals, rock forming minerals and different rocks, concepts of D.C. resistivity measurement, various electrode configurations for resistivity sounding and profiling, application of filter theory, Typecurves over multi-layered structures, Dar-Zarrouck parameters, reduction of layers, coefficient of anisotropy, interpretation of resistivity field data, equivalence and suppression, self potential and its origin, field measurement, Induced polarization, time and frequency domain IP measurements; interpretation and applications of IP, ground-water exploration, environmental and engineering applications.

Suggested Books

1. William Lowrie, Fundamentals of Geophysics, II Edition, Cambridge University Press, 2007,
1. Telford W.M., L.P.Geldart and R.E.Sheriff, Applied Geophysics, Cambridge University Press, 2008.
2. Stacey, F. D. Physics of the Earth. 3rd ed. Brisbane, Australia: Brookfield Press, 1992. ISBN: 9780646090917.

3. Turcotte, Donald L., and Gerald Schubert. Geodynamics. 2nd ed. Cambridge, UK: Cambridge University Press, 2001. ISBN: 9780521666244.
4. Merrill, Ronald T., et al. The Magnetic Field of the Earth. Burlington, MA: Academic Press, September 15, 1998. ISBN: 9780124912465.
5. <https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-201-essentials-of-geophysics-fall-2004/lecture-notes/>
6. <https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-201-essentials-of-geophysics-fall-2004/>
7. http://www.geology.cz/projekt681900/english/learning-resources/Geophysics_lecture_notes.pdf

Course Objectives

- Solar energy harvesting and utilizing for day to day purposes has become order of the day.
- The scarcity and increasing need of the fossil fuel has made man to think about alternate sources, the easiest and best being Solar energy.
- To introduce the students to the world of solar energy, its different uses, the different methods of harvesting solar energy.
- To understand the basic concepts of energies produced from various energy sources, advantages and disadvantages.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To motivate public to participate in environment protection and improvement.

Course Outcomes (COs)

Students can be able to

1. Impart the knowledge of Storage technologies form the autonomous renewable energy sources.
2. Explain the principles that underlie the ability of various natural phenomena to deliver solar energy.
3. Discuss the positive and negative aspects of solar energy in relation to natural and human aspects of the environment.
4. Understand the basic principles in wind energy conversion and advantage and disadvantage of wind energy conversion systems.
5. Gain the knowledge about the energy produced from biomass and biogas.
6. Understand the concepts of solar cell and solar energy

Unit -1

Introduction to Energy Sources : World Energy Features, Indian Energy Scene, Conventional and non-conventional energy sources, Prospects of renewable energy sources.

Solar Energy Source: Introduction, Solar constant, radiation on Earth's surface, Radiation geometry, Radiation measurements, Radiation data, Average solar radiation, radiation on tilted surfaces

Unit – II

Solar Energy collectors : Principle of conversion of energy, Flat plate collector, Transmissivity of cover system, Collector energy balance equation, Thermal Analysis of FPC, Useful heat gain, Focusing collectors, advantages and disadvantages, Factors affecting collector performance.

Application of Solar Energy: Solar Water Heating, Heating and Cooling of Buildings, Thermo electric conversion, Power generation, PV cells, Solar distillation, Pumping, Cooking, Hydrogen production.

Unit – III

Wind Energy: Principle of energy conversion, Power generation, Forces on blades, energy estimation, Wind data, Components of WECS, Classification of WECS, Advantages and Disadvantages, Types of Wind machines, Performance of Wind machines, Applications of wind energy. Problems

Energy from Biomass: Conversion technology, Factors affecting gas generation, classification of biogas plants, Advantages and disadvantages of different types of plants.

Unit – IV

Fuel Cells: Design and Principle of operation, Classification, Types, Advantages and disadvantages, Conversion efficiency, Types of electrodes, Work output and EMF of Fuel Cells, Applications of Fuel Cells.

Thermo Nuclear Fusion Energy: Fusion Reactions, Requirements, Plasma, Magnetic and Inertial Confinement fusion, Muon Catalyzed Fusion, Characteristics of D-T Reaction, Advantages of Nuclear Fusion, Fusion Hybrid, Cold Fusion.

Unit – V

Principles of working: Geothermal, OTEC, Tidal, Waves, and Hydrogen (Generation and Application)

Suggested Books

1. G.D.Rai. Non conventional energy sources, Khanna Publishers
2. S.P.Sukhatme. Solar Energy, Tata McGraw-Hill Publishing Co. Ltd.
3. G.D.Rai. Solar Energy, Khanna Publishers.
4. D. Mukherjee and S. Chakrabarti. Fundamentals of Renewable Energy Systems, New Age International Publishers.
5. D.S. Chauhan and S.K.Srivastava. Non Conventional Energy Resources, New Age International Publishers.
6. Singh, M.P., Singh, B.S. & Soma S. Dey, (2004). Conservation of Biodiversity and Natural Resources. Delhi: Daya Publishing House.
7. J.Balfour, M.Shaw and S. Jarosek, Photovoltaics, Lawrence J Goodrich (USA).
8. <https://www.edfenergy.com/for-home/energywise/renewable-energy-sources>
9. <https://www.nrdc.org/stories/renewable-energy-clean-facts>
10. <https://www.nationalgeographic.com/environment/energy/reference/renewable-energy/>

		Semester III
		L T P C
15PHP305B	NANOTECHNOLOGY	4 - - 4

Course Objectives

- This course introduces the fundamentals of nano-scale engineering and manufacturing.
- Current and future applications of nanostructured materials will be reviewed with respect to their impact in commercial products and technologies.
- The main physical forces controlling the nucleation and deposition of nanostructures will be presented allowing a better understanding of key design factors at the nano-scale.
- Well-established and novel synthesis/fabrication methods nanostructures will be critically discussed giving a broad overview of the state-of-the-art nanomanufacturing processes.
- The course will cover recent breakthroughs and assess the impact of this burgeoning field.
- Specific nanofabrication topics include epitaxy, beam lithographies, self- assembly, biocatalytic synthesis, atom optics, and scanning probe lithography.

Course Outcomes (COs)

At the end of the course, Students will understand and:

1. Explain the fundamental principles of nanotechnology and their application to biomedical engineering.
2. Apply engineering and physics concepts to the nano-scale and non-continuum domain.
3. Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the research literature.
4. Design processing conditions to engineer functional nanomaterials.
5. Evaluate current constraints, such as regulatory, ethical, political, social and economical, encountered when solving problems in living systems.
6. learn the fundamentals about the different types of nanostructures

UNIT I

GENERIC METHODOLOGIES FOR NANOTECHNOLOGY

Introduction and classification - What is nanotechnology? - Classification of nanostructures - Nanoscale architecture; Summary of the electronic properties of atoms and solids - The isolated atom - Bonding between atoms - Giant molecular solids - The free electron model

and energy bands - Crystalline solids - Periodicity of crystal lattices - Electronic conduction; Effects of the nanometre length scale - Changes to the system total energy - Changes to the system structure - How nanoscale dimensions affect properties.

UNIT II

CARBON NANOSTRUCTURES

Introduction; carbon molecules – nature of the carbon bond – new carbon structures; carbon clusters – small carbon clusters discovery of C₆₀ – structure of C₆₀ and its crystal – alkali doped C₆₀ – superconductivity in C₆₀ – large and smaller fullerenes – other buckyballs; carbon nanotubes – fabrication – structure – electrical properties – vibrational properties – mechanical properties; applications of carbon nanotubes – field emission and shielding – computers – fuel cells – chemical sensors – catalysis – mechanical reinforcement.

UNIT III

INORGANIC NANOSTRUCTURES

Overview of relevant semiconductor physics - Quantum confinement in semiconductor nanostructures - The electronic density of states - Fabrication techniques - Physical processes in semiconductor nanostructures - The characterisation of semiconductor nanostructures - Applications of semiconductor nanostructures.

UNIT IV

NANOSTRUCTURED MOLECULAR MATERIALS

Introduction; Building blocks - Principles of self-assembly - Self-assembly methods to prepare and pattern nanoparticles - Templated nanostructures - Liquid crystal mesophases - Macromolecules at interfaces - The principles of interface science - The analysis of wet interfaces - Modifying interfaces - Making thin organic films - Surface effects on phase separation - Nanopatterning surfaces by self-assembly - Practical nanoscale devices exploiting macromolecules at interfaces .

UNIT V

EVOLVING INTERFACES OF NANO

Nanobiology - Introduction - Bio-inspired nanomaterials - Interaction Between Biomolecules and Nanoparticle Surfaces - Different Types of Inorganic Materials Used for the Synthesis of Hybrid Nano-bio Assemblies - Applications of Nano in Biology - Nanoprobes for Analytical Applications - Current Status of Nanobiotechnology - Future Perspectives of Nanobiology; Nanosensors - Introduction - What is a Sensor? - Nanosensors - Order from Chaos - Characterization - Perception - Nanosensors Based on Quantum Size Effects - Electrochemical Sensors - Sensors Based on Physical Properties - Nanobiosensors - Smart Dust; Nanomedicines - Introduction - Approach to Developing Nanomedicines - Various Kinds of Nanosystems in Use Nanodrug Administration - Nanotechnology in Diagnostic Applications - Materials for Use in Diagnostic and Therapeutic Applications - Future Directions.

Suggested Books

1. Robert W. Kelsall, Ian W. Hamley and Mark Geoghegan. Nanoscale Science and Technology, , John Wiley & Sons, Ltd., UK, 2005.

2. Charles P. Poole Jr and Frank J. Owens. Introduction to Nanotechnology, Wiley Interscience, 2003.
3. Bio-Inspired Nanomaterials and Nanotechnology, Edited by Yong Zhou, Nova Publishers.
4. T.Pradeep. Nano:The Essentials: Understanding Nanoscience and Nanotechnology, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.
5. Richard Booker, Earl Boysen, Nanotechnology (John Wiley and Sons).
6. Mark C. Hersam (2006), "MSE 376 Nanomaterials," <https://nanohub.org/resources/1914>.
7. <https://nanohub.org/resources/7313>.
8. https://ocw.mit.edu/courses/mechanical-engineering/2-674-micro-nano-engineering-laboratory-spring-2016/lecture-notes/MIT2_674S16_Lec7Nano.pdf
9. <https://nptel.ac.in/courses/118/104/118104008/>

Course Objectives

- Particle physics is one of the fundamental subjects of physics.
- It is important to know about the physics of nuclei and the different energies involved in the nuclear processes.
- Particle energy is one of the major sources of energy, which, with proper careful usage, can solve the energy crisis to a large extent.
- This paper is intended to give an insight into the different nuclear processes and the fundamental particles, which are the real building blocks of the universe.
- To understand the importance of models in describing the properties of nuclei and nuclear collisions
- To know the concept of balanced strong interactions, understanding the role of gluons

Course Outcomes (COs)

Students who have completed this course should

1. Understand the relation between the standard model and QCD
2. Understand the importance of models in describing the properties of nuclei and nuclear collisions
3. Be able to make quantitative estimates of phenomena involving nuclei.
4. Understand the different elementary particles and their behaviour.
5. write balanced strong interactions, understanding the role of gluons
6. write balanced weak interactions, understanding the role of W and Z bosons

Unit – I

Nucleon - Nucleon interaction and Hadron Structure : Phenomenological Nucleon - Nucleon potentials - Meson theory - Derivation of Yukawa interaction - Electromagnetic properties of deuteron - Polarisation in nucleon - nucleon scattering - Scattering matrix - Probing charge distribution with electron - Form factors - Proton form factors - Deep inelastic electron - proton scattering - Bjorken scaling and partons - Quarks within the proton - Gluons as mediators of strong interaction.

Unit II

Particle Phenomenology : Pion – Nucleon scattering - Isospin analysis - Phase shifts - Resonance and their quantum numbers - Production and formation experiments Relativistic kinematics and invariants - Mandelstam variables - Phase space - Decay of one particle into three particles - Dalitz plot.

Unit III

Ionizing radiations : Ionization and transport phenomena in gases - Avalanche multiplication Detector Properties : Detection - Energy measurement - Position measurement Time measurement. Gas Counters : Ionization chambers, - Proportional counters - Multiwire proportional counters - Geiger - Muller counters - Neutron detectors. Solid State Detectors : Semiconductor detectors - Integrating solid state devices - Surface barrier detectors.

Unit IV

Scintillation counters : Organic and inorganic scintillators - Theory, characteristics and detection efficiency. High Energy Particle Detectors : General principles - Nuclear emulsions - Cloud chambers - Bubble chambers - Cerenkov counter.

Unit – V

Nuclear Electronics : Analog and digital pulses - Signal pulses - Transient effects in an R-C circuit - pulse shaping- linear amplifiers - Pulse height discriminators - Single channel analyser - Multichannel analyser.

Suggested Books

1. G.E.Brown and A.D. Jackson, Nucleon - Nucleon Interaction, North - Holland, Amsterdam, 1976
2. S. de Benedetti, Nuclear interaction, John wiley and Sons, New York, 1964.
3. P. Marmier and E. Sheldon, Physics of Nuclei and Particles, Vol. I & II Academic Press, New York 1970.
4. H.A. Enge, Introduction to Nuclear Physics, Addison - Wesley, 1975.
5. S.S. Kapoor and V.S. Ramamurthy, Nuclear Radiation Detectors, Wiley - Eafstern, New Delhi, 1986.
6. Peacock, John A. Cosmological Physics. New York, NY: Cambridge University Press, 1998. ISBN: 9780521422703.
7. <https://ocw.mit.edu/courses/physics/8-952-particle-physics-of-the-early-universe-fall-2004/>

Course Objectives

- This course will be useful to understand the zero-th and first law of thermodynamics and link thermodynamics to the micro description used in classical Statistical Mechanics.
- Statistical Mechanics is a probabilistic approach to equilibrium properties of large numbers of degrees of freedom.
- Students will learn thermodynamics, probability theory, kinetic theory, classical statistical mechanics, interacting systems, quantum statistical mechanics, and identical particles.
- Basic principles are examined in this class, such as the laws of thermodynamics and the concepts of temperature, work, heat, and entropy.
- Topics from modern statistical mechanics are also explored, including the hydrodynamic limit and classical field theories.
- To learn the behavior of Bose and Fermi gases.

Course Outcomes (COs)

1. The student should understand the connection between microphysics and thermodynamics.
2. Understand the basic concepts of classical statistical Physics
3. Understand the basic knowledge of quantum statistical Physics
4. Learn the behavior of Bose and Fermi gases.
5. Apply knowledge of statistical Physics to solve real world physical problems
6. To link thermodynamics to the micro description used in classical Statistical Mechanics.

Unit - I

Statistical basis of thermodynamics: macro states and micro states – connection between statistics and thermodynamics – Classical ideal gas – entropy of mixing and Gibbs paradox – phase space of a classical system – Liouville's theorem and its consequences – microcanonical ensemble – Quantum states and phase space – Equipartition theorem. The canonical ensemble Equilibrium between a system and a heat reservoir – A system in the canonical ensemble – thermodynamic relations – classical systems – Statistics of paramagnetism. The grand canonical ensemble – A system in the grand canonical ensemble Physical significance of statistical quantities – examples.

Unit – II

Fluctuations–fluctuations in microcanonical, canonical and grand canonical ensembles. Quantum Statistics – Quantum mechanical basis – ideal gas in various quantum mechanical

ensembles. Gaseous systems composed of molecules with internal motion – monatomic molecules – diatomic molecules – ortho and para hydrogen.

Unit – III

Thermodynamic behaviour of ideal Bose gas – thermodynamics of black body radiation Specific heats of solids – Einstein and Debye model – Bose-Einstein condensation. Thermodynamic behaviour of an ideal Fermi gas – Magnetic behaviours of an ideal Fermi gas – Pauli paramagnetism – electron gas in metals.

Unit – IV

Brownian motion – Langevin equation for random motion – random walk problem, diffusion – Einstein relation for mobility.

Unit – V

General remarks on the problem of condensation – The Yang-Lee theory. Bragg-Williams approximation. Ising model – solution for a linear chain – Equivalence of Ising model to other models: Lattice gas, Binary alloy.

Suggested Books

1. R. K. Pathria, Statistical Mechanics 2. K. Huang, Statistical Mechanics
2. E. S. R. Gopal, Statistical Mechanics and Properties of matter
3. Landau and Lifshitz , Statistical Physics
4. Kardar, Mehran. Statistical Physics of Fields. Cambridge University Press, 2007. ISBN: 9780521873413.
5. Amit, Daniel J. Field Theory, the Renormalization Group, and Critical Phenomena. Revised 2nd ed. World Scientific Publishing Company, 1984. ISBN: 9789971966102.
6. Feynman, Richard Phillips. Statistical Mechanics: A Set of Lectures. Westview Press, 1998. ISBN: 9780201360769.
7. <https://ocw.mit.edu/courses/physics/8-334-statistical-mechanics-ii-statistical-physics-of-fields-spring-2014/index.htm>
8. <https://ocw.mit.edu/courses/physics/8-333-statistical-mechanics-i-statistical-mechanics-of-particles-fall-2013/>
9. <https://ocw.mit.edu/courses/physics/8-08-statistical-physics-ii-spring-2005/>

Course Objectives

- Biophysics deals with the application of physics to biological systems.
- The concepts and techniques of biophysics find applications in bioelectronics, medicine/health, and population dynamics and are closely related to statistical mechanics and transport processes.
- Interdisciplinary skills and knowledge have heralded novel scientific outcomes with benefits to society.
- As such, this course develops foundational thinking and methods that are fundamental to an effective interdisciplinary STEMM workforce.
- Fundamental concepts that underlie biomolecular interactions will be discussed and biophysical methods that are employed for the structural analysis of these systems will be introduced at an elementary level.
- The physical quantities such as temperature, energy, enthalpy, entropy, and free energy will be employed to understand why a biological system chooses particular state at conditions under study.

Course Outcomes (COs)

On successful completion of the course students will be able to:

1. Explain models of biological systems and models dealing with statistical mechanics and transport phenomena.
2. Solve qualitative and quantitative problems, using appropriate mathematical and computing techniques.
3. Perform experiments which involve making correct and appropriate use of a range of scientific equipment, keeping an accurate record of experimental work and analysing results and reaching non-trivial conclusions from them.
4. Communicate the results of both theoretical and experimental work in various forms including written reports, oral presentations and poster presentations.
5. Contribute to team and group work for scientific investigations and for the process of learning.
6. Understand transport phenomena of neutral and electrically charged particles and biological systems.

UNIT I

Bio molecules: Organisation of molecules – macromolecules and intermolecular forces – stability of macromolecules – Types of bonds in biological molecules – Biological membranes – lipid composition – protein.

UNIT II

Principles of kinetics of molecules: diffusion – factors affecting diffusion – simple diffusion – Fick's law of diffusion – diffusion of electrolytes – biological significance of diffusion – osmosis – osmotic pressure – laws of osmosis

UNIT III

Dialysis: Principles of dialysis in artificial kidneys – kinds of dialysis – Kinetic theory of surface tension – Factors affecting surface tension – Determination of surface tension of liquids by capillary method

UNIT IV

Principles of Optics in biological studies: Characteristics of light – microscopy – types of microscopes – compound microscope – phase contrast microscope – Optical principle – interference microscope

UNIT V

Photometry of absorptiometry: Important components in instruments of photometry – light source – monochromator – Sample holders – light sensitive detectors.

Suggested Book

1. Subramanian M.A., 2005, Biophysics: Principles and techniques, M.J.P. Publishers, Chennai.
2. Physics in Molecular Biology; Kim Sneppen & Giovanni Zocchi (CUP 2005)
3. Biological Physics: Energy, Information, Life; Philip Nelson (W H Freeman & Co, NY, 2004)
4. Physical Biology of the Cell (2nd Edition), Rob Phillips et al (Garland Science, Taylor & Francis Group, London & NY, 2013)
5. An Introduction to Systems Biology; Uri Alon (Chapman and Hall/CRC, Special Indian Edition, 2013)
6. Evolution; M. Ridley (Blackwell Publishers, 2009, 3rd edition)
7. http://www.physics.drexel.edu/~brigita/COURSES/BIOPHYS_2011-2012/
8. <https://www.easybiologyclass.com/biophysics-free-online-classes-lecture-notes-references-study-materials/>

Course Objective

- To understand the Biasing network for BJT and FET, transient analysis and frequency response of BJT and FET in single stage and multistage amplifier
- To understand the frequency response feedback amplifier using BJT and FET and Tuned amplifier
- This course introduces the assembly language programming of 8085 Microprocessor. It gives a practical training of interfacing the peripheral devices with the 8086 microprocessor.
- To apply their knowledge to analog and digital electronics, pulse electronics, analog and digital communication systems, digital signal processing, control systems, and power electronics at a later stage.
- To demonstrate their knowledge in designing the control loops for these processes.
- To apply the theoretical knowledge into the experiments and find the solutions.

Course Outcomes (COs)

On completion of this lab course the students will be able to:

1. Understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
2. Work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters;
3. Troubleshoot interactions between software and hardware;
4. Analyze abstract problems and apply a combination of hardware and software to address the problem
5. Students will practically study the working of different electronic components/ circuits.
6. Learn to minimize contributing variables and recognize the limitations of the equipment.
7. Design and construction of circuits using analog component and trouble shooting of the circuits.

ANY TWELVE EXPERIMENTS

1. Arc spectra – Aluminium and Brass
2. (i) Determination of wavelength of He-Ne laser – Ruler method.
(ii) Determination of thickness of a wire using He-Ne laser.

3. G.M.Counter – Characteristics.
4. Experiment on rotatory dispersion of quartz.
5. Microprocessor – Stepper motor interfacing, ADC interface wave form generation
6. Microprocessor –Traffic control simulation
7. Microprocessor –Hex Key board interfacing
8. Multiplexer and de-multiplexer
9. Ring counter using IC's
10. 4-bit binary adder
11. 4-bit binary subtractor
12. Half adder and Half subtractor
13. Full adder and full subtractor
14. BCD counter, using IC 7490 and 7473.
15. A/D Converters any one method, D/A converter – Binary weighted, Ladder methods

Suggested Books

1. Ouseph C.C., U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai
2. Singh S.P., 2003, Advanced Practical Physics – 1, 13th Edition, Pragathi Prakashan, Meerut
3. Singh S.P., 2000, Advanced Practical Physics – 2, 12th Edition, Pragathi Prakashan, Meerut
4. Ouseph C.C., U.J. Rao and V.Vijayendran, 2007, Practical Physics and Electronics, S. Viswanathan (Printers & Publishers), Pvt. Ltd., Chennai.

		Semester IV
		L T P C
15PHP401	ELECTROMAGNETIC THEORY AND ELECTRODYNAMICS	4 - - 4

Course Objectives

- The aim of this course is to provide the students with the fundamental principles of electrical energy (electro- magnetism).
- To understand the propagation of waves in different media, its transmission and reception.
- To understand, develop, and design various engineering applications involving electromagnetic fields.
- To expose the students to the ideas of electromagnetic waves and structure of transmission line
- To obtain an understanding of Maxwell's equations and be able to apply them to solving practical electromagnetic fields
- To provide the understanding to the propagation of EM wave in free space, conductors & dielectrics.

Course Outcomes (COs)

Students will:

1. Formulate potential problems within electrostatics, magnetostatics and stationary current distributions in linear, isotropic media, and also solve such problems in simple geometries using separation of variables and the method of images. .
2. Define and derive expressions for the energy both for the electrostatic and magnetostatic fields, and derive Poyntings theorem from Maxwells equations and interpret the terms in the theorem physically.
3. Understand the theories and properties of electrostatics
4. Analyze the interaction of electrostatic properties with matter.
5. Acquire the fundamental knowledge in Magnetostatics
6. Understand the basic concepts of electrodynamics

UNIT- I

Electrostatics: Electric intensity – Electric potential – Gauss Law - Dielectric and its polarization - Electric displacement D – Dielectric constant ϵ_r – Polarisability α - Clausius-Mossotti relation (Non-polar molecules) – The Langevin equation (Polar molecules) – Electrostatic energy

Magnetostatics: Current density J – Ampere's law of force – Biot-Savart law – Ampere's circuital law – Magnetic scalar potential ϕ_m (no applications) – Magnetic vector potential A –

Magnetisation and magnetization current – Magnetic intensity – Magnetic susceptibility and Permeability.

UNIT- II

Field Equations and Conservation Laws: Equation of continuity - Displacement currents - The Maxwell's equations derivations - physical significance - Poynting vector - Electro magnetic potentials A and ϕ - Maxwell's equations in terms of Electro magnetic potentials - Concept of gauge - Lorentz gauge - Coulomb gauge

UNIT- III

Propagation of Electromagnetic Waves: Electromagnetic waves in Free space - Isotropic dielectric - Anisotropic dielectric – Conducting media - Ionized gases.

Radiating systems: Oscillating electric dipole – Radiation from an oscillating dipole – Radiation from small current element.

UNIT- IV

Interaction of E.M.Waves with matter (Macroscopic): Boundary conditions at interfaces - Reflection and refraction – Frenel's laws-Brewster's law and degree of polarization - Total internal reflection and critical angle.

Interaction of E.M.Waves with matter (Microscopic): Scattering and Scattering parameters - Scattering by a free electron (Thomson Scattering) - Scattering by a Bound electron (Rayleigh scattering) – Dispersion Normal and Anomalous – Dispersion in gases (Lorentz theory) – Dispersion in liquids and solids.

UNIT – V

Relativistic Electrodynamics: Purview of special theory of relativity – 4-vectors and Tensors - Transformation equations for charge and current densities J and ρ – For electromagnetic potentials A and ϕ - Electromagnetic field tensor $F_{\mu\nu}$ - Transformation equations for the field vectors E and B - Covariance of field equations in terms of 4-vectors - Covariance of Maxwell equations in 4-tensor forms – Covariance and transformation law of Lorentz force.

Suggested Book

1. Chopra & Agarwal 2004, Electromagnetic theory, 6th Edition, Nath & Co, Meerut.
2. Griffiths D., 1998, Introduction to Electrodynamics, 3rd Edition, Printice Hall of India, New Delhi.
3. Jacson. J.D., 1998, Classical Electro dynamics, 3rd Edition, Willey Eastern, New Delhi.
4. Schwaritz. M. 1972, Principles of Electro dynamics, McGraw Hill, Auckland.
5. Jordon and Balmain 2nd edition 2002, EMW radiating systems, Prentice Hall of India Pvt Ltd, New Delhi.
6. Gupta, Kumar and Singh, 2007, Electro dynamics, 19th Edition, Pragati Prakasan, Meerut, New Delhi.
7. Satya Prakash 10th revised 2003, Electromagnetic theory and Electro dynamics, Kedar Nath Ram Nath & Co, Meerut.
8. <https://nptel.ac.in/courses/115101008/>
9. https://nptel.ac.in/content/syllabus_pdf/104104085.pdf

10. <https://ocw.mit.edu/courses/physics/8-02x-physics-ii-electricity-magnetism-with-an-experimental-focus-spring-2005/>

		Semester IV
		L T P C
15PHP491	PROJECT	4 - - 4

Course Objectives

- The aim of the M.Sc. Research project work is to expose the students to preliminaries and methodology of research in Theoretical Physics and Experimental Physics.
- To provides the students to get opportunity and participate in some ongoing research activity and development of a laboratory experiment.
- To provide the student with a broad spectrum of physics projects courses
- To emphasize the role of physics in life and other discipline (chemistry, mathematics and biology)
- To develop the ability of the students to conduct, observe, analyzes and report an experiment and deal with physical models and formulas mathematically.
- To provide the student with different practical, intellectual and transferable skills.
- To understand the objective of a physics laboratory experiment, properly carry out the experiments, and appropriately record and analyze the results.
- To think creatively about scientific problems and their solutions.
- To design experiments, and to constructively question results they are presented with, whether these results are in a newspaper, in a classroom, or elsewhere.

Course Outcomes (COs)

After successful completion of the course, the student is expected to

1. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.
2. Demonstrate a depth of knowledge of Physics.
3. Complete an independent research project, resulting in research outputs in terms of publications in journals and conference proceedings.
4. Demonstrate knowledge of contemporary issues in their chosen field of research.
5. Demonstrate an ability to present and defend their research work.

6. Demonstrate an ability to succeed in problem solving in electronics
7. Solve physics problems using qualitative and quantitative reasoning including sophisticated mathematical techniques
8. Conduct independent research or work successfully in a technical position.
9. Successfully pursue career objectives in graduate school or professional schools, in a scientific career in government or industry, in a teaching career, or in a related career.
10. Apply their knowledge to develop the instruments.
11. Verify the basic principles and laws experimentally as a project.

15PHP306	MICROWAVE COMMUNICATION	Semester IV			
		L T P C			
		- - - 4			

Course Objectives:

- This course provide a wide understanding of microwave waveguides, passive & active devices, tubes and network analysis.
- An ability to design microwave matching networks.
- An ability to perform microwave measurements.
- An understanding of RADARs and its applications.
- To describe and explain working of microwave tubes and solid state devices.
- To perform measurements on microwave devices and networks using power meter and VNA.

Course Outcomes:

The student after undergoing this course will be able to:

1. Explain different types of waveguides and their respective modes of propagation.
2. Analyze typical microwave networks using impedance, admittance, transmission and scattering matrix representations.
3. Design microwave matching networks using L section, single and double stub and quarter wave transformer.
4. Explain working of microwave passive circuits such as isolator, circulator, Directional couplers, attenuators etc.
5. Describe and explain working of microwave tubes and solid state devices.
6. Perform measurements on microwave devices and networks using power meter and VNA.

UNIT-I

Microwave Fundamentals: Microwave frequency spectrum, Types and characteristics of transmission line, Transmission line equation solution, Reflection coefficient and transmission coefficient, Standing wave and standing wave ratio, Line impedance and admittance, Smith chart.

Unit II

Microwave Passive Devices

Rectangular wave guide, Circular wave guide, Microwave cavities, Microwave hybrid circuit, Directional coupler, Circulators and ferrit devices, Attenuators, Scattering matrix, Isolators.

Unit –III

Microwave Active Devices

Klystron, Reflex Klystron, Velocity modulation, Basic principle of magnetron, Principles and operations of magnetrons and traveling wave tube, Transfer electron devices, Gunn diode, Pin diode.

Unit –IV

Microwave Measurements

Attenuation measurement, Frequency measurement, Power measurement, Reflection coefficient and VSWR measurement, Scattering measurement. Microwave detection, Point contact diode, Schottky barrier diode.

Unit -V

Microwave Applications

Antenna fundamental, Microwave antennas, Antenna basic, Power received from an antenna, Radiation pattern, Radiation resistance, Efficiency, Directivity and gain, Antenna types, Rectangular horn antennas, H and E plane Horn antennas, Pyramidal Horn antenna, Parabolic reflector antenna. Radar system, Basic radar system, Radar range, Moving target indicator,

Suggested Books

1. Microwave Fundamental-Sanjeeva, Gupta and Others, Khanna Publications.
2. Microwave Devices and Circuits -Samull Y. Lio, Prentice Hall of India Pravate Limited, New Delhi. 3rd edition 1997
3. Microwave Communications Components and Circuits-Hunds, Mc Graw Hill, International Edition. 1st edition 1989
4. Microwave Techniques -D.C. Agarwal, S. Chand and Company.
5. Microwave Engineering-David M. Pozar, John Wiley and ons, New York. 4th edition 2012
6. Microwave Principles-Herbert S. Reich, C.B.S. Publications. 1st edition 2004

Course Objectives:

- This paper gives information about the nature of cosmic rays, detection of cosmic rays, and their analysis.
- To distinguish between mechanical and electromagnetic waves.
- To recognize that electromagnetic waves are transverse waves and travel at the speed of light through a vacuum.
- To give a basic description of cosmic rays.
- To demonstrate an understanding of a cloud chamber.
- To gain a better understanding of subatomic particles.

Course Outcomes:

Students able to

1. The students can use the acquired knowledge about experimental methods in their work in several fields of engineering (measurement techniques, electronics, computers) and knowledge about the basic properties of cosmic rays at their work in the field of medicine and radiology
2. Identify three aspects of contemporary cosmic ray physics which they wish to study in detail.
3. play a role in many different phenomena - e.g, climate
4. the student will have knowledge of the experimental and phenomenological aspects of the origin, nature and propagation of charged cosmic rays and neutrinos and a basic knowledge of the nature of Dark Matter, Gravitational Waves and Cosmic Microwave
5. Background and the related experimental detection techniques.
6. In particular, the student will be able to understand the connection between astrophysics and particle physics.

Unit I

Introduction to Cosmic Rays – The nature of the radiation – the latitude effect and effect of earth's magnetic fields – The primary cosmic ray energy spectrum – components in the primary radiation – Observation of knee and ankle in the energy spectrum – origin of cosmic rays – Possibility of electromagnetic acceleration – Fermi's acceleration mechanism – Supernovae as sources – Other sources – Motion and storage of cosmic rays.

Unit II

Extensive Air Shower (EAS) – Phenomenology – The cascade process – Bhabha's cascade theory – Electromagnetic cascade – Interaction of photons with matter – Interaction of electrons with matter – Lateral spread of EAS particles – EAS cascade – Monte Carlo simulation – Numerical methods – EAS initiated by primary nuclei.

Unit III

General features of EAS – Electromagnetic component – Lateral studies – Hadron component – Temporal structure of Hadrons – Charged to neutral (C/N) ratio – Muon component – Cherenkov light from EAS – Fluorescence light – Radio emission from EAS

Unit IV

Detection of EAS – Electron detectors – Scintillation detectors – Yes/No type detectors – Proportional counters – Fast timing – Muon detectors – Importance of muon detectors in EAS detector arrays – Hadron detectors – Underground detectors – Recording systems – Calibration of the detectors and electrons.

Unit V

Analysis of EAS data – Determination of shower parameters – NKG function – Search for sources – Significance of size spectrum – Relation to the energy spectrum – Knee and Ankle of the energy spectrum – Possible explanations – Models of origin of cosmic rays.

Suggested Books

1. Rao M.V.S and B.V. Sreekantan, Extensive Air Shower, world scientific publishing 1st edition 1998.
2. Hillas A.M., Cosmic Rays, Pergamon Press, New York 1st edition 1972.
3. <http://neutronm.bartol.udel.edu/catch/cr2.html>
4. <https://www.classe.cornell.edu/Outreach/>
5. <https://www.imagesco.com/geiger/radioactive-sources.html>

Course Objectives:

- This is a non-major elective paper for students of other departments.
- This paper gives an overview of the solar system, the stars, their evolution etc., for those who are interested in knowing about our Universe.
- Astronomy and Astrophysics is a very fundamental subject in Physics.
- Includes study of the solar system, evolution of stars, different physical processes going on stellar bodies, life cycle of stars etc.
- Is to apply basic physical principles from a broad range of topics in physics to astronomical situations
- Be able to formulate scientific problems in mathematical terms and apply analytical and numerical methods towards its solution
- Develop skills to design observing projects with research telescopes and projects drawing upon data in the literature and in archives
- Establish competence in focused areas of astrophysical theory and experiment

Course Outcomes:

Upon successful completion of this course, Students will be able to

1. Understand the basic concepts of coordinate systems, coordinate system used in astronomy, and evolution and properties of stellar objects.
2. Understand different mechanisms of energy transfer in stellar objects.
3. Understand the nuclear reactions in stellar objects and their behaviour.
4. Learn the basic concepts of cosmology and astrophysics.
5. Understand the different types astronomy according to the wavelengths of emission
6. Demonstrate a thorough understanding of current accepted theories for the origin of the universe

UNIT I

SUN: Sun, the nearest star to earth – Size, Mass and different layers of Sun – energy production in Sun – Temperature of the core, photosphere and Corona – Corona Heating problem – Solar activities – Sun spot – future of sun.

UNIT II

Planets: Planets of solar system – Orbits of the planets – Moons of the planets – Rings – Size, atmosphere temperature of the planets – Asteroids, Meteorite, Comets – Earth's Moon – Craters in Moon – Water in Moon.

UNIT III

Eclipse: Solar eclipse – Partial, Total, Annular and Hybrid eclipse – Conditions for these eclipses – Lunar eclipse.

Extra Solar Planets: Discovery of extra solar planets – Number of extra solar planets discovered – Telescopes – Invention – Different types of telescopes – Space telescopes

UNIT IV

Evolution of stars – Different stages of evolution – main sequence – white dwarf – supernova – pulsars – quasars – neutron stars – black holes – Chandrasekhar limit – Stellar cluster – Galaxy.

UNIT V

Evolution of the Universe – Big-bang theory – Steady state theory – Introduction to Radio astronomy, Infrared Astronomy, X-ray astronomy and Gamma ray astronomy.

Suggested Book

1. Bhatia V.B., 2001, Text Book of Astronomy and Astrophysics with elements of Cosmology, Narosa Publishing Co., New Delhi.
2. Martin Harwit, 1998, Astronomical Concepts, 3rd Edition, Springer Verlag, New York
3. Franklin Shu, 1st edition 1982, Physical Universe, University Science Books, U.S.A.
4. E.W.Kolb and M.S.Turner, 1st edition, 2007, The Early Universe Sarth book house and distributors
5. J.V.Narlikar, 3rd edition 2012 Introduction to Cosmology, Cambridge University Press.
6. A.K.Raychaudhuri, S.Banerji and A.Banerjee, General Relativity, Astrophysics and Cosmology – 1st edition (Springer-Verla, 2001)
7. S. Banerji and A. Banerjee, General Relativity and Cosmology – 1st edition (Elsevier, 2007)
8. <https://nptel.ac.in/courses/115105046/>
9. <http://www.nptelvideos.in/2012/12/astrophysics-cosmology.html>

FACULTY OF ENGINEERING

**B.E AUTOMOBILE ENGINEERING
REGULATIONS, CURRICULUM
&
SYLLABI 2015
(FULL-TIME PROGRAMME)**

**Department of Automobile Engineering
Faculty of Engineering**



KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University Established Under Section 3 of UGC Act 1956)
Eachanari post, COIMBATORE 641 021, INDIA

B.E. AUTOMOBILE ENGINEERING (REGULAR)

COURSE OF STUDY AND SCHEME OF EXAMINATIONS

(2015 and onwards)

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER I								
THEORY								
15BECC101	Communicative English –I	3	0	0	3	40	60	100
15BECC102	Engineering Mathematics I	3	2	0	4	40	60	100
15BECC103	Engineering Physics	3	0	0	3	40	60	100
15BECC104	Engineering Chemistry	3	0	0	3	40	60	100
15BEAE105	Basic Electrical and Electronics Engineering	3	0	0	3	40	60	100
PRACTICALS								
15BECC111	Engineering Physics & Chemistry Laboratory	0	0	3	2	40	60	100
15BEAE112	Engineering Practice Laboratory	0	0	3	2	40	60	100
15BEAE113	Engineering Graphics	1	0	4	3	40	60	100
	TOTAL	28 hrs			23	320	480	800
VALUE ADDED COURSE								
15BECC151	Human Values	1	1	0	1	100	-	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER II								
THEORY								
15BECC201	Communicative English –II	3	0	0	3	40	60	100
15BECC202	Engineering Mathematics – II	3	2	0	4	40	60	100
15BECC203	Materials Science	3	0	0	3	40	60	100
15BECC204	Environmental Studies	3	0	0	3	40	60	100
15BEAE205	Engineering Mechanics	3	2	0	4	40	60	100
15BEAE206	Computer Fundamentals and C Programming	3	0	0	3	40	60	100
PRACTICALS								
15BEAE211	Computer Practice and Programming Laboratory	0	0	3	2	40	60	100
15BEAE212	Machine Drawing	1	0	2	2	40	60	100
TOTAL		28 hrs			24	320	480	800
VALUE ADDED COURSE								
15BECC251	Elementary Biology	1	1	0	1	100	-	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER III								
THEORY								
15BEAE301	Methods of Applied Mathematics	3	2	0	4	40	60	100

15BEAE302	Strength of Materials	3	1	0	4	40	60	100
15BEAE303	Engineering Thermodynamics	3	1	0	4	40	60	100
15BEAE304	Automotive Engines	3	0	0	3	40	60	100
15BEAE305	Two and Three Wheeler Technology	3	0	0	3	40	60	100
PRACTICALS								
15BEAE311	Strength of Materials Laboratory	0	0	3	2	40	60	100
15BEAE312	Automotive Engine Components Laboratory	0	0	3	2	40	60	100
15BEAE313	Computer Aided Machine Drawing Laboratory	0	0	3	2	40	60	100
	Total	28 hrs			24	320	480	800
VALUE ADDED COURSE								
15BEAE351	Communication Skills Development	0	0	2	1	100	-	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER IV								
THEORY								
15BEAE401	Applied Thermodynamics and Heat Transfer	3	1	0	4	40	60	100
15BEAE402	Automotive Chassis	3	0	0	3	40	60	100
15BEAE403	Automotive Transmission	3	0	0	3	40	60	100
15BEAE404	Kinematics of Machinery	3	0	0	3	40	60	100
15BEAE405	Fluid Mechanics and Machinery	3	0	0	3	40	60	100
15BEAE406	Engineering Materials and Metallurgy	3	0	0	3	40	60	100
PRACTICALS								
15BEAE411	Fluid Mechanics and Machinery Lab	0	0	3	2	40	60	100
15BEAE412	Scientific Computing Laboratory	2	0	2	3	40	60	100
15BEAE413	Automotive Chassis &Transmission Laboratory	0	0	3	2	40	60	100
Total		29 Hrs			26	360	540	900
VALUE ADDED COURSE								
15BEAE451	Soft skills Development	0	0	2	1	100	-	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER V								
THEORY								
15BEAE501	Dynamics of Machinery	3	0	0	3	40	60	100
15BEAE502	Design of Machine Elements	3	0	0	3	40	60	100
15BEAE503	Automotive Pollution and NVH	3	0	0	3	40	60	100

	Control							
15BEAE504	Engineering Metrology And Measurements	3	0	0	3	40	60	100
15BEAE5E_	Department Elective - I	3	0	0	3	40	60	100
PRACTICALS								
15BEAE511	Thermal Engineering Laboratory	0	0	3	2	40	60	100
15BEAE512	Engineering Metrology and MeasurementsLaboratory	0	0	3	2	40	60	100
15BEAE513	DynamicsAnd Mechatronics Laboratory	0	0	3	2	40	60	100
Total		24 Hrs			21	320	480	800
VALUE ADDED COURSES								
15BEAE551	In-plant Training	1	1	0	1	100	0	100
15BEAE552	Technical Presentation & Seminar	1	1	0	1	100	0	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER VI								
THEORY								
15BEAE601	IC Engine design	3	1	0	4	40	60	100
15BEAE602	Vehicle Dynamics	3	0	0	3	40	60	100
15BEAE603	Manufacturing Technology	3	0	0	3	40	60	100
15BEAE604	Engineering Economics and Financial Management	3	0	0	3	40	60	100
15BEAE6E_	Department Elective - II	3	0	0	3	40	60	100
15BEAE6E_	Department Elective - III	3	0	0	3	40	60	100
PRACTICALS								
15BEAE611	Automotive Electrical and Electronics Laboratory	0	0	3	2	40	60	100
15BEAE612	Manufacturing Processes Laboratory	0	0	3	2	40	60	100
Total		25 Hrs			23	320	480	800
VALUE ADDED COURSE								
15BEAE651	Mini Project	0	0	2	1	100	0	100
15BEAE652	Value Added Course-I	1	1	0	1	100	0	100

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER VII								
THEORY								
15BEAE701	Finite Element Analysis	3	1	0	4	40	60	100
15BEAE702	Automotive Vehicle Design	3	1	0	4	40	60	100
15BEAE7E_	Department Elective - IV	3	0	0	3	40	60	100
15BEAE7E_	Department Elective - V	3	0	0	3	40	60	100
15BE__OE_	Open Elective	3	0	0	3	40	60	100
PRACTICALS								
15BEAE711	Automobile Vehicle Maintenance and Reconditioning Laboratory	0	0	3	2	40	60	100
15BEAE712	Auto Scanning and Vehicle Testing Laboratory	0	0	3	2	40	60	100
15BEAE713	Computer Aided Design Analysis Laboratory	0	0	3	2	40	60	100
Total		26 Hrs			23	320	480	800
SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER VIII								
THEORY								
15BEAE801	Total Quality Management	3	0	0	3	40	60	100
15BEAE8E_	Core Elective - VI	3	0	0	3	40	60	100
15BEAE8E_	Core Elective - VII	3	0	0	3	40	60	100
PRACTICALS								
15BEAE891	Project Work	0	0	24	12	120	180	300
TOTAL		33 Hrs			21	240	360	600
VALUE ADDED COURSE								
15BEAE751	Value Added Course –II	1	1	0	1	100	0	100

Total Credits : 185

Note:

- The credits of value added courses will not be accounted.
- Interested students can opt one self study course in VIII semester from open electives, which will be reflected in the marksheets if he/she passes the course

L: Lecture Hour T: Tutorial Hour CIA: Continuous Internal Assessment

P: Practical Hour C: No. of Credits ESE: End Semester Examinations

Note: For the following courses, Evaluation will be purely internal. The marks should be handed over to the Office of The Controller of Examinations, along with the Semester Internal marks.

1. Communication Skills Development
2. Soft Skills Development
3. Technical Presentation and Seminar
4. All Value Added Courses

B.E. AUTOMOBILE ENGINEERING

LIST OF ELECTIVES

Electives (For V Semester)								
Sub. Code	Title Of The Course	L	T	P	C	CIA	ESE	Total
15BEAE5E1	Composite Materials	3	0	0	3	40	60	100
15BEAE5E2	Special Vehicles	3	0	0	3	40	60	100
15BEAE5E3	Tractor and Farm Equipments	3	0	0	3	40	60	100
15BEAE5E4	Off Road Vehicles	3	0	0	3	40	60	100
15BEAE5E5	Vehicle Maintenance	3	0	0	3	40	60	100
Electives (For VI Semester)								
15BEAE6E1	Design for Manufacture and Assembly	3	0	0	3	40	60	100
15BEAE6E2	Optimization for Engineering Design	3	0	0	3	40	60	100
15BEAE6E3	Automotive Aerodynamics	3	0	0	3	40	60	100
15BEAE6E4	Computational Fluid Dynamics	3	0	0	3	40	60	100
15BEAE6E5	Vibration and Noise Control	3	0	0	3	40	60	100
15BEAE6E6	Failure Analysis and Design	3	0	0	3	40	60	100
15BEAE6E7	Computer Aided Vehicle Design	3	0	0	3	40	60	100
15BEAE6E8	Principles of Management and Entrepreneurship	3	0	0	3	40	60	100
Electives (For VII Semester)								
15BEAE7E1	Automotive Electrical and Electronics Systems	3	0	0	3	40	60	100
15BEAE7E2	Intelligent Vehicle Technology	3	0	0	3	40	60	100
15BEAE7E3	Modern Vehicle Technology	3	0	0	3	40	60	100
15BEAE7E4	Automation and Mechatronics	3	0	0	3	40	60	100
15BEAE7E5	Lean Manufacturing	3	0	0	3	40	60	100
15BEAE7E6	Supply Chain Management	3	0	0	3	40	60	100
15BEAE7E7	Process Planning and Cost Estimation	3	0	0	3	40	60	100
15BEAE7E8	Professional Ethics	3	0	0	3	40	60	100
15BEAE7E9	Production Process for Automotive Components	3	0	0	3	40	60	100
Electives (For VIII Semester)								
15BEAE8E1	Automotive Air Conditioning	3	0	0	3	40	60	100
15BEAE8E2	Alternate Fuels and Energy systems	3	0	0	3	40	60	100
15BEAE8E3	Advanced Theory of IC Engines	3	0	0	3	40	60	100
15BEAE8E4	Fuel Cell Technology	3	0	0	3	40	60	100
15BEAE8E5	Quality Control and Reliability Engineering	3	0	0	3	40	60	100
15BEAE8E6	Intellectual Property Rights (IPR)	3	0	0	3	40	60	100
15BEAE8E7	Vehicle Transport Management	3	0	0	3	40	60	100
15BEAE8E8	Vehicle Body Engineering and Safety	3	0	0	3	40	60	100
15BEAE8E9	Industrial Engineering and Operations Research	3	0	0	3	40	60	100

VALUE ADDED COURSES								
Sub. Code	Title Of The Course	L	T	P	C	CIA	ESE	Total
15BEAE65_	Industrial Robotics	1	1	0	1	100	0	100
15BEAE65_	Computer Hardware and Interfacing	1	1	0	1	100	0	100
15BEAE75_	Fuels and Lubricants	1	1	0	1	100	0	100
15BEAE75_	Automotive Ergonomics and Safety	1	1	0	1	100	0	100

LIST OF OPEN ELECTIVES

OPEN ELECTIVE (Courses offered by other Department)								
BIOTECHNOLOGY								
15BTBTOE01	Bioreactor Design	3	0	0	3	40	60	100
15BTBTOE02	Food Processing and Preservation	3	0	0	3	40	60	100
15BTBTOE03	Molecular Modeling	3	0	0	3	40	60	100
15BTBTOE04	Bioremediation	3	0	0	3	40	60	100
15BTBTOE05	Biophysics	3	0	0	3	40	60	100
15BTBTOE06	Basic Bioinformatics	3	0	0	3	40	60	100
15BTBTOE07	Fundamentals of Nano Biotechnology	3	0	0	3	40	60	100
CIVIL ENGINEERING								
15BECEOEO01	Housing, Plan and Management	3	0	0	3	40	60	100
15BECEOEO02	Building Services	3	0	0	3	40	60	100
15BECEOEO03	Coastal Zone Management	3	0	0	3	40	60	100
15BECEOEO04	Experimental Method and Model Analysis	3	0	0	3	40	60	100
15BECEOEO05	Management of Irrigation Systems	3	0	0	3	40	60	100
15BECEOEO06	Computer Aided Design of Structure	3	0	0	3	40	60	100
15BECEOEO07	Pavement Engineering	3	0	0	3	40	60	100
15BECEOEO08	Rock Engineering	3	0	0	3	40	60	100
15BECEOEO09	Storage Structures	3	0	0	3	40	60	100
15BECEOEO10	Wind Engineering	3	0	0	3	40	60	100
15BECEOEO11	Advanced Construction Technology	3	0	0	3	40	60	100
COMPUTER SCIENCE ENGINEERING								
15BECSEO01	Python Programming	3	0	0	3	40	60	100
15BECSEO02	Internet Programming	3	0	0	3	40	60	100
15BECSEO03	Multimedia and Animation	3	0	0	3	40	60	100
15BECSEO04	PC Hardware and Trouble shooting	3	0	0	3	40	60	100
15BECSEO05	Game Programming	3	0	0	3	40	60	100
ELECTRICAL AND ELECTRONICS ENGINEERING								
15BEEEOEO01	Electric Hybrid Vehicles	3	0	0	3	40	60	100

15BEEEOE02	Energy Management &Energy Auditing	3	0	0	3	40	60	100
15BEEEOE03	Sensors & Transducers	3	0	0	3	40	60	100
15BEEEOE04	Programmable Logic Controller	3	0	0	3	40	60	100
15BEEEOE05	Renewable Energy Resources	3	0	0	3	40	60	100
15BEEEOE06	Advanced Control Systems	3	0	0	3	40	60	100
ELECTRONICS AND COMMUNICATION ENGINEERING								
15BEECOE01	Real Time Embedded Systems	3	0	0	3	40	60	100
15BEECOE02	Consumer Electronics	3	0	0	3	40	60	100
15BEECOE03	Fundamentals of Nanotechnology	3	0	0	3	40	60	100
15BEECOE04	Image &Video Processing	3	0	0	3	40	60	100
15BEECOE05	VLSI Technology	3	0	0	3	40	60	100
15BEECOE06	Fundamentals of MEMS	3	0	0	3	40	60	100
15BEECOE07	Neural Networks and its Applications	3	0	0	3	40	60	100
15BEECOE08	Fuzzy Logic and its Applications	3	0	0	3	40	60	100
MECHANICAL ENGINEERING								
15BEMEEOE01	Introduction to MEMS	3	0	0	3	40	60	100
15BEMEEOE02	Robotics	3	0	0	3	40	60	100
15BEMEEOE03	Industrial Safety and Environment	3	0	0	3	40	60	100
15BEMEEOE04	Transport Phenomena	3	0	0	3	40	60	100
15BEMEEOE05	Introduction to Biomechanics	3	0	0	3	40	60	100
SCIENCE AND HUMANITIES								
15BESH0E01	Industrial Mathematics I	3	0	0	3	40	60	100
15BESH0E02	Industrial Mathematics II	3	0	0	3	40	60	100
15BESH0E03	Probability and Random Process	3	0	0	3	40	60	100
15BESH0E04	Probability and Statistical Methods	3	0	0	3	40	60	100
15BESH0E05	Probability and Queuing Theory	3	0	0	3	40	60	100
15BESH0E06	Fuzzy Mathematics	3	0	0	3	40	60	100
15BESH0E07	Mathematical Physics	3	0	0	3	40	60	100
15BESH0E08	Advanced Engineering Mathematics	3	0	0	3	40	60	100
15BESH0E09	Linear Algebra	3	0	0	3	40	60	100
15BESH0E10	Transforms and Partial Differential Equations (only for B.E. CSE students)	3	0	0	3	40	60	100
15BESH0E11	Technical Writing	3	0	0	3	40	60	100
15BESH0E12	Geophysics	3	0	0	3	40	60	100
15BESH0E13	Engineering Acoustics	3	0	0	3	40	60	100
15BESH0E14	Alternate Fuels and Energy Systems	3	0	0	3	40	60	100
15BESH0E15	Solid Waste Management	3	0	0	3	40	60	100
15BESH0E16	Green Chemistry	3	0	0	3	40	60	100
15BESH0E17	Applied Electrochemistry	3	0	0	3	40	60	100
15BESH0E18	Industrial Chemistry	3	0	0	3	40	60	100
AUTOMOBILE ENGINEERING (Courses offered to other Department)								
15BEAEOE01	Automobile Engineering	3	0	0	3	40	60	100
15BEAEOE02	Basics of Two and Three Wheelers	3	0	0	3	40	60	100
15BEAEOE03	Automobile Maintenance	3	0	0	3	40	60	100

15BEAEOE04	Introduction to Modern Vehicle Technology	3	0	0	3	40	60	100
------------	---	---	---	---	---	----	----	-----

Course Objectives :

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence.
- To study formal context

Course Outcomes

Students undergoing this course will be able to

- 1 Use English language for communication: verbal & non –verbal.
- 2 Enrich comprehension and acquisition of speaking & writing ability.
- 3 Gain confidence in using English language in real life situations.
- 4 Improve word power: lexical, grammatical and communication competence.
- 5 To guide the students to write business letters and other forms of technical writing.
- 6 To remember students to prepare for oral communication in formal contexts.

Unit I**(9)**

Listening– Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II**(10)**

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar**– Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit III**(10)**

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing –

Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses.
Vocabulary – Foreign words used in English – British and American usage.

Unit IV

(8)

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence pattern – Voice (active and passive voice).
Vocabulary – One word substitution.

Unit V

(8)

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION	REFERENCES:
1	Sangeeta	Technical	OUP,	2015	
1	Sangeeta	Communication: Principles and Practice	New Delhi		
1	Ramesh Kumar	2nd Edition	SCITECH Publications,	2009	
	K.R. & Murugavel, T.	Skills for Engineers	Chennai		
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007	
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006	

WEBSITES:

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

Course Objectives:

- To understand geometrical aspects of curvature and elegant application of differential calculus and improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- The goal of this course is for students to gain proficiency in calculus computations. In calculus, we use three main tools for analyzing and describing the behavior of functions: limits, derivatives and vector calculus.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations and partial differential equations.
- To introduce sequence and series which is central to many applications in engineering.
- To study the algebraic manipulation

Course Outcomes:

The student will be able to

- The student will be able to Apply advanced matrix knowledge to Engineering problems.
- Improve their ability in solving geometrical applications of differential calculus Problems.
- Solve engineering problems involving hyperbolic functions, Beta and Gamma functions.
- Expose the concept of sequences and series.
- To analyze and evaluate the accuracy of solution for ordinary differential equations
- To understand the difference of beta and gamma functions in control engineering

UNIT I MATRICES**(12)**

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS**(12)**

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III SEQUENCES AND SERIES**(13)**

Sequences: Definition and examples – **Series:** Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS (12)

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS

(11)

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014
2	Sundaram, V. Lakhminarayan, K.A. & Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES :

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants
4. [www. Intmath.com/calculus/calculus-intro.php](http://www.Intmath.com/calculus/calculus-intro.php)

Course Objectives:

- To inculcate the basics of properties of matter and its applications.
- To study the basics of sound and ultrasonics with appropriate applications.
- To study the fundamentals of thermal and quantum physics and their applications.
- To introduce the concepts of light, laser and fibre optics for diverse applications.
- To impart the basic knowledge of crystal and its various crystal structures.
- To study the quantum mechanics.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Describe the basics of properties of matter and its applications.
- Express the concepts of sound, ultrasonic and their applications.
- Illustrate the thermal properties of materials and advanced physics concepts of quantum theory.
- Identify the basics of light, laser and their applications.
- Identify the basics of fibre optics and their applications.
- Explain the basics of crystals and their structures.

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS (9)

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending.

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS (9)

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER -CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III QUANTUM PHYSICS (9)

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS (9)

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS (9)

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications - Sonogram
 Introduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	8 th Edition 2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	9 th Edition 2011

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

Course Objectives:

- To understand the terminologies of atomic and molecular structure.
- To study the basics of periodic properties and intermolecular forces.
- To study about spectroscopic technique.
- To understand the thermodynamic functions.
- To comprehend the basic Surface Chemistry.
- To get the knowledge of fuels and combustion

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Analyse microscopic chemistry in terms of atomic and molecular orbital and intermolecular forces.
- Rationalise periodic properties such as ionization potential, oxidation states and electronegativity.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise bulk properties and processes using thermodynamic considerations.
- List major chemical reactions that are used in the synthesis of molecules.
- Integrate the chemical principles in the projects undertaken in the field of engineering and technology.

UNIT I WATER TECHNOLOGY (9)

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES (9)

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode - Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS (9)

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, $\text{H}_2\text{-O}_2$ Fuel Cell - Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE (9)

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective

coatings - Paints - Constituents and functions -- Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY

(9)

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water-Applications of adsorption.

Total: 45

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Raman Sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., 3 rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:

- <http://www.studynotes.ie/leaving-cert/chemistry/>
- <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>
- <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>

Course Objectives

1. To impart the basic knowledge about the Electric circuits.
2. To understand the working of various Electrical Machines.
3. To understand the concepts of AC and DC currents.
4. To know about various measuring instruments.
5. To understand the basic concepts in semiconductor devices.
6. To understand the basic concepts of digital electronics

Course Outcomes

Upon completion of this course, the students will be able to

- Understand the basic knowledge about the Electric circuits.
- Infer the characteristics of various Electrical Machines.
- Extend the knowledge on concepts of AC and DC currents.
- Understand the various measuring instruments.
- Develop the idea of semiconductor devices.
- Understand the basic knowledge about digital electronics

UNIT I ELECTRIC CIRCUITS**9**

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II ELECTRICAL MACHINES**9**

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.

UNIT III MEASURING INSTRUMENTS**9**

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV SEMICONDUCTOR DEVICES AND APPLICATIONS**9**

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation, Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT V DIGITAL ELECTRONICS**9**

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

Total Hours:45**TEXT BOOKS**

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	Sedha R.S	Applied Electronics	S. Chand & Co	2006

REFERENCE BOOKS

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Muthusubramanian R, Salivahanan S and Muraleedharan K A	Basic Electrical, Electronics and Computer Engineering	Tata McGraw Hill, Second Edition	2006
2	Nagsarkar T K and Sukhija M S	Basics of Electrical Engineering	Oxford press	2005
3	Premkumar N	Basic Electrical Engineering	Anuradha Publishers	2003
4	Mahmood Nahvi and Joseph A. Edminister	Electric Circuits	Schaum' Outline Series, McGraw Hill	2002

ENGINEERING PHYSICS

Course Objectives

- To learn the basic concepts in physics relevant to different branches of Engineering and Technology.
- To study the concept of semiconductor and conductivity.
- To learn the properties of materials.
- To learn the device for determine the wavelength and velocity of sound
- To study the viscosity of liquids
- To learn the bandgap of semiconductor

Course Outcome

- Familiarize the properties of material and basic concepts in physics.
- Get experience in laser wavelength experimenattion
- Get practical exposure to analyse the velocity of sound
- Get knowledge in bandgap and wavelength determination
- Acquire knowledge about different bendings
- Practical knowledge in therml conductivity of wire and its thickness

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY

Course Objectives

- To learn the basic concepts in chemical terms relevant to different branches of Engineering and Technology.
- To study the concept of alkalinity of water sample.
- To study the hardness and chloride in water by experimental methods
- To learn the ferric ion by spectrophotometry
- To study the PH Titration
- To study the molecular weight and degree of polymerization using viscometry

Course Outcome

- 1.Familiarize the properties of material and basic concepts in chemistry
- 2.Get experience in argentometric method experimentation
- 3.Get practical exposure to analyse the water sample
- 4.Get knowledge in spectrophotometry
- 5.Acquire knowledge about different crystal formation in water
- 6.Practical knowledge in determine the chemical oxygen demand

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

Course Objectives:

- To provide hands-on training for the fabrication of components using carpentry and welding equipment/tools.
- To gain the skills for making fitting joints and household pipeline connections using suitable tools.
- To develop the skills for preparing the green sand mould.
- To present the skills for making the simple household electrical connection.
- To develop the skills for making wood/metal models using suitable tools.

Course Outcomes:

- Fabricate simple components using carpentry and welding equipment/tools.
- Make fitting joints and household pipeline connections using suitable tools.
- Prepare green sand mould using suitable tools.
- Make simple household electrical connections using suitable tools.
- Make simple models using wood and metal.
- Make simple plumbing work

PART – A (CIVIL & MECHANICAL)**1. WELDING**

- i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING

- i. Simple Turning and Taper turning
- ii. Drilling and Tapping

3. SHEET METAL WORK

- i. Model making – Trays, funnels, etc.

4. DEMONSTRATION ON

- i. Smithy operations
- ii. Foundry operations
- iii. Plumbing Works
- iv. Carpentry Works

PART –B (ELECTRICAL & ELECTRONICS)**5. ELECTRICAL ENGINEERING**

- i. Study of electrical symbols and electrical equipments.
- ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
- iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
- v. Measurement of energy using single phase energy meter.

6. ELECTRONICS ENGINEERING

- i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
- ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- iii. Study of logic gates AND, OR, NOT, NOR and NAND.
- iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapoovan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, Vikas Puplishing House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

Course Objectives:

- To learn conventions and use of drawing tools in making engineering drawings.
- To impart knowledge on orthographic projection.
- To draw orthographic projections of points, line and plane surfaces.
- To draw orthographic projections of solids.
- To impart the basic concepts of isometric projections through simple examples.
- To impart knowledge of the CAD software

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Recognise the conventions and apply dimensioning concepts while drafting simple objects.
- Draw freehand sketching of multiple views from pictorial views of objects.
- Draw the orthographic projection of points, line and plane surfaces.
- Draw the orthographic projection of solids.
- Draw the isometric projection of the given objects.
- Demonstrate knowledge of the CAD software

UNIT I INTRODUCTION

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES

SCALES:Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam):

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TEXT BOOKS

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

INTENDED OUTCOME:

- Educate the values and meaning of life in the young minds and to transform them as responsible citizens

UNIT – I :(4)

Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education
- Types of values - Components of values – Attitudes – types of attitudes

UNIT – II :**(4)**

Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT – III :**(5)**

Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT – IV:(4)

Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT - V :(3)

Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings .

Total: 20**REFERENCE BOOKS:**

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

Course Objectives

- To motivate learners to acquire listening & speaking skills in both formal and informal context.
- To focus on question forms & to make them understand the importance of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading.
- To equip them to write for academic as well as work place context.
- To enable students to face interviews.
- To study the receptive and productive skills

Course Outcomes

Students undergoing this course will be able to

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance their reading texts critically and analytically.
- Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.
- Ensure the good communication with the society.

UNIT-1

(10)

Listening - Difference between Hearing & Listening – Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II

(8)

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III

(9)

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R) **Writing** - Essay writing - Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV**(8)**

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V**(10)**

Listening – Types of listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45**TEXT BOOK:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP, New Delhi.	2015
S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective	Tata McGraw-Hill, Delhi.	2007
www.learnerstv.com – Listening/ Speaking/ Presentation/ Delhi.				
www.usingenglish.com – Writing/ Grammar				
3	Rutherford, Andrea, J.	Basic Communication Skills for Technicians	Pearson Education, New Delhi.	2006
www.englishclub.com – Vocabulary Enrichment/ Speaking				
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking				
www.teachertube.com – Writing Technically				
www.Dictionary.com – Semantic Grammar				

REFERENCES :**WEBSITES :**

Course Objectives:

1. To have knowledge in integral calculus and Vectorcalculus
2. To expose the concept of Analytical function and Complexintegration.
3. The syllabus is designed to develop the use of integrals techniques which is needed by Engineers for practical applications.
4. It aims to equip the students in integration to solve engineering problems
5. To learn Basic concepts of multiple and vector integrals.
6. To study complex integration

Course Outcomes:

The student will be able to

1. Solve problems in Fluid Dynamics, Theory of Elasticity, Heat and MassTransfer etc.
2. Find the areas and volumes using MultipleIntegrals
3. Improve their ability in Vectorcalculus
4. Expose to the concept of Analyticalfunction.
5. Apply Complex integration in their Engineeringproblems
6. Analysis the real time application of it.

UNIT-I PARTIAL DIFFERENTIAL EQUATIONS (11)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constantcoefficients.

UNIT-II MULTIPLE INTEGRALS (11)

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS (13)

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green’s theorem, Gauss divergence theorem and Stoke’s theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelopeds.

UNIT-IV ANALYTIC FUNCTIONS (12)

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION (13)

Complex Integration - Cauchy’s integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy’s residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolfram.com

COURSE OBJECTIVES:

1. To impart knowledge on aspects of materials.
2. To understand various types of Conducting Material.
3. To familiarize on Semiconducting Materials.
4. To impart knowledge on Magnetic and Superconducting Material
5. To learn about the Dielectric Materials.
6. To comprehend the significance of Advanced Materials.

COURSE OUTCOMES:

Learners should be able to

1. Identify the aspects of materials.
2. Identify suitable types of Conducting Material.
3. Select appropriate Semiconducting Materials for various applications.
4. Identify and select Magnetic and Superconducting Material.
5. Identify suitable Dielectric Materials.
6. Significance of Advanced Materials.

UNIT I CONDUCTING MATERIALS (9)

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS (9)

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIAL (9)

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity (Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS (9)

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS (9)

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications.

Composite materials, Aircraft materials and non-metallic materials.

Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley & Sons Inc., New York.	9 th Edition 2013
2	James F Shackelford	Introduction to Materials Science for Engineers	Macmillan Publication Company, New York	8 th Edition 2014
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	8 th Edition 2005

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

Course Objectives:

- To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures.
- To create the awareness about environmental problems among people.
- To motivate public to participate in environment protection and improvement.

Course Outcomes (COs)

Upon completion of the course the students will be able to

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
7. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**(9)**

Definition, Scope and Importance – Need for public awareness - Forest resources: Use and over-exploitation, deforestation- Water resources- Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources- Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources- World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources- Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM**(9)**

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY

(9)

Introduction to biodiversity, Definition- Genetic diversity, Species diversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION

(9)

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution– Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT

(9)

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

Total: 45

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	William P.Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Ltd., New Delhi.	2005
3.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

1. <http://people.eku.edu/ritchisong/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=120>
3. www.newagepublishers.com/samplechapter/001281.
4. www.unesco.org/ext/field/beijing/scienceb.htm, www.infinitepower.org/education.htm

Course Objectives:

- To familiarise the basic concepts and force systems in a real-world environment.
- To impart knowledge on the equilibrium of rigid bodies.
- To learn the concept of centroid, centre of gravity and moments of inertia.
- To understand the rectilinear motion and curvilinear motion.
- To enrich the understanding of dynamic forces exerted in rigid body
- To provide knowledge on the friction.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Determine the resultant force and moment for a given system of forces.
- Analyse the plane trusses having different types of supports and determine the forces in each member.
- Identify the location of centroid, centre of gravity and calculate the moment of inertia for different sections.
- Apply the equations of motion of particles to calculate displacement, velocity and acceleration.
- Calculate dynamic forces exerted in rigid body
- Determine the friction and its effects by using the laws of friction.

UNIT I STATICS OF PARTICLES (12)

Forces – system of forces - concurrent forces in plane and space- resultant - problems involving the equilibrium of a particle-free body diagram-equilibrium of particle in space.

UNIT II STATICS OF RIGID BODIES IN TWO DIMENSIONS (12)

Rigid bodies-two dimensional structure-moment of force about an axis-moment of a couple-equivalent system of coplanar forces-Rigid body in equilibrium-problems involving equilibrium of rigid body-types of supports-reactions of beams and frames.

APPLICATION OF STATICS: Roof trusses-Method of joints, method of sections and Tension coefficient method.

UNIT III CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA (12)

Centroids of areas, composite areas, determination of moment of inertia of plane figures, polar moment of inertia-radius of gyration – mass moment of inertia of simple solids.

UNIT IV KINEMATICS OF PARTICLES (12)

Introduction-plane, rectilinear motion - time dependent motion-rectangular coordinates-projectile motion.

IMPULSE AND MOMENTUM: Concept of conservation of momentum- Impulse-Momentum principle-Impact-Direct central impact-oblique central impact.

UNIT V FRICTION (12)

Laws of friction-coefficient of friction-problems involving dry friction- wedge and ladder friction.

KINETICS OF PARTICLES: Equation of motion-rectilinear motion-Newton's II law – D'Alembert's principle- Energy - potential energy-kinetic energy-conservation of energy-work done by a force - work energy method.

Total: 60

TEXT BOOKS:

S.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ferdinand Beer, David Mazurek, Jr.,E.Russell Johnston, Phillip Cornwell	Vector Mechanics for Engineers-Statics and Dynamics	Science Engineering and Math	2013
2.	Rajasekaran S	Engineering Mechanics- Statics and Dynamics	Vikas Publishing House Pvt. Ltd., New Delhi	2009

REFERENCE BOOKS:

S.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr.R.K.Bansal and Sanjai bansal	A Textbook of Engineering Mechanics	Laxmi Publications Pvt. Ltd., New Delhi	2013
2.	Bhavikatti S S.	Engineering Mechanics	New Age International Pvt. Ltd., New Delhi	2012
3.	Young D H.,S Timoshenko, J.V.Rao and Sukumar Pati	Engineering Mechanics	McGraw– Hill Education(India) Private Limited , New Delhi	2013
4.	Jivan Khachane and Ruchi Shrivastava	Engineering Mechanics	ANE Books, New Delhi.	2008

Course Objectives:

- To identify and understand the working of key components of a computer program.
- To identify and understand the various kinds of keywords and different data types of C programming.
- To understand, analyse and implement software development tools like algorithm, pseudo codes and programming structure.
- To study, analyse and understand the logical structure of a computer program, and different constructs to develop a program in C language.
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure.
- Study, analyze and understand logical structure of a computer program, and different constructs to develop a program in 'C' language

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Formulate simple algorithms for arithmetic and logical problems.
- Translate the algorithms to programs (in C language).
- Test and execute the programs and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

UNIT I	Overview of Computer	8
---------------	-----------------------------	----------

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types- Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II	Overview of ‘C’	8
----------------	------------------------	----------

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III Selection and Iteration 9

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop- break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV Functions

10

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V Arrays and Strings

10

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters

Total Hours: 45

Text Books:

1. H. M. Deitel and D. J. Deitel, 'C: How to Program', Prentice Hall, 7th Edition, 2012
2. Yashavant Kanetkar, "Let us C", BPB Publications, 13th Edition, 2013

References:

1. E. Balagurusamy, "Computing Fundamentals and C Programming", TMH Education, 5th Edition, 2014
2. E. Balagurusamy, "Programming in ANSI C", TMH Education, 6th edition, 2012

Course Objectives

- Identify and understand the working of key components of a computer program.
- Identify and understand the various kinds of keywords and different data types of C programming
- Understand, analyze and implement software development tools using algorithm
- Understand, analyze and implement software development tools using linux
- Acquire and analyse the roots of equations
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in “C” language

Course Outcomes:

The course will enable the students.

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs(in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem in to functions and synthesize a complete program using divide and conquer approach. and use arrays, pointers and structures to formulate algorithms and programs.
6. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

List of Experiments

1. Working with word Processing, Spreadsheet and presentation software in Linux.
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming.
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function.

Total Hours: 45

- To explain the surfaces for sheet metal working applications.
- To Understand the representation of details in machine drawing.
- To introduce tolerances and fits of machine elements.
- To equip them with skills to Construct an assembly drawing using part drawings of machine components.
- To equip them with skills to Construct an assembly drawing of machine components using 2D drafting.
- To Understand various Cam Profile

Course Objectives:

Course Outcomes:

- Draw the surfaces for sheet metal working applications.
- Understand the representation of details in machine drawing.
- Represent tolerances and fits of machine elements.
- Construct an assembly drawing using part drawings of machine components.
- Construct an assembly drawing of machine components using 2D drafting
- Understand the various Cam Profile

UNIT I CONVENTIONS

Importance of sectional views, Code of practice for engineering drawing, drilled and tapped holes, countersunk and counter bored holes, internal and external threads, undercuts, grooves, chamfers, fillet radii and keyways. Conventions to represent standard components-bolts, nuts, washers, screws, cotters, pins, circlips, bearings, gears, springs and flanges.

UNIT II ASSEMBLY CONCEPTS AND DRAWING PRACTICE

Methods and concepts of assemblies-assembly requirements, Bill of materials. Methods of assembly-bolts, nuts, studs, screws and pins. Methods of arresting motion of a member in an assembly. Drawing Practice of flange coupling, universal coupling, oldhams coupling, swivel bearing, stuffing box, knuckle joint, C clamp, plummer block, screw jack, simple drill jig.

UNIT III FITS AND TOLERANCES

Limits, fits and tolerances-need, types, representation of tolerances on drawing, calculation of minimum and maximum clearances and allowances. Geometric tolerance-uses, types of form and position tolerances, symbols, method of indicating geometric tolerances on part drawings. Surface finish symbols- methods of indicating the surface roughness.

UNIT IV SOLID MODELING

Modelling of flange coupling, universal coupling, oldhams coupling, swivel bearing, stuffing box, knuckle joint, C clamp, plummer block, screw jack, simple drill jig.

UNIT V CAM PROFILE

Classifications, displacement diagrams-parabolic, uniform velocity, simple harmonic paths. Layout of plate cam profiles for different types of followers - knife - edged, roller, mushroom, flat type, derivatives of follower motion, pressure angle and undercutting.

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Gopalakrishna K R	Machine Drawing Seventeenth Edition	Subhas Stores, Bangalore	2003
2.	Narayana K L, Kannaiah P, Venkata Reddy K	Machine Drawing	New Age International	2006.

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Varghese P I and John K C	Machine Drawing	Jovast Publishers, Thrissur	2007
2.	BIS	SP:46-2003	Engineering Drawing Practice for Schools and Colleges, New Delhi	2003
3.	ASME Y 14.5M-1994	Dimensioning and Tolerancing	ASME, New York	1995

INTENDED OUTCOMES:

- To understand the basics of biomolecules, human anatomy and physiology
- To have better understanding of advancements in biology

UNIT-I BASICS OF CELL BIOLOGY**(4)**

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT-II BIOMOLECULES**(4)**

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins-classification and functions; Nucleic acids-basic structure; Hormones-definition, importance; Vitamins.

UNIT-III HUMAN ANATOMY AND PHYSIOLOGY**(5)**

Levels of Structural organization, the eleven systems of human body, central nervous system-cardiovascular system and immune system.

UNIT-IV GENETICS AND GENETIC DISORDERS**(4)**

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information-genemutation, disorders due to mutant genes.

UNIT-V TECHNOLOGICAL ADVANCES IN BIOLOGY**(3)**

Biopharmaceuticals, Gene therapy, genetically modified crops, probiotics.

Total: 20**TEXTBOOK:**

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIONS
1	Verma, P.S., Agarwal, V.K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S.Chand & Company Ltd., New Delhi	2006

REFERENCE BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIONS
1	Nelson, D. L. and Cox, M.M	Lehninger Principles of Biochemistry 4 th Edition	Freeman, W.H. & Co company, New York	2004

2	Tortora, G.J., Derrickson, B	Principles of Anatomy and Physiology, 11 th Edition	John Wiley & Sons, New York	2006
---	------------------------------	---	-----------------------------	------

WEBSITE

- | |
|--|
| 1. http://www.biotechonweb.com/Application-of-biotech-in-Medical.html |
|--|

Course Objectives:

- To hone the analytical skills in the minds of Engineers.
- To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyze Engineering problems.
- To study the fourier series
- To study the basic principles of different transforms.
- To study the application of PDE
- To study the difference equations

Course Outcomes:

Upon Completion of this course the students will be able to:

1. Explain the fundamental concepts of probability and standard distributions which can describe real life phenomenon.
2. Explain the basic concepts of one- and two-dimensional random variables and their applications in engineering.
3. Apply the concept of testing of hypothesis for small and large samples in real life problems.
4. Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
5. Discuss the notion of sampling distributions and statistical techniques used in engineering and management problems.
6. Discuss about the techniques in quality control that model engineering problems

UNIT- I LAPLACE TRANSFORM**(13)**

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions.

UNIT- II FOURIER SERIES**(12)**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT -III FOURIER TRANSFORM**(12)**

Fourier integral theorem (Statement Only) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT- IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**(12)**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded)

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS**(10)**

Z-transform - Elementary properties – Inverse Z- transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES:

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. www.nptel.ac.in

Course Objectives:

- To study and estimate the mechanical properties of materials and their deformations under different loading conditions.
- To gain knowledge on the shear force and bending stress distribution in different beams under various loads.
- To impart knowledge on finding slope and deflection of beams and buckling of columns for various boundary conditions.
- To learn deformation of the shaft under torsion and deflection of closed helical springs.
- To acquire knowledge on the two-dimensional stress systems and stresses in thin cylinders and spherical shells.
- To introduce the concepts of Mohr's circle

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Evaluate the stresses and strains in simple and composite structures subjected to axial loads.
- Examine the shear force, bending moment and shear stress of various beams under different loading conditions.
- Examine the stresses induced in the shaft and closed coil helical springs subjected to torsion.
- Evaluate the slope and deflection of beams and buckling loads of columns with different boundary conditions.
- Examine the stresses in two-dimensional systems and thin cylinders.
- Familiar with construction of Mohr's circle

UNIT I STRESS STRAIN AND DEFORMATION OF SOLIDS

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

UNIT II BEAMS - LOADS AND STRESSES

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow

UNIT III TORSION

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

UNIT IV BEAM DEFLECTION

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Double integration method, Macaulay Method, and Moment-area Method –Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankine formula for columns

UNIT V ANALYSIS OF STRESSES IN TWO DIMENSIONS

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr's circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Popov .E.P	Engineering Mechanics of Solids	Prentice-Hall of India, New Delhi	1998
2.	Punmia .B.C, Ashok Kumar Jain and Arun Kumar Jain	Strength of Materials and Theory of Structures-Vol.2	Laxmi Publications, New Delhi	2005
3.	Ferdinand Beer, E. Russell Johnston Jr., John DeWolf and David Mazurek	Mechanics of Materials, 7 th Edition	McGraw-Hill Book Co, New Delhi.	2014

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William Nash, Merle Potter	Theory and problems in Strength of Materials Schaum Outline Series	McGraw-Hill Book Co, New York.	2011
2.	Kazimi S.M.A	Solid Mechanics	Tata McGraw-Hill Publishing Co., New Delhi.	2001
3.	Ryder G.H	Strength of Materials	Macmillan India Ltd, New Delhi	2002
4	Timoshenko.S.P.	Elements of Strength of Materials', 5th Edition	East West, India	2003

Course Objectives:

- To understand the Model of physical systems into relevant thermodynamic system and apply energy balance equation for closed and open system.
- To provide knowledge on entropy change in thermodynamic processes.
- To Study and acquire knowledge on various thermodynamic properties of pure substances in real time problems.
- To establish the basic thermodynamic relations and properties of ideal and real gases for physical systems.
- To facilitate the understanding of properties of air using psychometric chart.
- To acquaint the student with the concepts and applications of the thermodynamics to the various real life systems.

Course Outcomes:

Upon completion of this course, the students will be able to

- Model the physical systems into relevant thermodynamic system and apply energy balance equation for closed and open system.
- Determine entropy change in thermodynamic processes.
- Identify the various thermodynamic properties of pure substances in real time problems.
- Establish the basic thermodynamic relations and properties of ideal and real gases for physical systems.
- Calculate the properties of air using psychometric chart.
- Explain the basic principles and applications of the thermodynamics to the various real life systems.

UNIT I BASIC CONCEPTS AND FIRST LAW

Basic concepts - concept of continuum, macroscopic approach, thermodynamic systems - closed, open and isolated. Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – application to closed and open systems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments.

UNIT II SECOND LAW, ENTROPY AND AVAILABILITY

Second law of thermodynamics – Kelvin's and Clausius statements of second law. Reversibility and irreversibility. Carnot cycle, reversed carnot cycle, Rankine cycle ,efficiency, COP. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy – Carnot theorem, absolute entropy, availability.

UNIT III PROPERTIES OF PURE SUBSTANCE AND IDEAL & REAL GASES

Properties of steam, Pure substance, phase, phase change process, property diagrams, PVT surface. Gas mixtures- properties of ideal and real gases, equation of state, Avagadro's law, Vander Waal's equation of

states, compressibility and its chart. Dalton's law of partial pressure, exact differentials, T-D, relations, Maxwell relations, Clausius Clapeyroni equations, Joule Thomson Coefficient, Dryness fraction

UNIT IV PSYCHROMETRY

Psychrometry and psychrometric charts, property calculations of air vapour mixtures. Psychrometric process-sensible and latent heat exchange processes.

UNIT V GAS DYNAMICS

Energy and momentum equations of compressible fluid flows-stagnation state, Mach number, Mach cone, effect of Mach number on compressibility, isentropic flow through variable area ducts, (Descriptive study-Rayleigh , Fanno flow, normal shocks).

(Use of standard Steam table, Mollier diagram, Psychometric chart and Gas table are permitted in the examination)

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Nag.P.K	Engineering Thermodynamics-5 th Edition	McGraw-Hill Education (India) Private Limited	2013
2.	Rathakrishnan.E	Fundamentals of Engineering Thermodynamics	Prentice-Hall of India, New Delhi	2005
3.	Yahya, S.M,	Fundamentals of Compressible Flow	New Age International (P) Ltd., New Delhi	2003

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Holman J P	Heat Transfer	McGraw Hill Education	2009
2.	Arora.C.P	Thermodynamics	Tata McGraw-Hill, New Delhi.	2003
3.	Cohen. H., Rogers G.F.C and Saravanamuttoo.H.I.H and Paul Straznicky	Gas Turbine Theory	Prentice-Hall of India, New Delhi	2008

Course Objectives:

- To impart basic knowledge on the construction and operation of two-stroke and four-stroke engines.
- To study various components of the fuel feed system.
- To learn the combustion process and types of combustion chambers.
- To provide knowledge on the supercharging, turbocharging and engine testing.
- To familiarise the types of cooling and lubrication systems.
- To provide knowledge on modern engine technologies

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Differentiate the construction and operation of two-stroke and four-stroke engines.
- Name and explain various components of the fuel feed system.
- Discuss the combustion process and combustion chambers.
- List and describe the different methods of supercharging and turbocharging.
- Explain the importance of cooling system.
- Explain the importance of lubrication system.

UNIT I ENGINE CONSTRUCTION AND OPERATION

Constructional details of four stroke petrol and diesel engine, working principle, air standard Otto cycle, actual indicator diagram, two stroke engine construction and operation, comparison of four stroke and two stroke engine, firing order and its significance. Port Timing, Valve Timing of petrol and diesel engines.

UNIT II FUEL FEED SYSTEM

Carburettor working principle, requirements of an automotive carburettor, starting, idling, acceleration and normal circuits of carburettors. Compensation, maximum power devices, constant choke and constant vacuum carburettors, fuel feed systems; mechanical and electrical fuel feed pumps. Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)-Jerk pumps, distributor pumps, pintle and multihole nozzles, Unit injector and common rail injection systems. Injection pump calibration. Need for a governor for diesel engines. Description of a simple diesel engine governor.

UNIT III COOLING, LUBRICATION AND IGNITION SYSTEM

Need for cooling system, Types of cooling system: air cooling system, liquid cooling system, forced circulation system, pressure cooling system. Lubrication system; Mist, Dry sump and wet sump lubrication system, properties of lubricants.

Types of ignition systems and its working battery coil, magneto and electronic ignition systems, relative merits and demerits, centrifugal and vacuum advance mechanisms. Types and construction of spark plugs.

UNIT IV COMBUSTION AND COMBUSTION CHAMBERS

Combustion in SI engine; stages of combustion, flame propagation, Delay period, Uncontrolled combustion, Effect of Delay period, rate of pressure rise, abnormal combustion, detonation, effect of engine variables on

knock, knock rating. Combustion chambers; different types, Combustion in CI Engines, Direct and indirect injection combustion chambers for CI engines. Importance of Swirl, squish and turbulence. Factors considering combustion chamber design.

UNITV SUPERCHARGING, TURBOCHARGING AND ENGINE TESTING Supercharging and Turbocharging, Different methods of turbocharging, Intercooling, Turbocharger controls - wastegate, variable geometry, variable nozzle types. Dynamometers, indicated thermal, brake thermal and volumetric efficiencies. Measurement of friction, Cylinder pressure measurement. Engine performance maps, Engine testing standards.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2012
2.	Mathur .M.L and R.P.Sharma	A course in internal combustion engines	Dhanpat Raj& Sons Publications, New Delhi	2001
3.	Heinz Heisler	Advanced Engine Technology	Butterworth-Heinemann	1998

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John B. Heywood	Internal Combustion Engine Fundamental	McGraw-Hill Education(India) Private Limited.	2011
2.	Heldt.P.M	High Speed Combustion Engines: Design, Production, Test	Oxford & IBH Publishing Company	1965
3.	Obert.E.F	Internal Combustion Engines Analysis and Practice	International Text Books Co., Scrantron, Pennsylvania	1988
4.	William H.Crouse, 1985	Automotive Engines	McGraw-Hill Publishers.	2006
5.	Ellinger.H.E	Automotive Engines	Prentice Hall Publishers.	1992
6.	Pulkrabek	Engineering Fundamentals of the Internal Combustion Engines	Practice Hall of India.	2003

Course Objectives:

- To impart technical knowledge on construction and working of the power train and drive train of two and three wheeler vehicles.
- To familiarise with maintenance procedures of the engine and subsystems of two and three wheelers.
- To impart knowledge on types of transmission systems
- To impart knowledge on types of steering and suspension systems
- To impart knowledge on types of wheels, tyres and brakes for two and three wheelers
- To make the students conversant on servicing of two and three wheelers.

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
- Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS

2 stroke and 4 stroke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, NewJersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

Course Objectives:

- To understand Various material properties.
- To acquire the ability to determine the behavior of components for applied load.
- To expose students to different types of beams with various load condition.
- To expose students to strain energy, stress distribution & deformation in spring and shaft
- To provide an overview of slope and beam deflection.
- To make the student acquire sound knowledge on types of stresses

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Understand Various material properties
 - Apply the principles of solid mechanics, to determine the behavior of components for applied load.
 - Compute the shear force and bending moment for different types of beams with various load condition and also sketch the SF and BM diagram.
 - Calculate the strain energy, stress distribution & deformation in spring and shaft.
 - Use the appropriate method to determine slope and beam deflection for different beam sections.
 - Solve the problem in principal planes & stresses using analytical & graphical method and determine the different types of stresses involved in thick cylinders & thin cylinders.
-
1. Tensile test on metals-stress strain characteristics, ductility, resilience, toughness.
 2. Cupping test on metal sheets-load deformation characteristics, cupping load, cupping number.
 3. Hardness test on metals-Brinell, Vicker and Rockwell Hardness tests.
 4. Impact test on metals-Charpy, Izod impact tests.
 5. Shear test on metals-direct shear strength, single shear, double shear.
 6. Tests on helical springs-compression, tension springs-load deformation characteristics, stiffness, shear stress, modulus of rigidity, energy.
 7. Torsion test on beams-torque and angle of twist characteristics, shear stress, modulus of rigidity, energy.
 8. Microscopic examination of i) Hardened samples ii) Hardened and tempered samples.
 9. Tempering – Improvement of Mechanical properties – Comparison for
i) Unhardened specimen ii) Quenched specimen iii) Quenched and tempered specimen.
 10. Study of low carbon steel and medium carbon steel

15BEAE312 AUTOMOTIVE ENGINE COMPONENTS LABORATORY0 0 3 2 100

Course Objectives:

- To expose students to 4 cylinder petrol and 6 cylinder diesel engines .
- To provide knowledge on Fuel systems
- To provide knowledge on ignition system.
- To learn the engine cooling system components
- To study the engine lubrication system.
- To impart knowledge on cylinder bore and engine crank shaft.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Dismantling and Assembling procedure of 4 cylinder petrol and 6 cylinder diesel engines
- Knowledge on Fuel systems
- Knowledge on ignition system
- Study on engine cooling system components
- Study the engine lubrication system
- Knowledge on cylinder bore and engine crank shaft

1. Dismantling of 4 cylinder petrol engine.
2. Assembling of 4 cylinder petrol engine.
3. Dismantling of 6 cylinder diesel engine.
4. Assembling of 6 cylinder diesel engine.
5. Study of oil filter, fuel filter, fuel injection system, carburetor, MPFI & CRDI
6. Study of ignition system components – coil, magneto and electronic ignition systems.
7. Study of engine cooling system components
8. Study of engine lubrication system components
9. Ovality and taper measurement of cylinder bore and comparison with standard specifications
10. Ovality and taper measurement of engine crank shaft and comparison with standard specification

Course Objectives:

- To understand and interpret drawings of machine components.
- To acquire the ability in designing and making the assembly drawing of various components.
- To expose students to drawing of **sleeve and cotter joint**.
- To expose students to **knuckle joint, gib and cotter joint**
- To provide an overview of drawing of **universal coupling, screw jack**.
- To make the student acquire sound knowledge of piston and connecting rod

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Sketch the detailed drawing of **sleeve and cotter joint**.
- Sketch the detailed drawing of **knuckle joint**
- Sketch the detailed drawing of **gib and cotter joint**.
- Sketch the detailed drawing of **universal coupling**.
- Sketch the detailed drawing of **screw jack**.
- Create the assembly drawing of piston and connecting rod

1. Modeling of solid blocks
2. Modeling of V- Block , L- Block with rib
3. Modeling of blocks with holes
4. Modeling with square cut and U cut
5. Modeling of pistons and connecting rods
6. Assembly drawing of screw jack
7. Assembly drawing of Universal coupling
8. Assembly drawing of flanged coupling
9. Assembly drawing of knuckle joint
10. Modeling of valves
11. Modeling of crank shaft
12. Modeling of bumper
13. Modeling of frame assembly

OBJECTIVES:

- To assist students to understand the role of thinking in all forms of communication.
- To help students with neutral accent.
- To guide students to read and comprehend articles from newspapers and magazines.
- To equip students with oral and appropriate written communication skills.
- To assist students with employability and job search skills.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Listen to/ view and comprehend different spoken discourses/ excerpts in different accents.
- Take national and international examination and enhance the performance at Placement Interviews.

UNIT - I ESSENTIALS OF COMMUNICATION

Communication: Definition-Process-Scope-Types- Barriers- Dyadic Communication exercises.

UNIT - II SPEECH PROCESS

Pronunciation – Voice quality – Vowels – Consonants – Diphthongs – Syllables – Word stress - Sentence Stress – Pause - Intonation – Accent.

UNIT - III ORAL COMMUNICATION

Distinguishing between Formal and Informal speech – Defining and Describing objects and people –Self Introduction – Extempore talk on a given topic - Asking questions politely, disagreeing politely in formal contexts – Speaking to a group - Giving oral presentations – Group discussion – Debates- Types of Interview.

UNIT - IV WRITTEN COMMUNICATION

Formal Reports - Project Proposals - Book reviews - Official Correspondence - Proof Reading & Editing.

UNIT – V ENGLISH FOR COMPETITIVE EXAMINATION

Synonyms, Antonyms –Grammar and usage – Error Identification – Reading comprehension- Verbal analogy- Verbal Test.

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Jane Summers & Brett Smith	Communication Skills Handbook: How to Succeed in Written and Oral Communication 3rd Ed.	Hoboken, N.J. : Wiley ; Chichester : John Wiley [distributor], USA.	2009

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Anderson, Paul V	Technical Communication	Thomson and Wadsworth Publishers, USA.	2007
2	Barun, Mitra K	Effective Technical Communication – A Guide for Scientists and Engineers	Oxford University Press, New Delhi.	2006
3	Seely, John.	The Oxford Guide to Effective Writing and Speaking	Oxford University Press, New Delhi.	2005

WEBSITES :

<p>www.learning-development.hr.toolbox.com – Unit-III- Oral Communication</p> <p>www.englishclub.com - Writing/ Grammar – Unit-IV</p> <p>www.ispeakyouspeak.blogspot.com- Vocabulary Enrichment/ Speaking – Unit-II</p> <p>www.teachertube.com - Writing Technically – Unit- V</p> <p>www.Dictionary.com -Semantic / Grammar – Unit-IV & V</p>
--

Course Objectives:

- To impart knowledge on the fundamentals of thermodynamics, zeroth law, first law and second law of thermodynamics.
- To study the thermodynamic properties of pure substances and its phase change processes.
- To learn the gas power cycles and properties of gas mixtures.
- To acquaint the student with the concepts of air standard performance of heat engines.
- To impart knowledge of the conduction heat transfer mechanisms.
- To learn the principles of convection and radiation.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Apply the first law of thermodynamics to closed and open systems.
- Solve the problems related to cycles and cyclic devices using the second law of thermodynamics.
- Determine the thermodynamic properties of pure substances and its phase change processes.
- Evaluate the air standard performance of heat engines.
- Apply the heat conduction equation to compute the rate of heat transfer in simple and composite systems.
- Determine the rate of heat transfer in convection mode and radiation mode

UNIT I GAS POWER CYCLES

Air standard cycles-Otto-Diesel-Dual-Work output, Efficiency and MEP calculations – Comparison of the cycles with respect to compression ratio, heat addition, heat rejection, peak pressure, temperature and work output, Simple Brayton cycle.

UNIT II RECIPROCATING AIR COMPRESSORS & REFRIGERATION CYCLES

Single acting and double acting air compressors, work required, effect of clearance volume, volumetric efficiency, isothermal efficiency, free air delivery, two stage compression, condition for minimum work.

Fundamentals of refrigeration, C.O.P., reversed Carnot cycle, simple vapour compression refrigeration system, T-S, P-H diagrams, simple vapour absorption refrigeration system, desirable properties of an ideal refrigerant.

UNIT III HEAT CONDUCTION

Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – General Differential equation of Heat Conduction – Fourier Law of Conduction – Cartesian and Cylindrical Coordinates – One Dimensional Steady State Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems – Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – Use of Heisler's Chart.

UNITIV HEAT CONVECTION

Basic Concepts – Convective Heat Transfer Coefficients – Boundary Layer Concept –

Types of Convection – Forced Convection – Dimensional Analysis – External Flow – Flow over Plates, Cylinders and Spheres – Internal Flow – Laminar and Turbulent Flow – Combined Laminar and Turbulent – Flow over Bank of tubes – Free Convection – Dimensional Analysis – Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres.

UNITV RADIATION

Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchoff Law –Black Body

Radiation –Grey body radiation Shape Factor Algebra – Electrical Analogy – Radiation Shields –(Descriptive study -Gas Radiation).

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rajput.R.K	Applied Thermodynamics	Laxmi Publishing Co., New Delhi	2009
2	Holman.J.P, Souvik Bhattacharyya	Heat Transfer	McGraw –Hill Education (India) Private Limited	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Nag.P.K	Basic and applied Thermodynamics	McGraw –Hill Education (India) Private Limited	2009
2	Nag.P.K	Heat and Mass Transfer	McGraw –Hill Education (India) Private Limited	2011
3.	Kothandaraman.C.P	Fundamentals of Heat and Mass Transfer	New Age International, New Delhi.	2012

Course Objectives:

- To learn the design procedure of frame and springs.
- To study the design procedure of front axle and steering linkages.
- To provide knowledge on the design of clutches.
- To impart knowledge on the design of three speed and four speed gearboxes.
- To study the design of driveline components.
- To facilitate the understanding of shafts

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Design the frame and springs for automotive.
- Analyse the loads, moments and stresses at different sections of front axle.
- Design a suitable clutch for various engineering applications.
- Design the gearbox for various engineering applications.
- Design the propeller shaft to transmit required torque.
- Design the rear axle shafts

UNIT I INTRODUCTION

Types of chassis layout with reference to engine locations and drive, Vehicle frames. Various types of frames. Constructional details, Materials. Testing of vehicle frames. Unitised frame body construction: Loads acting on vehicle frame.

UNIT II FRONT AXLE AND STEERING SYSTEM

Types of front axles. Construction details. Materials. Front wheel geometry viz. Castor, Camber, King pin inclination, Toe-in - Conditions for true rolling motion of wheels during steering, turning radius, Wheel wobble and shimmy. Ackerman and Davis steering system. Constructional details of steering linkages. Different types of steering gear boxes. Steering linkages and layouts for conventional and independent suspension system. Power and power assisted steering.

UNIT III DRIVE LINE, REAR AXLE, FINAL DRIVE, AND DIFFERENTIAL

Effect of driving thrust and torque reactions. Hotch-kiss drive, torque tube drive and radius rods. Propeller shaft. Universal joints. Constant velocity joints. Front wheel drive. Construction of rear axles. Types of loads acting on rear axles. Fully floating Three quarter floating and Semi floating rear axles. Rear axle housing. Construction of different types of axle housings. Multi axled vehicles. Construction details of multi drive axle vehicles. Different types of final drive. Double reduction and twin speed final drives. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock - Differential housing.

UNIT IV SUSPENSION SYSTEM

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension - Pneumatic suspension - Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT V BRAKING SYSTEM, WHEELS AND TYRES

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory. Determination of braking torque. Brake actuating systems - Mechanical, Hydraulic and Pneumatic – Detailed study of components. Parking and engine exhaust brakes. Factors influencing brake performance. Power and power assisted brakes. Antilock Braking System (ABS).

Types of wheels - construction. Function of tyres - Solid and pneumatic Tyres. Constructional details of pneumatic tyres.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Tim Gilles	Automotive Chassis- Brakes, Steering and Suspension	Cengage Learning	2005
2.	Heldt .P.M	The Automotive Chassis	Literary Licensing, LLC	2012
3.	Reimpell.J, Stoll.H and Betzler.J.W	The Automotive Chassis: Engineering Principles	Elsevier India Pvt Ltd	2013

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Tom Birch	Automotive Braking Systems	Cengage Learning	1999
2.	Tom Birch	Automotive Chassis Systems	Cengage Learning	1999
3.	Tom Birch	Automotive Suspension and Steering Systems	Delmar Cengage Learning	1998
4.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001
6.	John Peter Whitehead, Donald Bastow and Geoffrey Howard	Car Suspension and Handling	SAE Inc	2014

Course Objectives:

- To enrich the understanding of Clutch and Gear Box
- To introduce Hydrodynamic Drive
- To familiarize the students to understand Planetary Gear Boxes
- To introduce the concepts of Automatic Transmission Applications
- To provide knowledge on Hydrostatic Drive
- To provide knowledge on Electric Drive

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- To learn the detailed study of Clutch and Gear Box
- To learn the detailed study of Hydrodynamic Drive
- To learn the detailed study of Planetary Gear Boxes
- To learn the detailed study of Automatic Transmission Applications
- To learn the detailed study of Hydrostatic Drive
- To learn the detailed study of Electric Drive

UNIT I CLUTCH AND GEAR BOX

Requirements of transmission system. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Typical problems involving the above principles.

UNIT II HYDRODYNAMIC DRIVE

Fluid coupling - principle of operation, constructional details, torque capacity, performance characteristics, reduction of drag torque. Torque converter - Principle of operation, constructional details, performance characteristics, converter coupling, multistage and poly phase torque converters.

UNIT III AUTOMATIC TRANSMISSION

Ford –T model gearbox, Wilson gearbox, Cotal electromagnetic transmission, Automatic over drive, Hydraulic control system for automatic transmission.

UNIT IV AUTOMATIC TRANSMISSION APPLICATIONS

Chevrolet Turbo glide transmission, Toyota “ECT-i” Power glides Transmission (Automatic Transmission with Intelligent Electronic control system), Mercedes Benz Automatic transmission, Hydraulic actuation system for automatic transmission system.

UNIT V HYDROSTATIC AND ELECTRIC DRIVES

Hydrostatic drive – principle, types, advantage and limitations. Comparison of hydrostatic drive with hydrodynamic drive. Construction and working of typical Janny hydrostatic drive.
Electric drive - Principle of early and modified Ward Leonard Control system. Advantage & limitations. Performance characteristics.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAEInc	2001
2.	Heinz Heisler	Advanced Vehicle Technology	Butterworth Heinemann Publishers	2002

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Arthur William Judge	Modern Transmission systems	Massachusetts Robert Bentley Inc	1969
2.	William H. Crouse, Donald L.Anglin	Automotive Transmission and Power Trains construction	McGraw Hill.	1976

OBJECTIVE

- To understand the mobility of mechanism in practice.
- To understand the mechanism for displacement, velocity and acceleration at any point in a link.
- To enrich the understanding of cam-follower principles for practical applications.
- To make the students conversant in selecting appropriate gear trains for engineering applications.
- To understand the friction concepts in machine parts and assembly.
- To give exposure to the basic components and layout of linkages in the assembly of a system.

OUTCOME

- Compute the mobility of mechanism in practice.
- Analyze a mechanism for displacement, velocity and acceleration at any point in a link.
- Apply cam-follower principles for practical applications.
- Select appropriate gear trains for engineering applications.
- Analyze friction concepts in machine parts and assembly.
- Understand the basic components and layout of linkages in the assembly of a system.

UNIT I BASICS OF MECHANISMS

Terminology and Definitions–Degree of Freedom – Mobility–Kutzbach criterion–Grashoff's law–Kinematic Inversions of 4–bar chain and slider crank –Mechanical Advantage–Transmission angle–Description of common Mechanisms–Single, double and offset slider mechanisms – Quick return mechanisms – Ratchets and escapements – Indexing Mechanisms – Rocking Mechanisms – Straight line generators–Design of Crank–rocker Mechanisms.

UNIT II KINEMATICS

Displacement, velocity and acceleration – analysis in simple mechanisms – Graphical Method –velocity and acceleration polygons – Kinematic analysis by Complex Algebra methods–Vector Approach, Computer applications in the kinematic analysis of simple mechanisms– Instantaneous center – Coriolis Acceleration.

UNIT III KINEMATICS OF CAM

Classifications – Displacement diagrams–parabolic, Simple harmonic and Cycloidal motions – Layout of plate cam profiles – Derivatives of Follower motion – High speed cams – circular arc and tangent cams – Standard cam motion – Pressure angle and undercutting.

UNIT IV GEARS

Spur gear Terminology and definitions–Fundamental Law of toothed gearing and involute gearing–Interchangeable gears–gear tooth action – Terminology – Interference and undercutting–Non standard gear teeth– Helical, Bevel, Worm, Rack and Pinion gears (Basics only)–Gear trains–Parallel axis gear trains–Epicyclic gear trains–Differentials

UNIT V FRICTION

Surface contacts–Sliding and Rolling friction – Friction drives – Friction in screw threads – Friction clutches – Belt and rope drives, Friction aspects in Brakes – Friction in vehicle propulsion and braking.

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rattan	Theory of Machines	Tata McGraw–Hill Education	2009
2	Joseph Shigely, John Uicker, Gordon Pennock	Theory of Machines and Mechanisms	Oxford University Press	2010

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Thomas Bevan	Theory of Machines	CBS Publishers	2005
2	Amitabha Ghosh and Asok Kumar Mallik	Theory of Mechanisms and Machines	EastWest Press	2006
3	Rao J.S and Dukkipati R.V	Mechanism and Machine Theory	New Age International (P) Ltd	2006

STANDARDS :

- IS 2458 : 2001, Vocabulary of Gear Terms – Definitions Related to Geometry
- IS 3756 : 2002, Method of Gear correction – Addendum modification for External Cylindrical Gears with Parallel Axes.
- IS 5267 : 2002 Vocabulary of Gear Terms – Definitions Related to Worm Gear Geometry.
- IS 12328 : Part 1: 1988 Bevel Gear Systems Part – 1 Straight Bevel Gears.
- IS 12328 : Part 2: 1988 Bevel Gear Systems Part – 2 Spiral Bevel Gears

Course Objectives:

- To enrich the understanding of fluid properties
- To make the students conversant with types of flow and calculate Major and minor losses in pipes.
- To acquaint the student with the concepts of Buckingham's π theorem.
- To explain the working of different pumps
- To explain the working of different turbines.
- To equip students with skills to produce analytical solutions to various simple problems

Course Outcomes:

On completion of the course students will be able to

- Demonstrate basic knowledge of fluid properties
- Find types of flow and calculate Major and minor losses in pipes.
- Apply Buckingham's π theorem for problem solving.
- Understand the working of different pumps
- Understand the working of different turbines.
- Produce analytical solutions to various simple problems

UNIT I BASIC CONCEPTS AND PROPERTIES OF FLUIDS

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures - pressure measurements by U Tube Manometer manometers.

UNIT II FLUID KINEMATICS AND FLUID DYNAMICS

Fluid Kinematics - Flow visualization - lines of flow - types of flow - velocity field and acceleration - continuity equation (one and three dimensional differential forms)- Equation of streamline - stream function - velocity potential function - circulation - flow net – Bernoulli's equation – applications - Venturi meter, Orifice meter, Pitot tube.

UNIT III INCOMPRESSIBLE FLUID FLOW

Viscous flow - Navier - Stoke's equation - flow through pipes - Darcy - weisback's equation - pipe roughness -friction factor - flow through pipes in series and in parallel - power transmission - Introduction to the concept of Boundary layer flows, boundary layer thickness, boundary layer separation ,drag and lift coefficients.

UNIT IV HYDRAULIC TURBINES

Fluid machines: definition and classification - exchange of energy - Hydro turbines: definition and classifications of turbines- Pelton turbine velocity triangles - work done - specific speed - efficiencies - performance curve for turbines.

UNIT V HYDRAULIC PUMPS

Pumps: definition and classifications - Centrifugal pump: classifications, working principles, velocity triangles, specific speed, efficiency and performance curves.Introduction to reciprocating pump- single acting and double acting.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr.R.K.Bansal	A Textbook of Fluid Mechanics and Hydraulics Machines	Laxmi publications (P) Ltd, New Delhi	2010
2.	Kumar.K.L,	Engineering Fluid Mechanics	S.Chand Publication	2010
3.	Vasandani.V.P	Theory and Design of Hydraulic Machines including Basic Fluid Mechanics	Khanna Publishers, New Delhi.	2010
4.	Yunus A.Cengel, John M.Cimbala	Fluid Mechanics – Fundamentals and Applications	McGraw Hill Education	2013

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Victor Lyle Streeter, E. Benjamin Wylie and Keith W.Bedford	Fluid Mechanics	WCB/McGraw-Hill	1998
2.	Frank M.White	Fluid Mechanics	McGraw-Hill Higher Education	2011
3.	Ramamrutham.S	Hydraulic Fluid Mechanics and Fluid Machines	Dhanpat Rai and Sons, New Delhi	2004
4.	S.Som, Gautam Biswas and S. Chakraborty	Introduction to fluid mechanics and fluid machines	McGraw-Hill Education (India) Private Limited	2011

Course Objectives:

- To provide knowledge on physical metallurgy of metals through the study of phase diagrams.
- To study the properties and applications of various metals and alloys used in engineering industries.
- To expose the various heat treatment processes of steels.
- To impart knowledge of the mechanical properties evaluation and testing methods of engineering materials.
- To introduce fundamentals of composites
- To provide fundamental knowledge of composites and their applications.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the phase diagrams of different engineering materials.
- Recognise the properties and applications of various metals and alloys.
- Identify the appropriate heat treatment processes for the given applications.
- Test the mechanical properties of the given materials for real-time applications.
- Understand the fundamentals of composites
- Identify the appropriate composites for applications in the automotive industry.

Review (Not for Exam):

Crystal structure – BCC, FCC and HCP structure – unit cell – crystallographic planes and directions, miller indices – crystal imperfections, point, line, planar and volume defects – Grain size, ASTM grain size number.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, peritectic, eutectoid and peritectoid reactions, Iron – Iron carbide equilibrium diagram. Classification of steel and cast Iron microstructure, properties and application.

UNIT II FERROUS AND NON FERROUS METALS

Effect of alloying additions on steel (Mn, Si, Cr, Mo, V Ti & W) - stainless and tool steels – HSLA - maraging steels – Gray, White malleable, spheroidal -Graphite - alloy cast irons.

Copper and Copper alloys – Brass, Bronze and Cupronickel – Aluminium and Al-Cu – precipitation strengthening treatment – Bearing alloys.

UNIT III INTRODUCTION TO COMPOSITES

Fundamentals of composites - need for composites – Enhancement of properties - classification of composites – Matrix-Polymer matrix composites (PMC), Metal matrix composites (MMC), Ceramic matrix composites (CMC) – Reinforcement – Particle reinforced composites, Fibre reinforced composites. Applications of various types of composites.

UNIT IV HEAT TREATMENT

Definition – Full annealing, stress relief, recrystallisation and spheroidizing – normalising, hardening and Tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on I.T. diagram

CCR - Hardenability, Jominy end quench test – Austempering, martempering – case hardening, carburising, nitriding, cyaniding, carbonitriding – Flame and Induction hardening.

UNITV MECHANICAL PROPERTIES AND TESTING

Mechanism of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell) Impact test Izod and charpy, fatigue and creep test.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Kenneth G.Budinski and Michael K.Budinski	Engineering Materials: Properties and Selection	Prentice-Hall of India Private Limited.	2010
2.	Raghavan.V	Materials Science and Engineering	Phi Learning	2013

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William D.Callister and David G.Rethwisch	Materials Science and Engineering: An Introduction	John Wiley and Sons Inc, New York	2010
2.	Sydney H.Avner	Introduction to Physical Metallurgy	McGraw- Hill Education (India) Private Limited.	1997

Course Objectives:

- To supplement the theoretical knowledge gained in Fluid Mechanics and Machinery with practical testing
- To understand the concepts of coefficient of discharge for Orifice meter and Venturi meter.
- To explain the Calibration of Rotameter.
- To understand the importance of friction factor for flow through pipes.
- To impart knowledge on the performance of various pumps.
- To impart knowledge on the performance of turbines

Course Outcomes:

- Calculate the coefficient of discharge for Orifice meter and Venturimeter.
- Calibrate the Rotameter
- Estimate the friction factor for flow through pipes.
- Asses the performance of centrifugal pump and submersible pump.
- Asses the performance of reciprocating pump and gear pump.
- Asses the performance of turbines

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Venturi meter.
2. Determination of the Coefficient of discharge of given Orifice meter.
3. Calculation of the rate of flow using Roto meter.
4. Determination of friction factor of given set of pipes.
5. Conducting experiments and drawing the characteristic curves of centrifugal pump/ submersible pump
6. Conducting experiments and drawing the characteristic curves of reciprocating pump.
7. Conducting experiments and drawing the characteristic curves of Gear pump.
8. Conducting experiments and drawing the characteristic curves of Pelton wheel.
9. Conducting experiments and drawing the characteristics curves of Francis turbine.
10. Conducting experiments and drawing the characteristic curves of Kaplan turbine.

Course Objectives:

- To introduce the scientific computing, covering some important aspects of solving algebraic equations, IVP, BVP.
- To implement the methods using the spread sheet in Excel
- To implement solution of numerical integration
- To implement solution of initial value problems governed by ODE
- To implement solution of BVP governed by PDE
- To implement solution of transcendental equation.

Course Outcomes:

1. To develop analytical skills for solving different engineering problems.
2. To understand the concepts of Matrices, sequences and series.
3. To solve problems by applying Differential Calculus and Differential equations.
4. To analysis initial value problems governed by ODE
5. To analysis BVP governed by PDE
6. To analysis transcendental equation.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
 - i) Runge - Kutta 4th order method
 - ii) Modified Euler's method
 - iii) Milne's method
 - iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
 - i) Laplace Equation
 - ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
 - iii) One dimensional wave equation
Implicit method

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014
2	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009

Course Objectives:

- To expose the different types of Clutch, Gear Box, Brake system.
- To provide knowledge on Differential Unit
- To provide knowledge on Propeller Shaft Unit.
- To learn the Clutch, Gear Box, Brake system, Differential Unit
- To study the suspension system.
- To impart knowledge on different Frames.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Dismantling procedure of Clutch, Gear Box, Brake system
- Dismantling procedure of Differential Unit
- Study of Propeller Shaft Unit
- Assembling procedure of Clutch, Gear Box, Brake system, Differential Unit
- Study of suspension system
- Study of different Frames

LIST OF EXPERIMENTS

1. Dismantling and assembling of clutch assembly
2. Dismantling and assembling of gear box assembly
3. Dismantling and assembling of propeller shaft and universal joint assembly
4. Dismantling and assembling of drive shaft assembly
5. Dismantling and assembling of differential assembly
6. Dismantling and assembling of different types of rear axle floating
7. Dismantling and assembling of steering box assembly
8. Dismantling and assembling of suspension system
9. Dismantling and assembling of air-braking system
10. Dismantling and assembling of hydraulic braking system.
11. Bleeding of hydraulic braking system and brake adjustment
12. Clutch and brake pedal play adjustment
13. Study of Frames used for HMV, LMV, Car and Two Wheelers.

OBJECTIVES:

- To help students comprehend the role of listening skills in effective communication.
- To familiarize students with verbal and non-verbal communication.
- To expose students to neutral accent.
- To develop emotional intelligence skills in them for enhancing their self-esteem.
- To assist them in setting goals and developing positive attitude.
- To enable students to acquire decision making skills, problem solving skills and assertive skills.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- Equip students of engineering and technology with effective speaking, writing and listening and reading skills in English.
- Develop their soft skills and inter personal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- Equip students of engineering and technology with group discussion and other recruitment exercises.
- Use both verbal and non-verbal skills cohesively and develop confidence in participating in seminars, conferences, technical and extracurricular activities for lifelong learning.

UNIT - I THE ART OF LISTENING

The art of listening - The importance of listening - The difference between listening and hearing- Barriers to listening - Remedies for listening problems - Listening through English.

UNIT - II VERBAL AND NON-VERBAL COMMUNICATION

Non - verbal communication - Eye contact - Facial expressions - Posture - Gestures - Body language - Etiquette.

Verbal communication - Importance of voice modulation - Accent - Diction - Functional Grammar - Sentence construction - Effective vocabulary- Idioms- Phrases- Jargons - How to get others to listen to.

UNIT - III INTRAPERSONAL AND INTERPERSONAL SKILLS

Intrapersonal skills - Self-analysis - Thought process -Understanding one's potential and limitations - Developing problem solving skills - Ability to self-reflect - Self-control - Improving self-esteem.

Interpersonal skills - Confidence building -Resolving conflicts - Negotiation - Handling difficult people - Valuing diversity - Adaptability and Flexibility – Inter Cultural Communication.

UNIT - IV GOAL SETTING AND POSITIVE ATTITUDE

Difference between goals and dreams - SMART goal setting - 3 Ds of goal setting- Determination, Discipline and Direction - Developing the right attitude - Motivation - Intrinsic and Extrinsic motivation - Dealing with change - Dedication - Taking responsibilities - Decision making.

UNIT - V MANAGERIAL SKILLS

Analytical skills - Team Building - Leadership skills - Planning/organizing - Ability to work independently - Professional ethics - Preparing résumé - Writing covering letter - Communicating via e-mail.

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Gopalaswamy Ramesh & Mahadevan Ramesh	<u>The Ace of Soft Skills</u>	Pearson Publication, Chennai	2014

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Murthy, G .R. K.	Soft Skills for Success.	The ICFAI University Press, Hyderabad.	2008
2	Jagadeesan, G & Santanakrishnan,R.	Soft Skills Development: Training and Evaluation.	The ICFAI University Press, Hyderabad.	2008
3	Sherfield, Robert M., Rhonda J. Montgomery, & Patricia G. Moody	Developing Soft Skills.	Pearson Education, New Delhi.	2005

WEBSITES:

www.englishclub.com – Art of Listening- Unit-I
<http://tribehr.com/social-hr-software/talent-management/skills-tracking> - Unit-V
www.ispeakyouspeak.blogspot.com – Unit-II
<https://alison.com/subjects/6/Personal-Development-Soft-Skills> - Unit-III, IV,&V
www.learning-development.hr.toolbox.com – Unit-V
<http://www.niit.com/solution/soft-skill-training> - Unit-III, IV,&V

Course Objectives:

- To provide knowledge on the static and dynamic forces in various mechanisms.
- To study the features of determine the rotating masses in dynamic balancing.
- To familiarize the students to understand free and forced vibration for practical applications.
- To understand the importance torsional vibrations in mechanical components.
- To explain principles and mechanisms used for speed control and stability control.
- To impart knowledge on type of governors and gyroscopes for different applications

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Analyze the static and dynamic forces in various mechanisms.
- Determine the rotating masses in dynamic balancing.
- Calculate free and forced vibration for practical applications.
- Analyze torsional vibrations in mechanical components.
- Understand the principles in mechanisms used for speed control and stability control.
- Select the type of governors and gyroscopes for different applications.

UNIT I FORCE ANALYSIS

Rigid Body dynamics in general plane motion – Equations of motion – Dynamic force analysis – Inertia force and Inertia torque – D'Alemberts principle – The principle of superposition – Dynamic Analysis in Reciprocating Engines – Gas Forces – Equivalent masses – Bearing loads – Crank shaft Torque – Turning moment diagrams – Fly wheels – Engine shaking Forces.

UNIT II BALANCING

Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder Engine – Balancing Multi-cylinder Engines – Partial balancing in locomotive Engines – Balancing linkages – balancing machines

UNIT III FREE VIBRATION

Basic features of vibratory systems – idealized models – Basic elements and lumping of parameters – Degrees of freedom – Single degree of freedom – Free vibration – Equations of motion – natural frequency – Types of Damping – Damped vibration critical speeds of simple shaft – Torsional systems; Natural frequency of two and three rotor systems.

UNIT IV FORCED VIBRATION

Response to periodic forcing – Harmonic Forcing – Forcing caused by unbalance – Support motion – Force transmissibility and amplitude transmissibility – Vibration isolation.

UNIT V MECHANISMS FOR CONTROL

Governors – Types – Centrifugal governors – Gravity controlled and spring controlled centrifugal governors – Characteristics – Effect of friction – Controlling Force – other Governor mechanisms.

Gyroscopes – Gyroscopic forces and Torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, ships and airplanes

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rattan S.S	Theory of Machines 4th Edition	Tata McGraw–Hill Publishing Company Ltd., New Delhi.	2014
2	Shigley J.E. and Uicker J.J	Theory of Machines and Mechanisms	McGraw–Hill, New York.	1995

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rao J.S. and Dukkipati R.V	Mechanism and Machine Theory	Wiley– Eastern Limited, New Delhi.	2007
2	John Hannah and Stephens R.C	Mechanics of Machines	Viva Books Pvt Ltd.	2005
3	Thomas Bevan	Theory of Machines 3rd Edition	CBS Publishers and Distributors, New Delhi.	2005

Course Objectives:

- To learn the design procedure of machine elements subjected to simple loads.
- To understand the various types of stresses induced in different machine members.
- To study the design procedure of shafts and couplings.
- To provide knowledge on the design of bolted and welded joints.
- To impart knowledge on the design of helical spring and flywheel.
- To study the selection procedure of sliding and rolling contact bearings.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Design machine elements subjected to simple loads.
- Design shaft for various engineering applications.
- Design couplings for various engineering applications.
- Design bolted and welded joints subjected to static and eccentric loading conditions.
- Design helical spring and flywheel for various engineering applications.
- Design and select journal bearings and rolling contact bearings for various machines.

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS

Introduction to the design process - factor influencing machine design, selection of materials based on mechanical properties – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – Design of curved beams – Factor of safety - theories of failure – stress concentration.

UNIT II DESIGN OF SOLID AND HOLLOW SHAFTS

Design of solid and hollow shafts based on strength, rigidity and critical speed. Basic concepts of rigid and flexible couplings.–Introduction and concepts of keys, key ways, Knuckle joints.

UNIT III DESIGN OF BOLTED JOINTS AND WELDED JOINTS

Design of bolted joints including eccentric loading –square threaded screws, Efficiency, Maximum efficiency.. Design of welded joints for structures -Purpose of Screw Jack, Introduction to fasteners.

UNIT IV DESIGN OF SPUR GEARS.

Gear Terminology –Introduction to Spur gears and Helical Gears -Speed ratios and number of teeth-Force analysis - Tooth stresses - Dynamic effects - Fatigue strength - Factor of safety - Gear materials – Module and Face width-power rating calculations based on strength.

UNIT V DESIGN OF BEARINGS

Introduction to bearings – sliding contact and rolling contact types. – Cubic mean load – Design of Journal bearings – McKee's equation – Lubrication in journal bearings – calculation of bearing dimensions.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Juvinall.R.C and Marshek K.M	Fundamentals of Machine Component Design, 5 th Edition	John Wiley & Sons.	2011
2.	Bhandari.V.B	Design of Machine Elements 3rd Edition	Tata McGraw-Hill Book Co.	2010
3.	Robert L.Mortt	Machine elements in Mechanical Design	Macmillan Publishing Co, London	1992
4.	Shigley and Mischke	Mechanical Engineering Design	McGraw Hill, New York.	2001

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Norton.RL	Design of Machinery	Tata McGraw-Hill Book Co., New Delhi	2004
2.	Orthwein .W	Machine Component Design	Jaico Publishing Co., New Delhi.	2006
3.	Ugural .A.C	Mechanical Design – An Integrated Approach	McGraw-Hill Book Co, New York.	2004
4.	Spotts.T.E,Shoup.T.H.E	Design of Machine Elements 8th Edition	Pearson Education, New Delhi.	2003
5.	Maitra.G.M	Handbook of Gear design	Tata McGraw Hill, New Delhi	2004

Course Objectives:

- To impart knowledge on the mechanism of pollutant formation in engines.
- To understand the importance of post-combustion treatments to control pollution.
- To study the pollution treatment and control techniques.
- To provide knowledge on the laws and regulations related to automotive emission levels.
- To introduce properties of tyres affecting vibration and noise
- To learn the noise and vibration control techniques.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the mechanism of pollutant formation in engines.
- Apply the knowledge of post-combustion treatments to control pollution.
- Discuss the control techniques and instrumentation for pollution measurements.
- State the laws and regulations related to automotive emission levels.
- Discuss the properties of tyres affecting vibration and noise
- Design the systems to reduce noise and vibration.

UNIT I MECHANISM OF POLLUTANT FORMATION AND POST COMBUSTION TREATMENTS

Introduction, Pollutants, sources, formation of HC and CO in SI engines, NO_x formation in SI and CI engines, Particulate emission from SI and CI engines, Smoke Emission in CI engines. Effect of operating variables on emission formation.

Post combustion treatments: physical conditions and exhaust gas compositions before treatment, catalytic mechanism. Thermal reactions, installation of catalyst in exhaust lines, NO_x treatment in diesel engines. Diesel trap oxidizers

UNIT II CONTROL TECHNIQUES AND INSTRUMENTATION FOR POLLUTION MEASUREMENTS

Crank case emission control, fuel evaporation & control, EGR, intake temp control, air injected exhaust, thermal reactors, SCR, catalytic converters – types, catalytic mechanism, tuning of mechanical systems - A/F ratio control. NDIR analyzer, flame ionization detectors, chemiluminescent analyzer, smoke meters, gas chromatograph, On-board Diagnostic system.

UNIT III LAWS AND REGULATIONS

Historical background, regulatory test procedures (European cycles), exhaust gas pollutants (European railroad limits), particulate pollutants, European statutory values, inspection of vehicles in circulation (influence of actual traffic conditions and influence of vehicle maintenance) Indian Emission Standards.

UNIT IV NOISE CONTROL

Identification of noise sources, quantification, control of air borne noise - use of noise absorber, barrier, different materials, criteria for the selection of materials, control of structure borne noise - treatments for vibration damping materials for hood liner and head liner, resonance and ill effects of resonance. Characteristics of vehicle noise, sources of vehicle noise, engine noise, techniques for locating and measuring engine noise, engine noise control techniques, inlet and exhaust noise mechanism and control, noise from cooling system, transmission noise and tyre noise. Anechoi chamber.

UNIT V VIBRATION CONTROL

Introduction, vibration analysis, sources of vibration, damping of vibration, rubber mountings, vibration isolation and absorption. Constrained and extensive layer dampings. Engine and drivetrain vibrations, vehicle and chassis vibration. Application of plastics and composites in automobiles.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Springer and Patterson	Engine Emission	Plenum Press.	1990
2.	Crouse.W.M and Anglin.A.L	Automotive emission control	McGraw Hill Co., New York	1993
3.	John B. Heywood	Internal Combustion Engine Fundamentals	McGraw Hill International Editions	2011
4.	Matthew Harrison	Vehicle Refinement – Controlling Noise and Vibration in Road Vehicles	Elsevier Butterworth-Heinemann, Burlington	2004

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ganesan.V	Internal Combustion Engines,4th Edition	Tata McGraw Hill Co, New Delhi	2012
2.	Obert.E.F	Internal Combustion Engines	Harper and Row, New York	1982
3.	Heinz Heisler	Advanced Engine Technology	SAE	1995
4.	Robert Hickling and Mounir M. Kamal	Engine Noise – Excitation, Vibration and Radiation	Plenum press, New York	1982
5.	White.R.G and Walker.J.G	Noise and Vibration	Ellis Horwood Ltd, England	2000

Course Objectives:

- To familiarise the concepts of measurement and characteristics of instruments.
- To learn the procedure for various linear and angular measurements.
- To provide knowledge on the measurement of gear and thread terminologies using suitable instruments.
- To expose the procedure to measure the mechanical parameters using suitable instruments.
- To study the use of laser and advances in metrology for linear geometric dimensions.
- To impart knowledge on digital devices and computer aided inspection devices

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the basic concept of measurement and characteristics of measuring instruments.
- Practice the appropriate linear and angular dimensions using precision measuring instruments.
- Examine the major terminologies for the gear and screw thread measurement.
- Explain the suitable type of instrument used to measure the mechanical parameters.
- Apply the advanced techniques in metrology to calculate the geometric dimensions.
- Practice the digital devices and computer aided inspection devices

UNIT I CONCEPT OF MEASUREMENT

General concept – Generalised measurement system-Units and standards-measuring instruments- sensitivity, readability, range of accuracy, precision-static and dynamic response-repeatability-systematic and random errors-correction, calibration, interchangeability.

UNIT II LINEAR AND ANGULAR MEASUREMENT

Definition of metrology-Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification, interferometry, optical flats, limit gauges- Comparators: Mechanical, pneumatic and electrical types, applications. Angular measurements: -Sine bar, optical bevel protractor, angle Decker – Taper measurements.

UNIT III FORM MEASUREMENT

Measurement of screw threads-Thread gauges, floating carriage micrometer-measurement of gears-tooth thickness-constant chord and base tangent method-Gleason gear testing machine – radius measurements-surface finish, straightness, flatness and roundness measurements.

UNIT IV LASER AND ADVANCES IN METROLOGY

Precision instruments based on laser-Principles- laser interferometer-application in linear, angular measurements and machine tool metrology Coordinate measuring machine (CMM)- Constructional features – types, applications – digital devices- computer aided inspection.

UNIT V MEASUREMENT OF POWER, FLOW AND TEMPERATURE RELATED PROPERTIES

Force, torque, power:-mechanical, pneumatic, hydraulic and electrical type-Flow measurement: Venturi, orifice, rotameter, pitot tube –Temperature: bimetallic strip, pressure thermometers, thermocouples, electrical resistance thermister.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Jain.R .K	Engineering Metrology 20th Edition	Khanna Publishers, New Delhi	2004
2.	Alan S. Morris,	The Essence of Measurement	Prentice Hall of India	1997

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Gupta.S.K	Engineering Metrology	Dhanpat rai Publications, New Delhi	1984
2.	Jayal.A.K,	Instrumentation and Mechanical Measurements	Galgotia Publications	2000
3.	Beckwith.T.G and Lewis Buck.N	Mechanical Measurements	Addison Wesley	1991
4.	Donald D.Eckman	Industrial Instrumentation	Wiley Eastern	1985

15BEAE5E_

Department Elective-I3 0 0 3 100

Course Objectives:

- To impart knowledge on the flash point, fire point and viscosity of the fuel.
- To learn the port timing and valve timing diagram of internal combustion engines.
- To study the performance of the internal combustion engine and refrigeration system.
- To understand the thermal conductivity, heat transfer and emissivity.
- To know the effectiveness of heat exchangers.
- To study the **coefficient of performance** of a refrigeration system

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Measure the flash point, fire point and viscosity of given sample.
- Draw the port timing diagram of two-stroke and valve timing diagram of four-stroke internal combustion engines.
- Evaluate the performance of internal combustion engine and reciprocating air compressor.
- Calculate the **coefficient of performance** of a refrigeration system.
- Estimate the thermal conductivity of material, heat transfer from surface and emissivity of a grey surface.
- Calculate the effectiveness of a heat exchanger.

1. Determination of Viscosity of Oils – Red Wood Viscometer.
2. Determination of Flash Point and Fire Point of fuels
3. Valve timing and port timing diagram
4. Performance test on automotive multi-cylinder CI engines
5. Morse test on multi-cylinder SI engine
6. Thermal conductivity measurement by guarded plate method
7. Natural convection heat transfer from a vertical cylinder
8. Heat transfer from pin-fin (natural & forced convection modes)
9. Determination of emissivity of a grey surface
10. Effectiveness of Parallel/counter flow heat exchanger
11. Determination of COP of a refrigeration system
12. Performance test on single/two stage reciprocating air compressor.

Course Objectives:

- To impart knowledge on Calibration of Vernier / Micrometer / Dial Gauge
- To introduce various measurement techniques
- To provide fundamental knowledge of dimensional tolerances
- To understand the thermal conductivity, heat transfer and emissivity.
- To know the effectiveness of straightness and flatness.
- To provide fundamental knowledge of Displacement, Force and Vibration.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Test the dimensions using Vernier / Micrometer / Dial Gauge.
- Understand the measurement techniques
- Obtain knowledge on dimensional tolerances
- Calculate the thermal conductivity, heat transfer and emissivity
- Estimate the straightness and flatness
- Obtain knowledge on measurement of displacement, Force and Vibration Displacement, Force and Vibration.

List of Experiments:

1. Calibration of Vernier / Micrometer / Dial Gauge
2. Checking Dimensions of part using slip gauges
3. Measurements of Gear Tooth Dimensions
4. Measurement of Taper Angle using sine bar / tool makers microscope
5. Measurement of straightness and flatness
6. Measurement of thread parameters
7. Checking the limits of dimensional tolerances using comparators (Mechanical / pneumatic / Electrical)
8. Measurement of Temperature using Thermocouple / Pyrometer
9. Measurement of Displacement (Strain Gauge / LVDT / Wheatstone Bridge)
10. Measurement of Force
11. Measurement of Vibration / Shock

Course Objectives:

- To study the working principle of governor and gyroscope.
- **To familiarize the students to understand gyroscopic law and gyroscopic couple**
- To provide knowledge on the balancing of rotating and reciprocating masses.
- To learn the concept of transverse and torsional vibration.
- To introduce the concept and working of sensors used in the mechatronic systems.
- To impart knowledge on working of microcontroller in the mechatronic systems.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Select the suitable governor for various engineering applications.
- **Familiar with gyroscopic law and determine the gyroscopic couple**
- Estimate the balancing mass for rotating and reciprocating masses.
- Calculate the natural frequency of transverse and torsional vibration.
- Select the different types of sensor for various mechatronics applications.
- Develop a controller using the microcontroller for mechatronic system.

LIST OF EXPERIMENTS

1. Governors – Determination of sensitivity, effort, etc. for Watt, Porter, Proell, and spring controlled Governors
2. Cam – Determination of jump speed and profile of the cam.
3. Motorized Gyroscope–Verification of laws –Determination of gyroscopic couple.
4. Whirling of shaft–Determination of critical speed of shaft with concentrated loads.
5. Balancing of rotating and reciprocating masses.
6. Determination of moment of inertia by oscillation method for connecting rod and flywheel.
7. Vibrating system – spring mass system – Determination of damping co-efficient of single degree of freedom system
8. Determination of torsional frequencies for compound pendulum and flywheel system with lumped moment of inertia.
9. Transverse vibration –free– Beam. Determination of natural frequency and deflection of beam.
10. Design and testing of fluid power circuits to control
(i) velocity (ii) direction and (iii) force of single and double acting actuators
11. Design of circuits with logic sequence using Electro pneumatic trainer kits.
12. Simulation of basic Hydraulic, Pneumatic and Electric circuits using software

13. Circuits with multiple cylinder sequences in Electro pneumatic using PLC.
14. Modeling and analysis of basic electrical, hydraulic and pneumatic systems using LAB VIEW

15BEAE551 IN-PLANT TRAINING 110 1 100

Students will undergo industrial training for three weeks during the vacation at the end of IV semester and a report with the training completion certificate from the industry will be subsequently submitted to the department within a week after completion. Viva – Voce exam will be conducted at the end of V semester and 100 marks will be awarded.

Course Objectives:

- To learn the design procedure of cylinder and piston.
- To study the design procedure of connecting rod.
- To provide knowledge on the design of crankshaft.
- To impart knowledge on the design of valves and valve actuating components.
- To study the design procedure of timing belt and pulley
- To acquaint the student with the concepts of sprocket and chain.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Design cylinder and piston for the specified power and torque.
- Design connecting rod of an engine.
- Design crankshaft of an engine.
- Design valves and valve actuating components.
- Select suitable timing belt and pulley.
- Select suitable transmission chains and sprockets

UNIT I DESIGN OF CYLINDER AND PISTON

Choice of material for cylinder and piston, piston friction, piston slap, design of cylinder, piston, piston pin, piston rings, piston failures, lubrication of piston assembly.

UNIT II DESIGN OF CONNECTING ROD, CRANKSHAFT

Material for connecting rod, determining minimum length of connecting rod, small end and big end design, shank design, design of big end cap bolts, connecting rod failures, balancing of I.C. Engines, significance of firing order, material for crankshaft, design of crankshaft under bending and twisting, balancing weight calculations.

UNIT III DESIGN OF VALVES AND FLYWHEEL

Design aspects of intake and exhaust manifolds, inlet and Exhaust valves, valve springs, tappets, valve train. Materials and design of flywheel.

UNIT IV DESIGN OF VALVE ACTUATING COMPONENTS

Design of valve springs, tappet. Cam design, cam profile generation, cam shaft design, rocker and rocker shaft design considerations, materials.

UNIT V DESIGN OF BELT, PULLEY, TIMING CHAIN AND SPROCKET

Selection of V belts and pulleys – selection of Flat belts and pulleys - Selection of Transmission chains and Sprockets. Design of pulleys and sprockets

TEXT BOOKS:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	R.K. Jain	Machine Design	Khanna Publishers, New Delhi.	1997

REFERENCE BOOKS:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	P.M.Heldt	High Speed Combustion Engines	Oxford-IBH Publishing Co., Calcutta.	1965
2	A.Kolchin and V.Demidov	Design of Automotive Engines	MIR Publishers, Moscow.	1984
3	Sundararaja Murthy T.V.	Machine Design	Khanna Publishers, New Delhi.	1991

DESIGN DATA BOOK:

Sl.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1	PSG College of Technology	Design Data Book	Kalaikathir Achagam, Coimbatore.	1978

Course Objectives:

- To study the fundamental concept of vibration of a single degree of freedom system.
- To acquire knowledge on the road vehicle dynamics, stability and handling.
- To develop an understanding of the relationships between vehicle design variables and vehicle dynamic behaviour.
- To apply modelling techniques to predict the dynamic behaviour of road vehicles.
- To introduce the concepts of gradeability, tractive force, braking force and stopping distance
- To provide knowledge on steady state cornering model to design the steering system.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the basic elements of vibration of single degree of freedom system.
- Analyse the cornering and tractive property of a tyre.
- Understand the sources of vibration
- Design and analyse the suspension system of a vehicle.
- Analyse the gradeability, tractive force, braking force and stopping distance of a vehicle.
- Apply steady state cornering model to design the steering system of a vehicle.

UNIT I INTRODUCTION

Fundamental of vibration, Mechanical vibrating systems. Modelling and Simulation - Model of an automobile - Single, two, multi degrees of freedom systems – Free, forced and damped vibrations. Magnification factor - Transmissibility - Vibration absorber.

UNIT II MULTI DEGREE OF FREEDOM SYSTEMS

Closed coupled system - Eigen value problems - Far coupled Systems - Orthogonality of mode shapes – Modal analysis - Forced vibration by matrix inversion. Approximate methods for fundamental frequency - Dunkerley's lower bound - Rayleigh's upper bound - Hozler method for close coupled and branched systems.

UNIT III SUSPENSION AND TYRES

Requirements. Sprung mass frequency. Wheel hop, wheel wobble, wheel shimmy. Choice of suspension spring rate. Calculation of effective spring rate. Vehicle suspension in fore and aft directions. Ride characteristics of tyre - Effect of driving and braking torque - Gough's tyre characteristics.

UNIT IV VEHICLE HANDLING

Over steer, under steer, steady state cornering. Effect of braking, driving torques on steering. Effect of camber, transient effects in cornering. Directional stability of vehicles.

UNIT V STABILITY OF VEHICLES

Load distribution, Calculation of Tractive effort and reactions for different drives - Stability of a vehicle on a slope, on a curve and a banked road.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Giri .N.K,	Automobile Mechanics 8th Edition	Khanna Publishers,New Delhi.	2008
2.	Rao.J.S and Gupta.K	Theory and Practice of Mechanical Vibrations	Wiley Eastern Ltd Delhi.	1999

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt.P.M	Automotive Chassis	Chilton Co., New York	1992
2.	Ellis.J.R	Vehicle Dynamics	Business Books Ltd., London	1991
3.	Giles.J.G	Steering, Suspension and Tyres	Illiffe Books Ltd, London	1998
4.	Gillespie.T.D	Fundamental of Vehicle Dynamics	Society of Automotive Engineers,USA	1992

Course Objectives:

- To impart knowledge on the basic principle and manufacturing methods of components.
- To study the steps involved in the casting process.
- To learn the theory of metal cutting and calculate the forces involved in it.
- To introduce the basic concepts of integrated manufacturing.
- To introduce the basic concepts of grinding process
- To provide an exhaustive knowledge on various generic process and benefits of rapid prototyping techniques.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- List and explain the steps involved in the casting process.
- Understand the theory of metal cutting
- Select the suitable type of machine for machining operations.
- Describe the types of grinding process.
- Select the suitable material handling and storage system for flexible manufacturing systems.
- Select appropriate rapid prototyping process for engineering applications.

UNIT I FOUNDRY AND CASTING

Patterns. Moulds-types of moulds, moulding sand characteristics. Core making, melting, Processes-shell moulding, investment castings, centrifugal castings, die casting, Fettling and cleaning of casting. Casting defects and remedies.

UNIT II THEORY OF METAL CUTTING AND MACHINE TOOLS

Introduction, mechanics of metal cutting, orthogonal and oblique cutting, merchants equation, chip formation, heat generation, cutting fluids, cutting tool life - recent developments and applications (Dry machining and high speed machining).

Cutting tool materials, cutting tool nomenclature, introduction to machine tools, lathe, shaper, planning, milling, drilling and boring machines, working principle, operations, work holding devices, machining time calculation and cost estimation.

UNIT III MANUFACTURE OF COMPONENTS AND SURFACE FINISHING PROCESSES

Production of axi-symmetrical components- shafts, hubs, pins. Production of prismatic components-housings, lathe beds, gearboxes, machine columns. Hole production in components using drilling and boring.

Gear manufacturing processes-Gear form machining-generation process and gear hobbing, shaping machines, manufacture of spur, helical, bevel, worm and worm wheel. Gear finishing.

Surface finishing processes- Grinding machines, grinding wheel specification, honing, lapping, burnishing, super finishing surface integrity concepts.

UNIT IV INTEGRATED MANUFACTURING SYSTEM

Definition – application – features – types of manufacturing systems – machine tools – computer control system – DNC systems manufacturing cell Flexible manufacturing systems (FMS) – The FMS concept – transfer systems – head changing FMS, Group Technology.

UNIT V RAPID PROTOTYPING

Introduction, FDM- Principle, process parameters, applications, SLS- Types of machines, principles of operation, process parameters, applications. Rapid Tooling- Indirect rapid tooling - silicone rubber tooling, aluminum filled epoxy tooling, spray metal tooling, direct rapid tooling - direct AIM, quick cast process, copper polyamide, rapid tool.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Bhattacharya.A	New Technology	IN Publishing, New Delhi	1984
2.	Milton C. Shaw	Metal Cutting Principles	Clarendon Press, Oxford	1999
3.	Singh.D.K	“Manufacturing Technology	Pearson Education	2008
4.	Kalpakjian	Manufacturing Engineering and Technology, 3 rd Edition	Addison Wesley Publishing Company Inc	1995
5.	Khanna .O.P	Welding Technology	Dhanpat Rai and Sons, New Delhi.	1994
6.	DucPham and Dimov S S	Rapid manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling	Springer	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	HMT	Production Technology	Tata McGraw-Hill Co, New Delhi	2004
2.	James Brown	Advanced Machining Technology Handbook	McGraw Hill Book Company, New York	1998
3.	Pandey.P.C	Modern Machining Processes	Tata McGraw Hill Publications Co. Ltd, New Delhi	2013

Course Objectives:

- To introduce the basics of economics and cost analysis related to engineering so as to take economically sound decisions.
- To acquire knowledge on laws of demand and supply.
- To emphasise the systematic evaluation of the costs, break-even point for return on economics and diseconomies.
- To acquaint in pricing methods, payback and competition in the modern market structure.
- To impart knowledge on economic liberalization, privatization and globalization
- To enrich the understanding of engineering economics analysis

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Apply the major concepts and techniques of engineering economic analysis in real-time applications.
- Analyse the demand and supply and sketch a demand and supply curve.
- Determine the break-even point and find out the strength and weakness of the market structure.
- Compare the cost of multiple projects by using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
- Understand economic liberalization, privatization and globalization
- Apply the appropriate engineering economics analysis methods for problem solving.

UNIT-I FUNDAMENTALS OF ENGINEERING ECONOMICS

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics – Demand and supply analysis – Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT-II FINANCIAL MANAGEMENT

Objectives and functions of financial management – financial statements, working capital management – factors influencing working capital requirements – estimation of working capital. Capital budgeting – Need for Capital Budgeting – Project Appraisal Methods – Payback Period – ARR – Time Value of Money.

UNIT-III CAPITAL MARKET

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions – Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT-IV NEW ECONOMIC ENVIRONMENT

National Income – concepts – methods of calculating national income - Economic systems, Economic Liberalization – Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT-V COST ANALYSIS AND BREAK EVEN ANALYSIS

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ramachandra Aryasri .A and Ramana Murthy.V.V	Engineering Economics & Financial Accounting	Tata McGraw Hill, New Delhi	2004
2.	Varshney.RL and Maheshwari.K.L	Managerial Economics	Sulthan Chand & Sons, New Delhi.	2001

REFERENCE

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Samuelson and Nordhaus	Economics	Tata McGraw Hill, New Delhi	2002

15BEAE6E_

Department Elective-II 3 0 0 3 100

15BEAE6E_

Department Elective-III 3 0 0 3 100

Course Objectives:

- To expose the different types of batteries, starting motors and generators
- To provide knowledge on ignition system
- To provide knowledge on electrical wiring.
- To learn the rectifiers, filters, logic gates, adder, flip-flops, SCR and IC timer
- To study the microcontrollers.
- To impart knowledge on automotive lighting system.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Understand different types of batteries, starting motors and generators
- Describe the ignition system
- Study of electrical wiring.
- Study of rectifiers, filters, logic gates, adder, flip-flops, SCR and IC timer
- Obtain knowledge on microcontrollers
- Obtain knowledge on automotive lighting system

List of Experiments:

A. Electrical Laboratory

1. Testing of batteries and battery maintenance
2. Testing of starting motors and generators
3. Testing of alternators
4. Diagnosis of ignition system faults
5. Study of Automobile electrical wiring

B. Electronics Laboratory

6. Study of rectifiers and filters
7. Study of logic gates, adder and flip-flops
8. Study of SCR and IC timer
9. Interfacing A/D converter and simple data acquisition
10. Micro controller programming and interfacing
 - Display interface using microcontroller.
 - Keyboard interface using microcontroller.
 - Sensor interface using microcontroller.
 - Stepper motor interface using microcontroller.
 - DC motor interface using microcontroller.
 - Simulation of automotive lighting system.

Course Objectives:

- To facilitate the understanding of lathe machine and its operations.
- To provide practical knowledge on Preparing a flat and contour surface using milling machine.
- To provide practical knowledge on Preparing holes with higher finish by Drilling / Tapping / Reaming.
- To facilitate the understanding of surface and cylindrical grinding operations for surface finish.
- To introduce Surface preparation and etching techniques, heat treatment and metallographic studies.
- To impart knowledge on Forging processes.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Perform various operations on of lathe machine.
- Prepare a flat and contour surface using milling machine.
- Prepare holes with higher finish by Drilling / Tapping / Reaming.
- Perform surface and cylindrical grinding operations for surface finish.
- Prepare Surface preparation and etching techniques, heat treatment and metallographic studies..
- Perform various Forging processes.

List of Experiments:

1. Introduction- lathe machine, plain turning, Step turning & grooving (Including lathe mechanisms, simple problems).
2. Taper turning-compound rest/offset method & Drilling using lathe (Including Drilling feed mechanism, Twist drill nomenclature, and Different types of taper turning operations).
3. External threading-Single start (Including Thread cutting mechanism-simple problems)
4. Eccentric turning-Single axis
5. Shaping-V-Block (Including Shaper quick return mechanism)
6. Grinding-Cylindrical /Surface/Tool & cutter
7. Slotting-Keyways (Including Broaching tool nomenclature and Slotter mechanism)
8. Milling-Polygon /Spur gear (Including Milling mechanism, simple problems)
9. Gear hobbing-Helical gear
10. Drilling, reaming, counter boring
11. Planning/Capstan lathe/Burnishing process (Planner Mechanism, Description of capstan and turret lathe)
12. Surface preparation and etching techniques, heat treatment and metallographic studies.
14. Laboratory experiments in fabrication processes: Spot, MIG, ARC and Gas Welding, Testing of Joints.
14. Basic Forging processes like upsetting, drawing down and forge welding

The objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems.

The students in convenient groups of not more than 4 members have to take one small item for design and fabrication. Every project work shall have a guide who is the member of the faculty of the institution.

The students are required to design and fabricate the chosen item in the college and demonstrate its working apart from submitting the project report. The report should contain assembly drawing, parts drawings, process charts relating to fabrication.

The mini-project involves the following:

- Preparing a project brief proposal including
- Problem identification
- A statement of system / process specification proposed to be developed (Block diagram / concept tree)
- List of possible solutions including alternative and constraints
- Cost benefit analysis
- Time Line of activities
- A report highlighting the design finalization (based on functional requirements & standards)
- Fabrication
- Testing & Validation of the developed system
- Learning in the Project
- Consolidated report preparation

Course Objectives:

- To impart basic knowledge on the finite element method.
- To provide knowledge on one- and two-dimensional elements.
- To study heat conduction problems using finite element method.
- To present knowledge on the higher order and isoparametric elements.
- To Study and acquire knowledge on numerical methods
- To provide knowledge on Gaussian quadrature method

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Apply the numerical methods to formulate the simple finite element problems.
- Apply the one-dimensional finite element method to solve bar, beam and truss type problems.
- Apply the finite element method for plane stress, plane strain and axisymmetric conditions.
- Determine the temperature distribution of one and two dimensional heat transfer problems using one and two dimensional finite elements.
- Apply the numerical methods to formulate the higher order and isoperimetric problems.
- Apply Gaussian quadrature method.

UNIT I INTRODUCTION

Historical background – Matrix approach – Application to the continuum – Discretization – Matrix algebra – Gaussian elimination – Governing equations for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method

UNIT II ONE DIMENSIONAL PROBLEMS

Finite element modeling – Coordinates and shape functions– Potential energy approach – Galerkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

UNIT III TWO DIMENSIONAL CONTINUUM

Introduction – Finite element modeling – Scalar valued problem – Poisson equation –Laplace equation – Triangular elements – Element stiffness matrix – Force vector – Galerkin approach – Stress calculation – Temperature effects

UNIT IV AXISYMMETRIC CONTINUUM

Axisymmetric formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures – Rotating discs

UNIT V ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL CONTINUUM

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector – Numerical integration – Stiffness integration – Stress calculations – Four node quadrilateral for axisymmetric problems.

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rao S.S	The Finite Element Method in Engineering 5th Edition	Butter worth Heinemann imprint, USA	2010
2	Logan D.L	A First course in the Finite Element Method 5th Edition	Cengage Learning, Stamford, USA.	2012

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Chandrupatla T.R., and Belegundu A.D	Introduction to Finite Elements in Engineering	Pearson Education, Delhi.	2002
2	David V Hutton	Fundamentals of Finite Element Analysis	McGraw–Hill Int. Ed, New York.	2005

Course Objectives:

- To study the fundamental concept of vibration Automobile Design..
- To acquire knowledge on Vehicle Motion.
- To develop an understanding of Performance Curves
- To apply modelling techniques to predict Vehicle Frame and Suspension.
- To introduce Front Axle and Steering Systems
- To provide knowledge on Final Drive and Rear Axle.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the basic elements of Automobile Design.
- Analyse the Vehicle Motion.
- Understand the Performance Curves
- Design and analyse the Vehicle Frame and Suspension.
- Understand the Front Axle and Steering Systems of a vehicle.
- Knowledge on Final Drive and Rear Axle

UNIT I INTRODUCTION

Assumptions to be made in designing a vehicle, Range of values for Gross Vehicle Weight, Frontal Area, maximum speed, maximum acceleration, gradability in different gears, Basics of Automobile Design.

UNIT II VEHICLE MOTION & PERFORMANCE CURVES

Calculation and Plotting of Driving force, Power requirement for different loads and acceleration, Maximum Power calculation. Calculation, Tabulation and Plotting of Torque and Mechanical Efficiency for different vehicle speeds, Interpolation of Pressure – Volume diagram, Calculation of frictional Mean Effective Pressure, Calculation of Engine Cubic Capacity, Bore and Stroke Length.

UNIT – III VEHICLE FRAME AND SUSPENSION

Study of loads, moments and stresses on frame members, computer aided design of frame for passenger and commercial vehicles, computer aided design of leaf springs, coil springs and torsion bar springs.

UNIT – IV FRONT AXLE AND STEERING SYSTEMS

Analysis of loads, moments and stresses at different sections of front axle, determination of loads at kingpin bearings, wheel spindle bearings, choice of bearings, determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

UNIT – V FINAL DRIVE AND REAR AXLE

Design of propeller shaft, design details of final drive gearing, design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Giri.N.K	Automobile Mechanics 8th Edition	Khanna Publishers, New Delhi.	2008
2.	Prabhu.T.J	Design of Transmission Elements	P R Lithographers	2003
3.	Lichty	IC Engines	Kogakusha Co., Limited, Tokyo.	1986
4.	Julien Happian-Smith	An Introduction to Modern Vehicle Design	Butterworth Heinemann Publishers	2000

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Giles.J.G	Engine Design	Iliffe Books Ltd., London	1968
2.	John Fenton	Gasoline Engine analysis for CAD	MEP, London.	1986
3.	Fred Schaefer and Richard Van Basshuysen	Internal Combustion Engine Handbook-Basic Components, Systems and Perspectives	SAE.	2004
4.	Heldt P M	High Speed Combustion Engines	Oxford IBH Publishing Co., Calcutta	1986

15BEAE7E_

Department Elective–IV 3 0 0 3 100

15BE__OE__

Open Elective 3 0 0 3 100

**15BEAE711 AUTOMOBILE VEHICLE MAINTENANCE AND RE-CONDITIONING
LABORATORY 0 0 3 2 100**

Course Objectives:

- To study the garage layout and general procedure for servicing.
- To learn the tuning of gasoline engine.
- To expose students to tuning of diesel engines
- To impart knowledge on fault diagnosis in electrical and electronic ignition systems.
- To provide knowledge on troubleshooting of fuel feed system, charging system, starting system and lighting system.
- To familiarise with adjustment of the headlight beam.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- List the procedure for servicing of an automobile.
- Demonstrate the tuning of gasoline engines.
- Demonstrate the tuning of diesel engines.
- Identify the fault in electrical and electronic ignition systems.
- Analyse and troubleshoot the faults of fuel feed system, charging system, starting system and lighting system.
- Demonstrate the adjustment of the headlight beam.

List of Experiments:

I AUTOMOBILE VEHICLE MAINTENANCE

1. Study and layout of an automobile repair, service and maintenance shop.
2. Study and preparation of different types of tools and instruments, different statements/records required for the repair and maintenance works
3. Minor and major tune up of gasoline and diesel engines
4. Fault diagnosis in electrical and electronic ignition systems
5. Gasoline fuel system, diesel fuel system and rectification
6. Study of faults in the electrical systems such as Head lights, Side of Parking lights, Trafficator lights, Electric horn system, Windscreen wiper system, Starter system and charging system.
7. Study of fuel filters (both gasoline and diesel engines) and air cleaners (dry and wet)
8. Simple tinkering, soldering works of body panels, study of door lock and window glass rising mechanisms.
9. Adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play
10. Air bleeding from hydraulic brakes, air bleeding of diesel fuel system.
11. Adjustment of head lights beam.

II AUTOMOBILE RE-CONDITIONING

12. Removal and fitting of tire and tube.
14. Cylinder reboring – checking the cylinder bore.
14. Setting the tool and reboring.
15. Valve grinding, valve lapping.
16. Setting the valve angle and checking for valve leakage
17. Calibration of fuel injection pump
18. Chassis alignment testing

Course Objectives:

- To introduce knowledge of Computerized engine analyzer.
- To provide knowledge on wheelbalancing.
- To impart knowledge on wheelalignment.
- To learn about Head light focusingtest.
- To impart knowledge on emission test
- To expose students toBrakingdistancetestandVisibilitytest

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Analysis of engine using Computerized engine analyzer.
- Perform wheelbalancing.
- Perform wheelalignment.
- Understand Head light focusingtest
- Perform emission test.
- PerformBrakingdistancetestandVisibilitytest

1. Computerized engine analyzer study and practice;
2. Computerized wheel balancing machine study and practice;
3. Computerized wheel alignment machine study and practice;
4. Head light focusing test;
5. Exhaust emission test of petrol and diesel engine;
Study of NDIR Gas Analyser and FID.
Study of Chemiluminescent NOx analyzer.
Measurement of HC, CO, CO₂, O₂ using exhaust gas analyzer.
Diesel smoke measurement.
6. Braking distance test and Visibility test.

Course Objectives:

- To introduce knowledge of the FEA software as a tool for analysis.
- To provide knowledge on contact stress analysis using FEA software.
- To impart knowledge on transient analysis using FEA software.
- To learn about temperature distribution for heat conduction using FEA software.
- To impart knowledge on coupled field analysis using FEA software.
- To expose students to analysis of the simple structure using FEA software

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Analysis of piston and connecting rod using FEA software.
- Analysis of bumper using FEA software.
- Analysis of leaf spring using FEA software.
- Analysis of composite structure using FEA software
- Find the temperature distribution for heat conduction using FEA software.
- Dynamic analysis of the simple structure using FEA software.

1. Transient analysis of connecting rod.
2. Crash analysis of bumper.
3. Thermal analysis of piston.
4. Contact stress analysis of leaf spring.
5. Coupled field analysis of brake shoes.
6. Study of Combustion analysis.
7. Study of Aerodynamic analysis.
8. Contact stress analysis of gear pair.
9. Stress analysis of composite structure.
10. Vibration analysis of quarter car model.

LIST OF EQUIPMENTS

(for a batch of 30 students)

1. Computer system - 30 Nos.
2. Software like Pro-E - 15 licenses.
3. ANSYS Software - 15 licenses.

15BEAE751

VALUE ADDED COURSE II11 0 1 100

Course Objectives:

- To learn concepts, dimension quality and philosophies of TQM.
- To study the TQM principles and its strategies.
- To expose the seven statistical quality and management tools.
- To impart knowledge on TQM tools for continuous improvement.
- To introduce the quality systems and procedures adopted.
- To acquaint the student with the concepts of quality management system

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Use the concepts, dimension of quality and philosophies of TQM.
- Apply the principles of TQM and its strategies in industries.
- Apply the statistical quality tools and seven management tools.
- Choose suitable TQM tools for continuous improvement.
- Understand the Failure Modes and Effects Analysis
- Use the concepts of quality management system in industries.

UNIT I INTRODUCTION

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II TQM PRINCIPLES

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDCA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TEXT BOOK

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dale H.Besterfield	Total Quality Management	Pearson Education, Inc.	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	James R.Evans and William M.Lindsay	The Management and Control of Quality	South Western College	2010
2.	Feigenbaum.A.V,	Total Quality Control	McGraw-Hill Professional	2004
3.	Oakland.J.S	Total Quality Management and Operational Excellence	Routledge	2014
4.	Narayana.V and Sreenivasan.N.S	Quality Management – Concepts and Tasks	New Age International Ltd., New Delhi.	1996

OBJECTIVE

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

COURSE OBJECTIVES

1. To understand the fundamentals of composite material strength and its mechanical behavior
2. Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.
3. Thermo-mechanical behavior and study of residual stresses in Laminates during processing.
4. Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.
5. Impart knowledge on carbon-carbon composite
6. Impart knowledge on advances in composites

COURSE OUTCOMES

Learners should be able to

1. Select the various types of composite matrix required for an application.
2. Choose appropriate manufacturing process for polymer matrix composite.
3. Opt appropriate manufacturing process for metal matrix composite.
4. Use the concepts of ceramic composites and its production techniques.
5. Identify the type of carbon-carbon composite for different industrial application.
6. Explain the various advances in composites

UNIT I INTRODUCTION TO COMPOSITES

Fundamentals of composites - need for composites – Enhancement of properties - classification of composites – Matrix-Polymer matrix composites (PMC), Metal matrix composites (MMC), Ceramic matrix composites (CMC) – Reinforcement – Particle reinforced composites, Fibre reinforced composites. Applications of various types of composites.

UNIT II POLYMER MATRIX COMPOSITES

Polymer matrix resins – Thermosetting resins, thermoplastic resins – Reinforcement fibres – Rovings – Woven fabrics – Non woven random mats – various types of fibres. PMC processes - Hand lay up processes – Spray up processes – Compression moulding – Reinforced reaction injection moulding - Resin transfer moulding – Pultrusion – Filament winding – Injection moulding. Fibre reinforced plastics (FRP), Glass fibre reinforced plastics (GRP).

UNIT III METAL MATRIX COMPOSITES

Characteristics of MMC, Various types of Metal matrix composites Alloy vs. MMC, Advantages of MMC, Limitations of MMC, Metal Matrix, Reinforcements – particles – fibres. Effect of reinforcement - Volume fraction – Rule of mixtures. Processing of MMC – Powder metallurgy process - diffusion bonding – stir casting – squeeze casting.

UNIT IV CERAMIC MATRIX COMPOSITES

Engineering ceramic materials – properties – advantages – limitations – Monolithic ceramics - Need for CMC – Ceramic matrix - Various types of Ceramic Matrix composites- oxide ceramics – non oxide ceramics – aluminium oxide – silicon nitride – reinforcements – particles- fibres- whiskers. Sintering - Hot pressing – Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing).

UNIT V ADVANCES IN COMPOSITES

Carbon /carbon composites – Advantages of carbon matrix – limitations of carbon matrix Carbon fibre – chemical vapour deposition of carbon on carbon fibre perform. Sol gel technique. Composites for aerospace applications.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Mathews.F.L, and Rawlings.R.D	Composite materials: Engineering and Science, 1 st edition	Chapman and Hall, London, England.	1994.
2.	Chawla.K.K	Composite materials Science & Engineering	Springer – Verlag.	2012

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Clyne.T.W and Withers.P.J	Introduction to Metal Matrix Composites	Cambridge University Press.	1995
2.	Strong.A.B	Fundamentals of Composite Manufacturing	SME	1989
3.	Sharma.S.C	Composite materials	Narosa Publications, New Delhi.	2000

Course Objectives:

- To impart knowledge of the construction layout and applications of the off-road vehicles.
- To learn the various earth moving constructional machines.
- To study the construction and working details of industrial vehicles.
- To acquire knowledge on the working of tractor attachments and military vehicles.
- To provide knowledge on the mechanism of brake, suspension and steering in off-road vehicles.
- To impart knowledge on earth moving machines

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the construction layout and features of off-road vehicles.
- Select earth moving constructional machine for a particular application.
- Describe the construction details and working of industrial vehicles.
- State the special features of tractor attachments and military vehicles.
- Illustrate the mechanism of brake
- Illustrate the mechanism of suspension and steering

UNIT I EARTH MOVING AND CONSTRUCTIONAL EQUIPMENTS

Construction layout, capacity and applications of earthmovers for dumpers, front-end loaders, bulldozers, excavators, backhoe loaders, scrapers, motor graders etc. criteria for selection of prime mover for dumpers and front end loaders based on vehicle performance characteristics.

UNIT II POWER TRAIN CONCEPTS

Engine – converter match curves. Epicyclic type transmissions. Selection criteria for universal joints. Constructional details of steerable and drive axles of dumper.

UNIT III VEHICLE SYSTEMS, FEATURES

Brake system and actuation – O/CDB and dry disc caliper brakes. Body hoist and bucket operational hydraulics. Hydro-pneumatic suspension cylinders. Power steering system. Kinematics for loader and bulldozer operational linkages. Safety features, safe warning system for dumper. Design aspects on dumper body, loader bucket and water tank of sprinkler. Articulated vehicles, double decker. Fire fighting equipment.

UNIT IV SPECIAL PURPOSE VEHICLES FOR INDUSTRIAL APPLICATIONS

Constructional features, capacity and stability of jib cranes. Vibratory compactors. Stackers, borewell machines, concrete mixtures.

UNIT V FARM EQUIPMENTS, MILITARY AND COMBAT VEHICLES

Ride and stability characteristics, power take off, special implementations. Special features and constructional details of tankers, gun carriers and transport vehicles. Harvesting vehicles.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Pipenger.	Industrial Hydraulics.	Mcgraw Hill, Tokoyo.	1979.
2.	A. Astakhov.	Truck cranes.	MIR Publishers, Moscow.	1971.
3.	Bart H Vanderveen.	Tanks and Transport Vehicles.	Frederic Warne and co. Ltd., London.	1974.
4.	K. Abrosimov, A. Bromberg and F. Katayer.	Road making machineries.	MIR Publisher, Moscow.	1975.
5.	SAE Handbook – Vol III, 1995.			

Course Objectives:

- To familiarise the components of a tractor and its controls.
- To impart knowledge on the various farm equipment.
- To expose students to the types of tractors.
- To familiarize the students to understand the performance characteristics of a tractor engine.
- To facilitate the understanding of cooling and lubrication system for troubleshooting.
- To impart knowledge on tractor attachments

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Classify the types of tractors.
- Explain the performance characteristics of a tractor engine.
- Discuss the construction and operation of the valve mechanism.
- Analyse the cooling and lubrication system for troubleshooting.
- Discuss the tractor attachments
- List and explain the various farm equipment.

UNIT I GENERAL DESIGN OF TRACTORS

Classification of tractors - Main components of tractor - Safety rules.

UNIT II CONTROL OF THE TRACTOR AND FUNDAMENTALS OF ENGINE OPERATION

Tractor controls and the starting of the tractor engines - Basic notions and definition - Engine cycles – Operation of multi cylinder engines - General engine design - Basic engine performance characteristics.

UNIT III ENGINE FRAME WORK AND VALVE MECHANISM OF TRACTOR

Cylinder and pistons - Connecting rods and crankshafts - Engine balancing - Construction and operation of the valve mechanism - Valve mechanism components - Valve mechanism troubles.

UNIT IV COOLING SYSTEM, LUBRICATION SYSTEM AND FUEL SYSTEM

Cooling system - Classification - Liquid cooling system - Components, Lubricating system servicing and troubles - Fuel tanks and filters - Fuel pumps - Air cleaner and turbo charger

UNIT V FARM EQUIPMENTS

Working attachment of tractors - Farm equipment - Classification - Auxiliary equipment - Trailers and body tipping mechanism.

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Rodichev and Rodicheva.G	Tractor and Automobiles	MIR Publishers.	1987
2.	Kolchin.A and Demidov.V	Design of Automotive engines for tractor	MIR Publishers.	1984

Course Objectives:

- To impart knowledge of the construction layout and applications of the off-road vehicles.
- To learn the various earth moving constructional machines.
- To study the construction and working details of industrial vehicles.
- To acquire knowledge on the working of tractor attachments and military vehicles.
- To provide knowledge on the mechanism of brake, suspension and steering in off-road vehicles.
- To impart knowledge on earth moving machines

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the construction layout and features of off-road vehicles.
- Select earth moving constructional machine for a particular application.
- Describe the construction details and working of industrial vehicles.
- State the special features of tractor attachments and military vehicles.
- Illustrate the mechanism of brake
- Illustrate the mechanism of suspension and steering

UNIT I CLASSIFICATION AND REQUIREMENTS OF OFF ROAD VEHICLES

Power plants, chassis and transmission, Multi axle vehicles.

UNIT II LAND CLEARING MACHINES

Bush cutter, Stampers, Tree dozer, Rippers.

UNIT III EARTH MOVING MACHINES

Bulldozers, cable and hydraulic dozers. Crawler track, running and steering gears, scrapers, drag and self powered types - Dump trucks and dumpers - Loaders, single bucket, multi bucket and rotary types - Power and capacity of earth moving machines.

UNIT IV SCRAPERS AND GRADERS

Scrapers, elevating graders, self powered scrapers and graders.

UNIT V SHOVELS AND DITCHERS

Power shovel, revolving and stripper shovels - drag lines - ditchers - Capacity of shovels.

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Abrosimov.K, Bryan berg.A and Katayer.K	Road making Machinery	MIR Publishers, Moscow.	1971
2.	Wong.J.Y	Theory of Ground vehicles	John Wiley & Sons, New York	2008

Course Objectives:

- To impart knowledge of the construction layout and applications of the off-road vehicles.
- To learn the various earth moving constructional machines.
- To study the construction and working details of industrial vehicles.
- To acquire knowledge on the working of tractor attachments and military vehicles.
- To provide knowledge on the mechanism of brake, suspension and steering in off-road vehicles.
- To impart knowledge on earth moving machines

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Explain the construction layout and features of off-road vehicles.
- Select earth moving constructional machine for a particular application.
- Describe the construction details and working of industrial vehicles.
- State the special features of tractor attachments and military vehicles.
- Illustrate the mechanism of brake
- Illustrate the mechanism of suspension and steering

UNIT I MAINTENANCE TOOL, SHOP, SCHEDULE, RECORDS

Standard tool set, torque wrenches, compression and vacuum gauges, engine analyzer and scanner, computerized wheel alignment and balancing, gauges for engine tune up and pollution measurement, spark plug cleaner, cylinder re boring machine, fuel injection calibration machine. Importance of maintenance. Schedule and unscheduled maintenance. Scope of maintenance. Equipment downtime. Vehicle inspection. Reports. Log books. Trip sheet. Lay out and requirements of maintenance shop.

UNIT II POWER PLANT REPAIR AND OVERHAULING

Dismantling of power plant and its components. Cleaning methods. Inspection and checking. Repair and reconditioning methods for all engine components. Maintenance of ignition system, fuel injection system, cooling system, - lubrication system. Power plant trouble shooting chart.

UNIT III MAINTENANCE, REPAIR AND OVERHAULING OF THE CHASSIS

Maintenance, servicing and repair of clutch, fluid coupling, gearbox, torque converter, propeller shaft. Maintenance of front axle, rear axle, brakes, steering systems. Tyre maintenance.

UNIT IV MAINTENANCE AND REPAIR OF VEHICLE BODY

Body panel tools for repairing. Tinkering and painting. Use of soldering, metalloid paste.

UNIT V MAINTENANCE AND REPAIR OF ELECTRICAL SYSTEMS

Care, maintenance, testing and trouble shooting of battery, starter motor, dynamo, alternator and regulator. Transistorized regulator problems.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	A.W.Judge.	Motor Vehicle Servicing.	3rd Edition, Pitman Paperpack, London .	1969.
2.	W.Crouse.	Everyday Automobile repair.	Intl.student edition, TMH, New Delhi.	1986.
3.	Ernest Venk., Edward spicer.	Automotive maintenance and trouble shooting.	D.B. Taraporevala Sons, Bombay.	1963.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Stator Abbey.	Automotive steering, braking and suspension overhaul.	pitman publishing, London.	1971.
2.	Frazee, fledell, Spicer.	Automobile collision Work.	American technical publications, Chicago.	1953.
3.	John Dolce.	Fleet maintenance.	Mcgraw Hill, Newyork.	1984.
4.	A,W.Judge.	Maintenance of high speed diesel engines.	Chapman Hall Ltd., London.	1956.
5.	V.L.Maleev.	Diesel Engine operation and maintenance.	McGraw Hill Book CO., Newyork..	1995.

Course Objectives:

- To introduce the way of specifying dimension and tolerance in engineering drawing by using geometric dimensioning and tolerancing.
- To indicate the design considerations while casting, welding and forming of components.
- To familiarise with the concept and design guidelines for manufacturing parts by different machining processes.
- To study the factors affecting the easy assembly of parts into a final product.
- To impart knowledge on the environmental impact of products manufactured and engineering ways to minimise it
- To Study and acquire knowledge on disassembly, recyclability, remanufacture

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Apply geometric dimensioning and tolerancing techniques in engineering drawing.
- Apply design considerations to minimise the difficulty in fabrication of components by casting, welding and forming processes.
- Apply design for manufacturing concept to reduce the machining time and manufacturing cost.
- Perform the parts assembly of the given component using design for assembly guidelines.
- Design components taking into consideration the environmental impact.
- Describedisassembly, recyclability, remanufacture,

UNIT I**DFM APPROACH, SELECTION AND SUBSTITUTION OF MATERIALS IN INDUSTRY**

DFM approach, DFM guidelines, standardization, group technology, value engineering, comparison of materials on cost basis, design for assembly, DFA index, Poka - Yoke principle; 6σ concept; design creativity.

Tolerance Analysis: Process capability, process capability metrics, C_p , C_{pk} , cost aspects, feature tolerances, geometric tolerances, surface finish, review of relationship between attainable tolerance grades and different machining process, cumulative effect of tolerances, sure fit law, normal law and truncated normal law.

UNIT II SELECTIVE ASSEMBLY

Interchangeable and selective assembly, deciding the number of groups, Model-I: group tolerances of mating parts equal; Model-II: total and group tolerances of shaft, control of axial play-introducing secondary machining operations, laminated shims, examples.

Datum Systems: Degrees of freedom, grouped datum systems-different types, two and three mutually perpendicular grouped datum planes, grouped datum system with spigot and recess, pin and hole, grouped datum system with spigot and recess pair and tongue-slot pair, computation of translational and rotational accuracy, geometric analysis and applications.

UNITIII TRUE POSITION TOLERANCING THEORY

Comparison between co-ordinate and convention method of feature location, tolerancing and true position tolerancing, virtual size concept, floating and fixed fasteners, projected tolerance zone, assembly with gasket, zero true position tolerance, functional gauges, paper layout gauging, compound assembly, examples.

UNIT IV FORM DESIGN OF CASTINGS AND WELDMENTS

Redesign of castings based on parting line considerations, minimising core requirements, redesigning cast members using weldments, use of welding symbols – design considerations for plastic component manufacturing.

Tolerance Charting Technique: Operation sequence for typical shaft type of components, preparation of process drawings for different operations, tolerance worksheets and centrality analysis, examples, design features to facilitate machining, datum features - functional and manufacturing, component design-machining considerations, redesign for manufacture, examples.

UNIT V LEAN MANUFACTURING

Need for lean concepts, different types of waste, metrics of manufacturing, an overview of value stream mapping- present state map, future state map, evaluation of benefits – Process FMEA, Design FMEA

TEXT BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Harry Peck,	Designing for Manufacture	Pitman Publications, London	1983
2	Robert Matousek D C Johnson	Engineering Design a Systematic Approach	Blackie and Son Ltd., London.	1974

REFERENCES

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Spotts.M.F	Dimensioning and Tolerance for Quantity Production	Prentice Hall Inc., New Jersey, USA.	1983
2	Oliver R Wade	Tolerance Control in Design and Manufacturing	Industrial Press Inc., New York.	1967
3	James G.Bralla	HandBook of Product Design for Manufacturing	McGraw Hill Publications, New Delhi.	1983

Course Objectives:

- To formulate design optimization problems for engineering applications.
- To provide knowledge on single variable unconstrained problems.
- To learn multi-objective unconstrained optimization problems.
- To introduce concepts of constrained non-linear optimization problems.
- To interpret non-traditional optimization techniques for engineering problems.
- To study the features of neural network-based optimization

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Formulate design optimization problem from real-world applications.
- Compute the solution for single variable unconstrained optimization problems.
- Determine the solution for multivariable unconstrained optimization problems.
- Find the solution for the constrained non-linear optimization problems.
- Apply non-traditional optimization techniques to solve engineering problems.
- Apply the neural network-based optimization

UNIT I SINGLE VARIABLE OPTIMIZATION ALGORITHM

Introduction - Engineering optimization problems - Optimality criteria - Bracketing methods – Region elimination methods - Point estimation methods - Gradient based methods - Root finding using optimization techniques - Computer Programmes.

UNIT II MULTI VARIABLE OPTIMIZATION ALGORITHM

Optimality criteria - Unidirectional search - Direct search methods - gradient based methods – Computer programmes.

UNIT III CONSTRAINED OPTIMIZATION ALGORITHMS

Kuhn-Tucker conditions - Transformation methods - sensitivity analysis - Direct search for constrained minimization - Unearized search techniques method - Gradient projection method - Computer programmes

UNIT IV SPECIALIZED ALGORITHMS

Integer programming - Geometric programming

UNIT V NON TRADITIONAL OPTIMIZATION ALGORITHMS

Genetic algorithms - Simulated annealing - Global optimization - Computer programmes.

TEXT BOOK

SL.N O	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Kalyanmoy Deb	Optimization for Engineering Design, 5 th print	Prentice Hall of India, New Delhi.	2003

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Taha.H.A	Operations Research	Macmillan, New York.	1986
2.	Rao.S.S	Engineering Optimization: Theory and Practice, 4th Ed	Wiley Eastern, New Delhi.	2009
3.	Murthy.K.G	Linear Programming	Wiley New York.	1987
4.	Reklaitis.G.V,Ravindran.A and Regedit K.M	Engineering optimization methods and applications	Wiley, New York.	2006

Course Objectives:

- To provide knowledge on the fundamentals of aerodynamics and vehicle body optimisation.
- To introduce the use of wind tunnels in testing the vehicles.
- various aerodynamic shapes of car
- To introduce aerodynamics for design of the vehicle body
- To study the features of characteristics of forces and moments
- To understand the importance computational fluid dynamics analysis

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the importance of aerodynamics for automobiles.
- Apply principles of aerodynamics for design of the vehicle body.
- Analyse the various aerodynamic shapes of car.
- Discuss the characteristics of forces and moments.
- Apply the concept of wind tunnel for the aerodynamic design of automobiles.
- Apply the computational fluid dynamics analysis.

UNIT I INTRODUCTION

Scope - historical development trends - Fundamental of fluid mechanics - Flow phenomenon related to vehicles - External & Internal flow problem - Resistance to vehicle motion - Performance - Fuel consumption and performance - Potential of vehicle aerodynamics.

UNIT II AERODYNAMIC DRAG OF CARS

Cars as a bluff body - Flow field around car - drag force - types of drag force - analysis of aerodynamic drag - drag coefficient of cars - strategies for aerodynamic development - low drag profiles.

UNIT III SHAPE OPTIMIZATION OF CARS

Front end modification - front and rear wind shield angle - Boat tailing - Hatch back, fast back and square back - Dust flow patterns at the rear - Effects of gap configuration - effect of fasteners.

UNIT IV VEHICLE HANDLING

The origin of forces and moments on vehicle - side wind problems - methods to calculate forces and moments- vehicle dynamics under side winds - the effects of forces and moments - Characteristics of forces and moments - Dirt accumulation on the vehicle - wind noise - drag reduction in commercial vehicles.

UNIT V WIND TUNNELS FOR AUTOMOTIVE AERODYNAMIC

Introduction - Principle of wind tunnel technology - Limitation of simulation - Stress with scale models – full scale wind tunnels - measurement techniques - Equipment and transducers - road testing methods – Numerical methods.

TEXT BOOK

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Hucho .W.H	Aerodynamic of Road vehicles	Butterworth's Co. Ltd, London.	1997

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Alan Pope William H. Rae Jewel B. Barlow	Low-Speed Wind Tunnel Testing, 3 rd Ed	John Wiley & Sons, New York.	1999
2	SAE	Automotive Aerodynamic	Update SP-706, SAE	1987
3	SAE	Vehicle Aerodynamic	SP-1145, SAE.	1996

Course Objectives:

- To introduce governing equations of viscous fluid flows.
- To acquaint the student with the concepts of finite difference and finite volume methods for diffusion.
- To familiarize the students to understand the finite volume method for convective diffusion
- To introduce numerical modelling and its role in the field of fluid flow and heat transfer.
- To provide knowledge on the various discretization methods, solution procedures and turbulence modelling.
- To impart knowledge on use of software tools.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Derive the governing equations and boundary conditions for fluid dynamics.
- Analyse finite difference and finite volume methods for diffusion.
- Analyse finite volume method for convective diffusion.
- Analyse the flow field problems.
- Explain and solve the turbulence models and mesh generation techniques.
- Use software tools.

UNIT I GOVERNING EQUATIONS AND BOUNDARY CONDITIONS

Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momentum and Energy equations – Chemical species transport – Physical boundary conditions – Time-averaged equations for Turbulent flow - Turbulence -Kinetic -Energy Equations – mathematical behavior of PDEs on CFD: Elliptic, Parabolic and Hyperbolic equations.

UNIT II DISCRETIZATION AND SOLUTION METHODOLOGIES

Methods of Deriving the Discretization Equations - Taylor Series formulation – Finite difference method – Control volume Formulation – Spectral method.

Solution methodologies: Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.

UNIT III HEAT CONDUCTION

Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems

UNIT IV CONVECTION AND DIFFUSION

Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes - Discretization equations for two dimensional convection and diffusion.

UNIT V CALCULATION OF FLOW FIELD

Representation of the pressure - Gradient term and continuity equation - Staggered grid - Momentum equations - Pressure and velocity corrections - Pressure - Correction equation, SIMPLE algorithm and its variants. Turbulence models: mixing length model, Two equation (k- ϵ) models.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Versteeg. H.K and Malalasekera. W	An Introduction to Computational Fluid Dynamics: The Finite Volume Method	Longman	1998
2.	Ghosh dastidar. P. S	Computer Simulation of flow and heat transfer	Tata McGraw-Hill Publishing Company Ltd., New Delhi.	1998

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Patankar. S.V	Numerical Heat Transfer and Fluid Flow	And- Books2004 Indian Edition, McGraw-Hill, New Delhi.	1980
2.	Muralidhar.K and Sundararajan.T	Computational Fluid Flow and Heat Transfer	Narosa Publishing House, New Delhi.	1995
3.	Bose.D.K,	Numerical Fluid Dynamics	Narosa publishing House,New Delhi.	1997
4.	Muralidhar.K and Biswas	Advanced Engineering Fluid Mechanics	Narosa Publishing House, New Delhi.	1996

Course Objectives:

- To impart knowledge on the basics of vibration and noise.
- To understand the importance of single degree and two degrees of freedom vibration systems.
- To equip them with skills to Calculate the total sound pressure level
- To enrich the understanding of frequency analysis
- To understand the sources of vibration and noise.
- To learn the vibration and noise control techniques.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- List and explain the types of vibrations.
- Analyse a single degree and two degrees of freedom vibration systems.
- Calculate the total sound pressure level produced by two sounds of different levels.
- Apply frequency analysis
- Identify the sources of vibration in automobiles.
- Design the systems to reduce vibration and noise.

UNIT I SIMPLIFICATION OF VIBRATION PROBLEMS TO ONE DEGREE OF FREEDOM

Basic equation of motion for various vibration problems – Torsional, Free, Damped and Forced vibration problems, critical speed, nature of exciting forces, vibration isolation, vibration instruments.

UNIT II TWO AND MULTI-DEGREE OF FREEDOM SYSTEMS

Two degree – Formulation of solution - Coupling between rotating and translation - Applications. Multi degree – Governing equation for closed coupled systems - Lateral vibration, Geared systems - Effect of gyroscopic acceleration.

UNIT III SOLUTION OF VIBRATION PROBLEMS

Approximate methods (or) Numerical methods – Holzer's method, Myklestad's method, Sturgen sequence Energy methods – Rayleigh's Approach – Closed coupled systems. For coupled systems – Dunkerley's method, Rayleigh Ritz method.

UNIT IV DIAGNOSTICS AND FIELD MEASUREMENT

Diagnostic tools - Condition monitoring in real time - Balancing of rotors - Field measurements on various compressors, fans, machine foundation.

UNIT V MACHINERY NOISE AND CONTROL

Basics of noise - Introduction, amplitude, frequency, wavelength and sound - Pressure level, noise dose level - Measurement and analysis of noise. Methods for control of noise - Mechanical noise - Predictive analysis, Sound in enclosures - Sound energy absorption - Sound transmission through barriers.

TEXT BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE	PUBLISHER	YEAR OF
-------	-----------	--------------	-----------	---------

		BOOK		PUBLICATION
1	Ramamurthy .V,	Mechanical Vibration Practice with Basic Theory	Narosa Publishing House, Chennai	2000
2	Kewel Pujara	Vibration and noise for engineers	Dhanpatrai & Sons	1992

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rao .J.S and Gupta. K	„Introductory course on theory and practice of mechanical vibrations	Wiley Eastern, New Delhi.	1984
2	Rao.S.S	Mechanical vibrations,3 rd Edition	Wesley publishing company, New York	1995
3	Thomson.W.T	“Theory of Vibration and its Applications”	Prentice Hall, New Delhi	1982

Course Objectives:

- To impart knowledge on significance of failure analysis in engineering design.
- To understand failure mechanism.
- To equip them with skills to handle the specific failure component
- To enrich the understanding of detailed root-cause analysis
- To understand the material factors that cause the failure
- To learn the corrective and preventive guidelines.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the significance of failure analysis in engineering design.
- Design and implement an appropriate strategy to handle the specific failure component
- Implement detailed root-cause analysis
- Apply various tools and techniques to identify the failure mechanism
- Describe the various material factors that cause the failure
- Propose appropriate corrective and preventive guidelines

UNIT I MATERIALS AND DESIGN PROCESS

Factors affecting the behavior of materials in components, effect of component geometry and shape factors, design for static strength, stiffness, designing with high strength and low toughness materials, designing for hostile environments, material processing and design, processes and their influence on design, process attributes, systematic process selection, screening, process selection diagrams, ranking, process cost.

UNIT II FRACTURE MECHANICS

Ductile fracture, brittle fracture, Cleavage-fractography, ductile-brittle transition-Fracture mechanics approach to design-energy criterion, stress intensity approach, time dependent crack growth and damage

LINEAR ELASTIC FRACTURE MECHANICS: Griffith theory, Energy release rate, instability and R-curve, stress analysis of cracks-stress intensity factor, K-threshold, crack growth instability analysis, crack tip stress analysis.

UNIT III ELASTIC PLASTIC FRACTURE MECHANICS

Crack tip opening displacement (CTOD), J integral, relationship between J and CTOD, DYNAMIC AND TIME-DEPENDENT FRACTURE: Dynamic fracture, rapid loading of a stationary crack, rapid crack propagation, dynamic contour integral, Creep crack growth-C Integral, Visco elastic fracture mechanics, visco elastic J integral

UNIT IV DETERMINATION OF FRACTURE TOUGHNESS VALUES

Experimental determination of plane strain fracture toughness, K- R curve testing, J measurement, CTOD testing, effect of temperature, strain rate on fracture toughness.

UNIT V FAILURE ANALYSIS TOOLS

Reliability concept and hazard function, life prediction, life extension, application of poisson, exponential and Weibull distribution for reliability, bath tub curve, parallel and series system, MTBF, MTTR, FMEA definition-Design FMEA, Process FMEA, analysis causes of failure, modes, ranks of failure modes, fault tree analysis, industrial case studies/projects on FMEA.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John M. Barsom and Stanley T Rolte	Fracture and Fatigue Control in Structures	Prentice Hall, New Delhi.	1987
2.	ASM Metals Handbook	Failure Analysis and Prevention, 10 th edition, Vol.10	ASM Metals Park, Ohio, USA.	1995
3.	Michael F. Ashby	Material Selection in Mechanical Design	Butterworth Heinemann.	1999

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Shigley and Mischke	Mechanical Engineering Design	McGraw Hill.	1992
2.	Mahmoud M.Farag	Material Selection for Engineering Design	Prentice Hall, New Delhi.	1997

Faculty of Mechanical Engineering, PSG College of Technology "Design Data Book", DPV Printers, 1993

Course Objectives:

- To impart knowledge on significance of CAD.
- To impart knowledge on Vehicle Frame and Suspension
- To acquire the ability in designing of Front Axle and Steering Systems
- To acquire the ability in designing of Clutch
- To provide an overview of drawing of Gear Box
- To provide an overview of Drive Line and Rear Axle

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Acquire knowledge on significance of CAD
- Acquire knowledge on Vehicle Frame and Suspension
- Understand designing of Front Axle and Steering Systems
- Understand designing of Clutch
- Acquire knowledge on drawing of Gear Box
- Acquire knowledge on Drive Line and Rear Axle

UNIT I VEHICLE FRAME AND SUSPENSION

Study of loads - moments and stresses on frame members. Computer aided design of frame for passenger and commercial vehicle - Computer aided design of leaf springs - Coil springs and torsion bar springs.

UNIT II FRONT AXLE AND STEERING SYSTEMS

Analysis of loads - moments and stresses at different sections of front axle. Determination of bearing loads at Kingpin bearings. Wheel spindle bearings. Choice of bearings. Determination of optimum dimensions and proportions for steering linkages ensuring minimum error in steering.

UNIT III CLUTCH

Torque capacity of clutch. Computer aided design of clutch components, Design details of roller and sprag type of clutches.

UNIT IV GEAR BOX

Computer aided design of three speed and four speed gear boxes.

UNIT V DRIVE LINE AND REAR AXLE

Computer aided design of propeller shaft. Design details of final drive gearing. Design details of full floating, semi-floating and three quarter floating rear shafts and rear axle housings.

TEXT BOOK

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dan Evans	Automobile Chassis Design	Iliffe Books Ltd.	1992

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Heldt.P.M,	Automotive Chassis	Chilton Co., New York	1992
2	Steeds.W	Mechanics of Road vehicles	iliffe Books Ltd, London.	1990
3	Newton, Steeds & Garrett	Motor vehicle	iliffe Books Ltd., London.	2001
4	Giri.N.K	Automobile Mechanics8th Edition	Khanna Publisher, New Delhi.	2008

Course Objectives

- Evaluate the global context for taking managerial actions of planning, organizing and controlling.
- Assess global situation, including opportunities and threats that will impact management of an organization.
- Integrate management principles into management practices.
- Assess managerial practices and choices relative to ethical principles and standards
- To evaluation of organizational theories and human resource management principles
- To impart knowledge on Entrepreneurship

Course Outcome

At the end of this course, students will be able to

- Synthesis of trends and issues as related to current professional practice
- Understand global situation, including opportunities and threats that will impact management of an organization
- Evaluation of organizational theories and human resource management principles
- Ability to Integrate management principles into management practices
- Analyze organizational theories and human resource management principles
- Understanding of Entrepreneurship

UNIT I OVERVIEW OF MANAGEMENT

Organization – Management – Role of managers – Evolution of Management thought – Organization and the environmental factors – Managing globally Strategies for International Business.

UNIT II PLANNING

Nature and Purpose planning – Planning process – Types of plans – Objectives
Managing by objective (MBO) Strategies – Types of strategies – Policies – Decision Making
Types of decision – Decision Making Process - Rational Decision Making Process – Decision Making under different conditions.

UNIT III ORGANISING

Nature and purpose of organizing – Organization structure – Formal and informal groups
organization – Line and Staff authority – Departmentation – Span of Control –
Centralization and Decentralization – Delegation of authority – Staffing – Selection and
Recruitment – Orientation Career Development – Careerstages – Training –Performance Appraisal.

UNIT IV DIRECTING AND CONTROLLING

Managing people- Communication- Hurdles to effective communication- Organization culture Elements and types of culture- Managing cultural diversity. Process of controlling- Types of control- Budgetary and non-budgetary control techniques Managing productivity- Cost control- Purchase control- Maintenance control- Quality control Planning operations

UNIT V ENTREPRENEURSHIP

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

TEXTBOOK

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Stephen P. Robbins and Mary Coulter	Management	Prentice Hall of India	8th Edition
2.	Charles W.L Hill, Steven L McShane	Principles of Management	Mcgraw Hill Education, Special Indian Edition.	, 2007

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Hellriegel, Slocum & Jackson	Management – A Competency Based Approach	Thomson South Western	10 edition, 2007
2.	Harold Koontz, Heinz Weihrich and Mark V Cannice	Management – A global & Entrepreneurial Perspective	Tata Mcgraw Hill	12 edition, 2007
3.	Andrew J. Dubrin	Essentials of Management	Thomson Southwestern	7 edition, 2007

Course Objectives:

- To expose the different types of batteries and ignition systems.
- To provide knowledge on the working of starting system and charging system.
- To provide knowledge on automobile wiring system.
- To learn the automobile lighting system.
- To study the various sensors and actuators used in the automobile.
- To impart knowledge on the electronic engine management system.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Sketch and explain the working principle of battery and ignition system.
- Discuss working of the starting system and charging system.
- Illustrate the automobile wiring system.
- Illustrate the automobile lighting system.
- Identify the sensors and actuators used in the automobile.
- Explain the electronic engine management system.

UNIT I BATTERIES AND ACCESSORIES

Principle and construction of lead acid battery, characteristics of battery, rating capacity and efficiency of batteries, various tests on batteries, maintenance and charging. Lighting system: insulated and earth return system, details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator.

UNIT II CHARGING SYSTEM

Generation of direct current, shunt generator characteristics, armature reaction, third brush regulation, cutout. Voltage and current regulators, compensated voltage regulator, alternators principle and constructional aspects and bridge rectifiers, new developments.

UNIT III STARTING SYSTEM

Condition at starting, behavior of starter during starting, series motor and its characteristics, principle and construction of starter motor, working of different starter drive units, care and maintenances of starter motor, starter switches.

UNIT IV FUNDAMENTALS OF AUTOMOTIVE ELECTRONICS

Current trends in automotive electronic engine management system, electro magnetic interference suppression, electromagnetic compatibility, electronic dashboard instruments, onboard diagnostic system, security and warning system.

UNIT V SENSORS AND ACTIVATORS

Types of sensors: sensor for speed, throttle position, exhaust oxygen level, manifold pressure, crankshaft position, coolant temperature, exhaust temperature, air mass flow for engine application. Solenoids, stepper motors, relay.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	William B.Riddens	Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn	1988

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Bechhold	Understanding Automotive Electronics	SAE.	1998
2.	Crouse.W.H	Automobile Electrical Equipment, 3 rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	Judge.A.W	Modern Electrical Equipment of Automobiles	Chapman & Hall, London	1992
4.	Kholi.P.L	Automotive Electrical Equipment	Tata McGraw-Hill Co Ltd., New Delhi	1975
5.	Robert Bosch	Automotive Hand Book, 5 th Edition	SAE.	2000
6.	Ganesan.V	Internal Combustion Engines 4th Edition	Tata McGraw-Hill Publishing Co., New Delhi	2012

Course Objectives:

- To learn the various advanced driver assistance systems.
- To provide knowledge of the vehicle telematics.
- To impart knowledge on safety and security systems.
- To study the various comfort systems.
- To introduce the adaptive control systems.
- To introduce the concepts of the global positioning systems

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- List and explain the various driver assistant systems.
- Discuss the global positioning systems
- Describe the vehicle telematics and its applications.
- Explain the safety and security systems for automotive.
- Discuss the various comfort systems.
- Explain the adaptive control systems.

UNIT I DRIVER ASSISTANCE SYSTEMS

Introduction, driver support systems – driver information, driver perception, driver convenience, driver monitoring. Vehicle support systems – general vehicle control, collision avoidance, vehicle status monitoring.

UNIT II TELEMATICS

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition, driver assistance systems.

UNIT III SAFETY AND SECURITY SYSTEMS

Airbags, seat belt tightening system, collision warning systems, child lock, anti lock braking systems. Anti theft technologies, smart card system, number plate coding.

UNIT IV COMFORT SYSTEMS

Active suspension systems, requirement and characteristics, different types, power steering, collapsible and tiltable steering column, power windows.

UNIT V ADAPTIVE CONTROL SYSTEMS

Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut-off technology.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ljubo Vlacic, Michael	Intelligent Vehicle	Butterworth-	2001

	Saren and Fumio Harashima	Technologies	Heinemann publications, Oxford	
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems –Progress in Technology	Automotive Electronics Series,SAE, USA.	1998

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William B Riddens	Understanding Automotive Electronics, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	Understanding Automotive Electronics	SAE	1998
3.	Robert Bosch,	Automotive HandBook, 5 th Edition	SAE	2000

Course Objectives:

- To impart knowledge on trends in the vehicle power plants.
- To learn the various advanced driver assistance systems.
- To study the working of advanced suspension and braking systems in an automobile.
- To give information about motor vehicle emission and noise pollution control.
- To provide knowledge of the vehicle telematics.
- To give information about the noise control techniques

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Distinguish and describe the various modern vehicle power plant systems.
- List and explain the various driver assistant mechanisms.
- Identify and describe the working of advanced suspension and braking systems.
- Apply the knowledge of motor vehicle emission and noise pollution control.
- Describe the noise control techniques
- Describe the vehicle telematics and its applications.

UNIT I TRENDS IN POWER PLANTS

Hybrid vehicles - Stratified charged / lean burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II SUSPENSION BRAKES AND SAFETY

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT III NOISE & POLLUTION

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT IV VEHICLE OPERATION AND CONTROL

Computer Control for pollution and noise control and for fuel economy - Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

UNIT V VEHICLE AUTOMATED TRACKS

Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel.

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Beranek.L.L	.Noise Reduction	McGraw-Hill Book Co., Inc, New York	1993
2	SAE	Bosch Hand book	3 rd Edition, SAE	1993

Course Objectives:

- To introduce the concept and working of sensors used in the mechatronic system.
- To study different types of actuators used in the mechatronic system.
- To provide knowledge on feedback mechanism for improving the reliability of the mechatronic system.
- To impart knowledge on working of microcontroller in the mechatronic system.
- To learn the Programmable Logic Controller (PLC) used in the mechatronic system.
- To expose students to program for PLC

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Select the different types of sensor for various mechatronics applications.
- Identify suitable actuator used in a mechatronic system.
- Design a feedback controller for mechatronic systems.
- Develop a controller using microcontroller for the mechatronic system.
- Describe the PLC
- Write a program for PLC used in the mechatronic systems.

INTRODUCTION

Concept and scope of automation: Socio economic Consideration: Low cost automation. Necessity of Multidisciplinary study – Evolution of Mechatronics – Brief introduction to manufacturing – Principles of Mechatronics.

UNIT I PNEUMATIC AND HYDRAULIC SYSTEMS

Hydraulics and pneumatic power supplies, Direction control valves, Pressure control valve: pressure limiting, pressure relief and pressure sequencing valves, speed control valve, servo valves and servo systems, time delay valves, shuttle valve, Actuators: Single acting and double acting cylinders, Cushion assembly, Rotary actuators, Vane Motor, Pilot operation, Cylinders sequencing and process control.

UNIT II PROGRAMMABLE LOGIC CONTROLLER (PLC)

Function of PLC, Architecture, Components Of PLC, selection of PLC, Ladder Logic Diagram, and Logic Functions: latching, sequencing, counters, shift registers, jumpers, manipulation of data, arithmetic operations. Application of personal computer in control and automation: Data acquisition: ADC, DAC, digital input, digital output, control of DC motor, stepper motor. MEMS, Solid State Switches, Solenoid, DC/AC Motors, Stepper Motors.

UNIT III ROBOTICS

Introduction, classification based on geometry, devices, control and path movements, End effectors- types and application: Sensors- types and application, Concept of Robotics/Machine vision, Teach Pendant. Application: Material transfer, machine loading /unloading, welding, assembly and spray painting operations.

UNIT IV TRANSDUCERS, SENSORS&ACTUATORS

Define Transducer and Sensor - Transduction Principle – Transducer types – Photo emissive, Photoconductive and Photovoltaic Transducers – Thermistors – Thermo devices – Thermocouple – Inductive Transducers – Piezo-electric Transducer- Hall-effect Transducer – Strain-gauge type Transducers.

Sensors: Types – Active or Self-generating and Passive or Modulating types – Pressure Sensing – Variable resistor, Variable Inductance, Variable differential transformer, Strain gauge and Piezo-resistive types – Position and Level sensing – Magnetic-variable reluctance, d.c.excited inductive, hall-effect, Reed Switch, Optical & Fibre Optics and Capacitance types – Air Flow Sensing – Hot wire, Flap type and Aneroid MAP – Temperature Sensing – Thermistor and Thermocouples – Gas Sensing – Exhaust Gas Oxygen Sensor – Knock Sensing.

Actuators: Introduction – Types and application areas – Stepper Motor – Pneumatic actuators – Valves - Hydraulic actuators.

UNIT V MECHATRONIC SYSTEMS

Definition and approach of Mechatronics, Measurement and Control Systems and Mechatronics Approach. Traditional and Mechatronics design, possible Mechatronics design solutions, case studies.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Bolton.W	Mechatronics	Pearson Education Asia, New Delhi	2003
2.	Ramesh S. Gaonkar	Microprocessor Architecture, Programming, and Applications with the 8085 6th Edition	Penram International, India	2013

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Bradley D.A, Dawson.D, Buru.N.C and Loader.A.J,	Mechatronics	Chapman and Hall, New Delhi	1993
2.	Dan Neculescu	Mechatronics	Pearson Education Asia, New Delhi.	2002
3.	Lawrence J. Kamm	Understanding Electro – Mechanical Engineering, An Introduction to Mechatronics	Prentice – Hall of India Pvt., Ltd., New Delhi.	2000
4.	Nitaigour Premchand Mahadik	Mechatronics	Tata McGraw-Hill publishing Company Ltd, New Delhi.	2003
5.	Groover.M.P	Industrial Robotics – Technology, Programming and Applications	McGraw-Hill, New Delhi.	2001

Course Objectives:

- To acquire the general knowledge to deliver consistently high quality and value added products and services to the customer in a lean environment.
- To understand the terminology relating to lean operations in both service and manufacturing organizations.
- To impart knowledge on principles of lean manufacturing on the shop floor
- To enrich the understanding of just in time concept
- To expose students to concepts of visual management, 5S and total productive maintenance
- To expose students to Jidoka principle

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Summarise the quality requirements to provide products and services in a lean environment.
- Apply the principles of lean manufacturing on the shop floor.
- Explain the just in time
- Explain the concepts of visual management, 5S and total productive maintenance.
- Examine the Jidoka principle.
- Illustrate the culture of lean management.

UNIT I INTRODUCTION

Objectives of lean manufacturing-key principles and implications of lean manufacturing- Traditional Vs lean manufacturing – Lean benefits.

Lean Manufacturing Concepts: Value creation and waste elimination- Major kinds of waste- pull production-different models of pull production-continuous flow-continuous improvement / Kaizen- Worker involvement.

UNIT II GROUP TECHNOLOGY

Part family- Production flow analysis – Composite part concept – Machine cell design-Case studies.

UNIT III LEAN MANUFACTURING TOOLS & METHODOLOGIES

Standard work -communication of standard work to employees -standard work and flexibility -visual controls-quality at the source- 5S principles -preventive maintenance-total quality management-total productive maintenance-changeover/setup time -batch size reduction.

UNIT IV VALUE STREAM MAPPING

The as-is diagram-the future state map-application to the factory simulation scenario-line balancing -poke yoka-Kanban – overall equipment effectiveness.

UNIT V JIT AND LEAN MANUFACTURING

Just In Time Manufacturing: Introduction - elements of JIT - Kanban system.

Implementing Lean - Road map-senior management Involvement-best practices.

Reconciling Lean With Other Systems: Toyota production system-lean six sigma-lean and ERP-lean with ISO9001: 2000

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Michael L.George, David T.Rowlands and Bill Kastle	What is Lean Six Sigma	McGraw-Hill, New York.	2004
2.	Askin R.G and Goldberg J.B	Design and Analysis of Lean Production Systems	John Wiley and Sons Inc.	
3.	Micheal Wader	Lean Tools: A Pocket guide to Implementing Lean Practices	Productivity and Quality Publishing Pvt Ltd., New Delhi.	2002

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Joseph D.E. Feo, William W Barnard	Juran Institute's Six Sigma BreakThrough and Beyond	Tata McGraw-Hill Edition, New Delhi	2004
2.	Richard B. Chase, Robert Jacobs F and Nicholas J Aquilano	Operation Management for Competitive Advantage, Tenth Edition.	McGraw- Hill.	2003
3.	Poka - Yoke	Improving Product Quality by Preventing Defects	Productivity Press.	1992
4.	Alan Robinson	Continuous Improvement in Operations	Productivity Press, Portland, Oregon.	1991

Course Objectives:

1. To know the principle methods, areas of usage, possibilities and limitations as well as environmental effects of the Additive Manufacturing technologies
2. To be familiar with the characteristics of the different materials those are used in Additive Manufacturing.
3. To explain basics of SCM and logistics
4. To impart knowledge need for inventory management
5. To expose students to value of information in SCM
6. To understand the concept of information technology involved in SCM
- 7.

Course Outcomes

On completion of this course, students will learn about

1. Basics of SCM .
2. Understand the need for inventory management
3. Apply the need for value of information in SCM
4. Describe about the various strategic alliances
5. Explain about the various issues in the international SCM
6. Get knowledge in information technology involved in SCM

UNIT I INTRODUCTION TO SUPPLY CHAIN MANAGEMENT

Definition, global optimization, objectives of SCM. Logistics networks- data collection, model and data elevation, solution techniques.

UNIT II INVENTORY MANAGEMENT

Introduction, single warehouse, Inventory examples, economic lot size model, effect of demand uncertainty. Risk pooling, centralized and decentralized system, managing inventory in the supply chain, forecasting.

UNIT III VALUE OF INFORMATION

Bullwhip effect, information and supply chain technology. Supply chain integration- push, pull and push-pull system. Demand driven strategies, impact of internet on SCM, distribution strategies.

UNIT IV STRATEGIC ALLIANCES

Framework for strategic alliance, third party logistics, retailer, supplier partnership, distributor- integration, procurement and out servicing strategies.

UNIT V INTERNATIONAL ISSUES IN SCM

Introduction, risks and advantages- design for logistics, supplier integration into to new product development, mass customization. Issues in customer value.

Information Technology for SCM: Goals, standardization, infrastructure, DSS for supply chain management.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Simchi – Levi David, Kaminsky Philip and Simchi-Levi Edith,	Designing and Managing the Supply Chain, 3 rd Edition	Tata McGraw-Hill Publishing Company Ltd, New Delhi.	2007
2.	Sunil Chopra and Peter Meindl,	Supply Chain Management – Strategy, Planning and Operation, 3 rd Edition	Prentice Hall, New Delhi	2006

Course Objectives:

- To introduce the process planning concepts.
- To impart importance of the cost estimation process and procedures.
- To study the procedure to calculate direct, indirect and overhead expenses.
- To facilitate the understanding of the production cost of forging, welding, and foundry.
- To learn the procedure to estimate the various machining costs.
- To acquire the procedure to estimate the machining time for lathe, drilling, boring, shaping, milling and grinding operations.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the concepts of process planning and cost estimation.
- Assess the importance of cost estimation process and its procedures.
- Compute direct, indirect and overhead expenses.
- Determine the production cost of forging, welding, and foundry.
- Calculate the machining time for lathe, drilling, boring and shaping operations.
- Calculate the machining time for milling and grinding operations.

UNIT I PROCESS PLANNING

Process Planning, selection and analysis – Manual, Experience based planning – CAPP, Variant, Generative - Processes analysis – Types of Production.

UNIT II COSTING, ESTIMATION, COSTS AND EXPENSES

Aims of costing and Estimation – Functions and Procedure – Introduction to Costs, Computing Material cost, Direct Labor cost, Analysis of Overhead costs, Factory expenses, Administrative expenses, Selling and Distributing expenses – Cost Ladder - Cost of Product - Depreciation – Analysis of Depreciation.

UNIT III ESTIMATION OF COSTS IN DIFFERENT SHOPS

Estimation in Foundry shop – Pattern cost, Casting cost - Illustrative examples. Estimation in Forging Shop – Losses in forging – Forging cost - Illustrative examples

UNIT IV ESTIMATION OF COSTS IN FABRICATION SHOPS

Estimation in welding shop – Gas cutting – Electric Welding - Illustrative examples. Estimation in sheet metal shop – Shearing and Forming - Illustrative examples

UNIT V ESTIMATION OF MACHINING TIMES AND COSTS

Estimation of machining time for lathe operations - Estimation of machining time for drilling, boring, shaping, planning, milling and grinding operations - Illustrative examples

TEXT BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Adithan.M.S and Pabla	Estimating and Costing	Konark Publishers vt., Ltd, New Delhi	1989
2	Chitale.A.K and Gupta.R.C	Product Design and Manufacturing	Prentice Hall of India, New Delhi	1997

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Nanua Singh	.System Approach to Computer Integrated Design and Manufacturing	John Wiley Inc.	1996
2	Joseph G. Monks	Operations Management Theory and Problems	McGraw Hill Book Company.	1982
3	Narang.G.B.S and Kumar.V	Production and Planning	Khanna Publishers ,New Delhi.	1995
4	Banga.T.R and Sharma.S.C	Estimating and Costing	Khanna publishers,New Delhi.	1986

15BEAE7E8 PROFESSIONAL ETHICS 3 0 0 3 100

Course Objectives:

- Provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
- To have an idea about the Collegiality and Loyalty
- To provide knowledge on Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
- To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics and Honesty.
- To understand Moral Leadership, sample Code of Conduct.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- The students will understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
- The students will be aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
- The students will acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.
- Knowledge on Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
- Understand Moral Leadership, sample Code of Conduct

UNIT I ENGINEERING ETHICS

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) -

Discrimination

UNIT V GLOBAL ISSUES

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw Hill, New York	2005
2.	Charles E Harris, Michael S Pritchard and Michael J Rabins	Engineering Ethics – Concepts and Cases	Thompson Learning	2000

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Charles D Fleddermann	Engineering Ethics	Prentice Hall, New Mexico	1999
2.	John R Boatright	Ethics and the Conduct of Business	Pearson Education	2003
3.	Edmund G Seebauer and Robert L Barry	Fundamentals of Ethics for Scientists and Engineers	Oxford University Press	2001
4.	Prof. (Col) P S Bajaj and Dr. Raj Agrawal	Business Ethics – An Indian Perspective	Biztantra, New Delhi	2004
5.	David Ermann and Michele S Shauf	Computers, Ethics and Society	Oxford University Press	2003

Course Objectives:

- To impart knowledge on basic principle and production methods of automotive components.
- To learn the surface coating technologies used in the automotive industry.
- To understand the importance of suitable process for the manufacturing automotive components.
- To enrich the understanding of casted and forged engine components
- To know the application of the emission control system
- To expose students to the stretch forming of auto body panels

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Select the materials for the components based on its functionality.
- Analyse suitable process for the manufacturing automotive components.
- List the casted and forged engine components.
- Select suitable surface coating technologies for the components.
- Describe the emission control system
- Explain the stretch forming of auto body panels.

UNIT I FORMING PROCESS

Forging - process flow chart, forging of valves, connecting rod, crank shaft, cam shaft, propeller shaft, transmission gear blanks, foot brake linkage, steering knuckles, Extrusions: Basic process steps, extrusion of transmission shaft, steering worm blanks, brake anchor pins, rear axle drive shaft, axle housing spindles, piston pin and valve tappets. Hydro forming: Process, hydro forming of manifold and comparison with conventional methods- Hydro forming of tail lamp housing. Stretch forming - Process, stretch forming of auto body panels -Super plastic alloys for auto body panels.

UNIT II CASTING, MACHINING AND GEAR MANUFACTURING

Sand casting of cylinder block and liners - Centrifugal casting of flywheel, piston rings, bearing bushes, and liners, permanent mould casting of piston, pressure die casting of carburettor other small auto parts. Machining of connecting rods - crank shafts - cam shafts - pistons - piston pins - piston rings - valves - front and rear axle housings - fly wheel - Honing of cylinder bores - Copy turning and profile grinding machines. Hobbing and shaping - Gear finishing and inspection.

UNIT III POWDER METALLURGY AND RECENT TRENDS IN MANUFACTURING OF AUTO COMPONENTS

Process flow chart - Production of metal powders and their raw materials – Manufacture of friction lining materials for clutches and brakes - Testing and inspection of PM parts.

Powder injection moulding – Shot peen hardening of gears - Production of aluminum MMC liners for engine blocks - Plasma spray coated engine blocks and valves - Recent developments in auto body panel forming - Squeeze casting of pistons - aluminum composite brake rotors

UNIT IV WELDING & ALLIED PROCESSES

Classification of Welding Processes; Arc Welding- Principle of Arc, Metal Transfer, Arc Characteristics; Working and applications of Carbon Arc Welding, Flux Shielded Metal Arc Welding (SMAW), TIG (GTAW), MIG (GMAW), SAW and ESW; Resistance Welding- Spot, Seam, Projection and Flash Butt; Gas Welding- Oxy Acetylene and Oxy Hydrogen; Thermit Welding; Solid State Welding Processes; Fusion Welding Pool and Welding Defects, Allied Processes- Brazing and Soldering.

UNIT V UN CONVENTIONAL MACHINING PROCESSES

Abrasive Jet Machining – Water Jet Machining – Ultrasonic Machining. Electric Discharge Machining (EDM) - Wire cut EDM - Chemical machining and Electro-Chemical machining (CHM and ECM) Laser Beam machining (LBM), plasma Arc machining (PAM) and Electron Beam Machining - Working Principles – equipment used – Process parameters – MRR-Variation in techniques used – Applications

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt.P.M	High Speed Combustion Engines	Oxford Publishing Co., New York	1990
2.	Philip F.Ostwald and Jairo Munoz	Manufacturing Processes and Systems	John Wiley & Sons, New York	Reprint 2008

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Haslehurst.S.E	Manufacturing Technology	ELBS, London	1990
2.	Rusinoff	Forging and forming of metals	D.B.Taraporevala Sons & Co. Pvt Ltd., Mumbai	1995
3.	Sabroff.A.M	Forging Materials & Processes	Reinhold Book Corporation, New York.	1988
4.	ASTME	High Velocity Forming of Metals	Prentice Hall of India (P) Ltd., New Delhi	1990

Course Objectives:

- To gain knowledge of fundamentals of the automotive air conditioning.
- To study the working of automotive cooling and heating systems.
- To provide knowledge on air conditioning controls, delivery system and refrigerants.
- To impart knowledge on working of automatic temperature control.
- To learn the system servicing and testing.
- To impart knowledge on special tools for servicing

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Apply the psychrometry principles.
- Explain the components of vehicle air conditioning systems.
- Describe the air conditioning controls.
- Select the suitable sensors and actuators for automatic temperature control.
- Discover and troubleshoot the fault in vehicle air conditioning systems.
- Describe the special tools for servicing vehicle air conditioning

UNIT I AIRCONDITIONING FUNDAMENTALS

Basic air conditioning system - Location of air conditioning components in a car - Schematic layout of a refrigeration system. Compressor components - Condenser and high pressure service ports. Thermostatic expansion valve - Expansion valve calibration - Controlling evaporator temperature - Evaporator pressure regulator - Evaporator temperature regulator.

UNIT II AIR CONDITIONER - HEATING SYSTEM

Automotive heaters - Manually controlled air conditioner - Heater system - Ford automatically controlled air conditioner and heater systems - Automatic temperature control - Air conditioning protection – Engine protection.

UNIT III REFRIGERANTS

Containers - Handling refrigerants - Tapping into the refrigerant container - Refrigeration system diagnosis - Diagnostic procedure - Ambient conditions affecting system pressures.

UNIT IV AIR ROUTING & TEMPERATURE CONTROL

Objectives - Evaporator control air flow through the Dash recirculating unit - Automatic temperature control – Duct system - Controlling flow - Vacuum reserve - Testing the air control and handling systems.

UNIT V AIR CONDITIONING SERVICE

Air conditioner maintenance and service - Servicing heater system Removing and replacing components. Trouble shooting of air controlling system - Compressor service.

TEXT BOOK

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	William H. Crouse and Donald L Anglin	Automotive Air conditioning	McGraw-Hill Inc.	1990

REFERENCE BOOKS

SL.NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Mitchell	Mitchell Automatic Heating and Air Conditioning Systems	Prentice Hall India	1989
2	Paul Weller	Automotive Air Conditioning	Reston Publishing Co Inc.	1990
3	MacDonald.K.L,	Automotive Air Conditioning	Theodore Audel series	1978
4	Goings.L.F	Automotive Air Conditioning	American Technical services	1978

Course Objectives:

- To acquire knowledge of alternative fuels and changes in the engine design for handling them.
- To learn the various energy systems for use in the automobiles.
- To equip them with skills to modify the engines
- To make the students conversant of biofuels
- To make the students conversant of synthetic fuels
- To give exposure to combustion, performance and emission characteristics of engines

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Analyse the thermodynamics of combustion characteristics of alternative fuels.
- Distinguish the various types of alternative fuels based on need and scope.
- Modify the engines according to the type of alternative fuel.
- Explain the biofuels
- Explain the synthetic fuels
- Analyse the combustion, performance and emission characteristics of engines

UNIT I INTRODUCTION

Estimation of petroleum reserve - Need for alternate fuel - Availability and properties of alternate fuels – general use of alcohols - LPG - Hydrogen - Ammonia, CNG, and LNG - Vegetable oils and Biogas - Merits and demerits of various alternate fuels.

UNIT II ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engine. Methanol and gasoline blends - Combustion characteristics in engines - emission characteristics.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

Availability of CNG, properties, modification required to use in engines - performance and emission characteristics of CNG using LPG in SI & CI engines. Performance and emission for LPG - Hydrogen – Storage and handling, performance and safety aspects.

UNIT IV VEGETABLE OILS

Various vegetable oils for engines - Esterification - Performance in engines - Performance and emission Characteristics

UNIT V ELECTRIC AND SOLAR POWERED VEHICLES

Layout of an electric vehicle - Advantage and limitations - Specifications - System component. Electronic control system - High energy and power density batteries - Hybrid vehicle - Solar powered vehicles.

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Maheswar Dayal	Energy today & tomorrow	I & B Harish India.	1982
2.	Nagpal.G.K	Power Plant Engineering	Khanna Publishers, New Delhi.	2002
3.	Bechtold.R.L	Alternative Fuels Guide Book	SAE	1997

Course Objectives:

- To impart knowledge on advancement in IC engine construction and combustion process.
- To familiarise the combustion modelling.
- To enrich the understanding of advances in IC Engines
- To expose students to performance of the IC engines
- To facilitate the understanding of computer control of engine parameters
- To impart knowledge on performance maps

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Explain the operating cycles of SI engines, CI engines and gas turbines.
- Understand the IC engine combustion processes.
- Analyse the causes of knocking in combustion.
- Apply new techniques to improve the performance of the IC engines.
- Explain the computer control of engine parameters for pollution control
- Explain the performance maps.

UNIT I CYCLE ANALYSIS

Operating cycles of S.I. and C.I. engines and Gas turbines - Comparison of Air standard cycle - Fuel air cycle and actual cycle.

UNIT II COMBUSTION OF FUELS

Combustion stoichiometry of petrol, diesel, alcohol and hydrogen fuels - Chemical energy and heating values - Chemical equilibrium and maximum temperature - SI engine combustion - Flame velocity and area of flame front - CI engine combustion. Fuel spray characteristics - droplet size, penetration and atomization.

UNIT III COMBUSTION MODELLING

Basic concepts of engine simulation - Governing equation - Flow models, thermodynamic models - SI engine and CI engine models.

UNIT IV ADVANCES IN IC ENGINES

Adiabatic and L.H.R. engines - MAN combustion chamber and multifuel engines - Stratified charged and lean burn engines - Locomotive and marine engines.

UNIT V OPERATION AND PERFORMANCE

Computer control of engine parameters for pollution control and better efficiency - Closed loop control of engine parameters - Hybrid operation - performance maps.

TEXT BOOK

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ganesan.V	Internal combustion engines, 4 th Edition	Tata McGraw Hill Publishing Co.	2012

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ganesan.V	Computer Simulation of Spark Ignition engine process	Universities Press (India) Ltd, Hyderabad.	1996
2.	John.B.Heywood	Internal Combustion Engine Fundamentals	McGraw Hill Publishing Co., New York.	2011

Course Objectives:

- To address the need and promise of alternative clean energy.
- To introduce the concept of fuel cells for use in automobiles.
- To learn the fuel cell components and their impact on performance.
- To impart knowledge on Alkaline Fuel Cells & Phosphoric Acid Fuel Cells
- To impart knowledge on Solid Oxide Fuel Cells & Molten Carbonate Fuel Cells
- To impart knowledge on Direct Methanol and Proton Exchange Membrane Fuel Cells

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- List the types of fuel cells.
- Explain the thermodynamics and electrochemical kinetics of fuel cells.
- Describe the fuel cell performance characteristics
- Explain the various components of the fuel cell.
- Describe the various types of fuel cells
- Understand the working of various types of fuel cells

UNIT I INTRODUCTION AND THERMODYNAMICS

Introduction: Basic operating principles – Historical highlights – Classification. Thermodynamics:

Electrochemical energy conversion – Theoretical efficiency – Electrochemical energy conversion – Factors affecting electrochemical energy conversion

UNIT II ELECTRODE KINETICS

Electrode double layer – Electrolyte double layer – Double layer models (Helmoltz model, Gouy-Chapman Model, Stern model, Grahame model – Bockris, Devenathan and Muller model, and chemical models) – Solid metallic electrode – Semiconductor electrode – Specific adsorption – Zero potential.

UNIT III ALKALINE FUEL CELLS & PHOSPHORIC ACID FUEL CELLS

Alkaline Fuel Cells: Working principle – Components – Modules and stacks – Performance characteristics (power density, space applications, atmospheric pressure cells) – Limitations and R&D challenges – System issues – Ammonia as fuel. Phosphoric Acid Fuel Cells: Cell reactions – Electrodes (stability of catalysts, electrode fabrication – fuel cell performance) – Stacks and systems.

UNIT IV SOLID OXIDE FUEL CELLS & MOLTEN CARBONATE FUEL CELLS

Solid Oxide Fuel Cell: Principle of operation - Benefits and limitations – Cell components (electrolytes, zirconia systems, ceria based electrolytes, perovskite-based systems) – Cathode materials – Anode materials – Interconnects – Fuel reactions – Configurations and performance (tubular, monolithic, planar) – Environmental impact – Applications. Molten Carbonate Fuel Cell: General principle – Components (electrolyte and matrix, cathode and anode materials) – Electrode reactions – Life time

UNIT V DIRECT METHANOL AND PROTON EXCHANGE MEMBRANE FUEL CELLS

Direct Methanol Fuel Cells, Operating principle: – Noble metal issue – Electro-oxidation of methanol (catalysts, oxygen electro-reduction, electrolyte, non-catalytic aspects) - Methanol crossover – Catalyst optimization – Vapor feed versus liquid feed cells.

Proton Exchange Membrane Fuel Cells: Operating principle (membranes, electrodes and electrolysis, optimization of membrane and electrode assembly,

Impurities) – Technology development (single cell and stacks, composite plates) – Fuel processing – Modeling studies (membrane, electrode, membrane-electrode assembly, fuel cell, stack and system) – Technology development and applications.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Viswanathan.B and Scibioh M. Aulice	Fuel Cells Principles and Applications	Universities Press (India) Pvt. Ltd., Hyderabad.	2006
2.	Hoogers.G	Fuel Cell Technology Handbook	CRC Press, Washington D. C	2003

REFERENCE BOOK

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Larminie. J and Dicks. A,	Fuel Cell Systems Explained, 2 nd Edition	John Wiley & Sons, Ltd., New York.	2003

Course Objectives:

- To introduce the concept of Statistical Quality Control (SQC).
- To familiarise with various statistical process control methods.
- To study the methods and characteristics of sampling.
- To describe the concept of reliability and its models.
- To impart knowledge on the design of reliability process.
- To describe the concept of product life cycles

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Summarise the concept of quality and process control for variables.
- Apply the process control for attributes.
- Explain the importance of sampling methods and their characteristics.
- Explain the concept of life testing.
- Evaluate the reliability concept with their models.
- Explain the product life cycles

UNIT I INTRODUCTION AND PROCESS CONTROL FOR VARIABLES

Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost-Variation in process- factors – process capability – process capability studies and simple problems – Theory of control chart- uses of control chart – Control chart for variables – X chart, R chart and σ chart.

UNIT II PROCESS CONTROL FOR ATTRIBUTES

Control chart for attributes –control chart for proportion or fraction defectives – p chart and np chart – control chart for defects – C and U charts, State of control and process out of control identification in charts.

UNIT III ACCEPTANCE SAMPLING

Lot by lot sampling – types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producer's Risk and consumer's Risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

UNIT IV LIFE TESTING - RELIABILITY

Life testing – Objective – failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate, system reliability, series, parallel and mixed configuration – simple problems. Maintainability and availability – simple problems. Acceptance sampling based on reliability test – O.C Curves.

UNIT V QUALITY AND RELIABILITY

Reliability improvements – techniques- use of Pareto analysis – design for reliability – redundancy unit and standby redundancy – Optimization in reliability – Product design – Product analysis – Product development – Product life cycles.

Note: Use of approved statistical table permitted in the examination.

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Grant, Eugene .L	Statistical Quality Control	McGraw-Hill, New Delhi.	1996
2.	Srinath. L.S	Reliability Engineering	Affiliated East west press.	1991

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Monohar Mahajan	Statistical Quality Control	Dhanpat Rai & Sons, New Delhi.	2001
2.	Besterfield.D.H,	Quality Control	Prentice Hall, New Delhi.	1993
3.	Sharma.S.C	Inspection Quality Control and Reliability	Khanna Publishers, New Delhi.	1998
4.	Connor. P.D.T.O	Practical Reliability Engineering, 4 th Edition	John Wiley, London.	2002

Course Objectives:

- To introduce the basic concepts of Intellectual Property Rights (IPR).
- To compare and contrast the different forms of intellectual property protection in terms of their key differences and similarities.
- To study the various agreements and legislation related to IPR.
- To learn digital products and law.
- To provide knowledge on enforcement of IPRs.
- To provide knowledge on the Infringement of IPRs

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Outline the basic concepts of intellectual property rights.
- Explain the registration of copyrights, trademarks, patents, geographical indications, trade secrets and industrial design registration.
- State the various agreements and legislation related to IPR.
- Describe digital products and law.
- Explain the enforcement measures of IPRs.
- Explain the Infringement of IPRs

UNIT I

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property i. Movable Property ii. Immovable Property and iii. Intellectual Property).

UNIT II

IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.

UNIT III

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities - History - General Agreement on Trade and Tariff (GATT).

UNIT IV

Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

UNIT V

Case Studies on Patents - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

TEXT BOOK

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Subbaram.N.R	Handbook of Indian Patent Law and Practice	S. Viswanathan (Printers and Publishers) Pvt. Ltd.	1998

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Eli Whitney	United States Patent Number	72X, Cotton Gin	March 14, 1794.

Course Objectives:

- To study Transport Management
- To understand the concept of Organisation
- To learn about Vehicle Maintenance
- To be aware of the Supply Management and Budget
- To provide knowledge on Scheduling and Fare Structure
- To introduce Motor Vehicle Act

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Acquire in-depth knowledge of Transport Management.
- Analyse concept of Organisation.
- Describe Vehicle Maintenance.
- Knowledge on Supply Management and Budget.
- Knowledge on Scheduling and Fare Structure.
- Awareness on Motor Vehicle Act

UNIT I ORGANISATION AND MANAGEMENT

Forms of Ownership – principle of Transport Management – Staff administration – Recruitment and Training – welfare – health and safety. Basic principles of supervising. Organizing time and people. Driver and mechanic hiring - Driver checklist - Lists for driver and mechanic - Trip leasing - Vehicle operation and types of operations.

UNIT II VEHICLE MAINTENANCE

Scheduled and unscheduled maintenance - Planning and scope - Evaluation of PMI programme – Work scheduling - Overtime - Breakdown analysis - Control of repair backlogs - Cost of options.

UNIT III VEHICLE PARTS, SUPPLY MANAGEMENT AND BUDGET

Cost of inventory - Balancing inventory cost against downtime - Parts control - Bin tag systems – Time management - Time record keeping - Budget activity - Capital expenditures - Classification of vehicle expenses - Fleet management and data processing - Data processing systems - Software. Model - Computer controlling of fleet activity - Energy management.

UNIT IV SCHEDULING AND FARE STRUCTURE

Route planning - Scheduling of transport vehicles - Preparation of timetable – preparation of vehicle and crew schedule - Costs, fare structure – Fare concessions - Methods of fare collection - Preparation of fare table.

UNIT V MOTOR VEHICLE ACT

Schedules and sections - Registration of motor vehicles - Licensing of drivers and conductors - Control of permits - Limits of speed - traffic signs - Constructional regulations - Description of goods carrier, delivery van, tanker, tipper, municipal, fire fighting and break down service vehicle.

REFERENCE BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Dolu	Fleet Management	McGraw-Hill Co.	1984
2.	Rex W. Faulks	Bus and Coach Operation	Butterworth.	1987
3.	Kitchin L.T.D	Bus operation, 3 rd Edition	iliffe and Sons Ltd., London.	1992

Course Objectives:

- To understand the vehicle aerodynamics.
- To impart knowledge on body construction of the car, bus and commercial vehicles.
- To study the body materials, mechanisms and repair.
- To impart knowledge on the safety aspect of bus body
- To introduce the concepts of regulations
- To expose students to material used in bodybuilding, tools used and body repairs

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Distinguish the various aerodynamic forces and moments.
- Explain different aspects of the car body, bus body and commercial vehicle.
- Describe the safety aspect of bus body
- Describe the commercial vehicle bodies
- Explain the regulations.
- Describe the material used in bodybuilding, tools used and body repairs.

UNIT I CAR BODY

Types: Saloon, Convertibles, Limousine, Estate Van, racing and sports car - Driver's seat, Body Mechanisms - window winding, Door lock, seat adjustment. Driver's visibility and tests for visibility. Minimum space requirements and methods of improving space in cars. Safety - safety design, safety equipments. Car body construction.

UNIT II BUS BODY

Types: Mini bus, single and double decker, two level, split level and articulated bus. Bus body layout – Floor height - Engine location - Entrance and exit location - Seating dimensions.

Constructional details: Frame construction, Double skin construction -Types of metal section used - Regulations -Conventional and integral type construction.

UNIT III COMMERCIAL VEHICLE

Types: Flat platform, drop side, fixed side, tipper body, tanker body. LCV body types: pickup, van. Dimensions of driver's seat in relation to controls and steering angle -Driver cab design.

UNIT IV VEHICLE AERODYNAMICS AND ERGONOMICS

Objectives -Vehicle drag and types - various types of forces and moments -Effects of forces and moments – Side wind effects -Various body optimization techniques for minimum drag –Wind tunnel testing: Flow visualization techniques, Scale model testing, Component balance to measure forces and moments. Simple problems.

ERGONOMICS: Introduction, seating dimensions, interior ergonomics, ergonomics system design, seat comfort, suspension seats, split frame seating, back passion reducers, dash board instruments, electronic displays, commercial vehicle cabin ergonomics, mechanical package layout, goods vehicle layout.

UNIT V BODY MATERIALS, TRIM AND MECHANISMS

Aluminium alloy sheet, extrusion and casting, stainless steels, alloy steels, Metal Matrix Composites. Structural timbers -properties. Designing in GRP and high strength composites, Thermo plastics, Load bearing plastics, semi-rigid PUR foams and sandwich panel construction. Corrosion, Anticorrosion methods. Selection of paint and painting process -Body trim items.

TEXT BOOK

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Powloski.J	Vehicle Body Engineering	Business Boob Ltd.	1989

REFERENCE BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Giles.J.C	Body construction and design	Iliffe Boob Butterworth & Co	1971
2.	John Fenton	Vehicle Body layout and analysis	Mechanical Engg Publication Ltd, London	1982
3.	Braithwaite.J.B	Vehicle Body building and drafting	Heinemann Educational Book-I Ltd., London.	1977
4.	Dieter Anselm	The Passenger Car Body	ISBN Number: 0-7680-0708-9, SAE International	2000

15BEAE8E9 INDUSTRIAL ENGINEERING AND OPERATIONS RESEARCH
3 0 0 3 100

Course Objectives:

- To familiarise the production planning methodologies and layout design.
- To learn the concept of work study.
- To impart knowledge on the basics of linear programming techniques.
- To understand the transportation and assignment models.
- To provide knowledge on the importance of inventory control.
- To provide knowledge on economic order quantity

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Select suitable production planning methodologies, production system and plant layout for the industry.
- Execute an effective work study and ergonomics for better productivity.
- Formulate and select a suitable method to solve the linear programming problem.
- Solve different transportation and assignment-based models.
- Solve the inventory decision-making problem using mathematical modelling.
- Describe the economic order quantity

UNIT I INTRODUCTION

Evolution of industrial engineering, fields and functions of industrial engineering. Methods engineering process charts, motion study, work sampling and work measurement.

UNIT II PRODUCTION PLANNING AND CONTROL

Introduction, objectives, components of PPC, manufacturing systems, plant layout, types of layouts, forecasting, product planning, loading and scheduling, dispatching, production control, material handling principles, case studies.

Human engineering- Ergonomics, design of controls and displays, heating, ventilation, glare, airflow, influence of factory environment on productivity, industrial safety.

Cost analysis - Cost structure of a product-labor, material, overhead. Overhead absorption, machine hour rate, cost computation for simple machined components, learning curve, 'Make-or-Buy' decision.

UNIT III LINEAR PROGRAMMING TECHNIQUES

Operations research and decision-making, types of mathematical models and constructing the model. Role of computers in operations research, formulation of linear programming problem, applications and limitations, simplex method, variants in simplex method (analytical and graphical).

UNIT IV DISTRIBUTION METHODS AND ASSIGNMENT MODELS

Vogel's approximation method, modified distribution method, optimization models, unbalance and degeneracy in transportation model. Hungarian algorithm, traveling salesman problem, routing problems, processing 'n' jobs through two machines and three machines, processing two jobs through 'm' machines.

UNIT V INVENTORY CONTROL

Variables in inventory problems, inventory models with penalty, storage and quantity discount, safety stock, inventory models with probability, lead time, demand, multi item deterministic model.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Frederick S.Hillier and Gerald J.Lieberman	Introduction to Operations Research	Tata McGraw Hill Publishing Company Ltd., New Delhi	2006
2.	Chase R.B, Jacob F.R.E.D and Aquilano N.J	Operations Management for Competitive Advantage, 10 th Edition	Tata McGraw Hill, New Delhi	2004
3.	Elwood S. Buffa	Modern Production /Operations Management 8 th Edition	Wiley Eastern, New Delhi.	2007
4.	Kanti Swarup Gupta P.K and Manmohan	Operations Research	Sultan Chand and Sons, New Delhi.	1995

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Srinath.C	PERT and CPM – Principles and Applications 3 rd Edition	East West Press, New Delhi	2001
2.	Dharani Venkatakrishnan.S	Operations Research	Keerthi Publication House, Coimbatore	1991
3.	D. Kannappan, D Paranthaman, A. G Augustine	Mechanical Estimating and Costing	Tata mcGraw Hill, (New Delhi :)	2003
4.	Saravanan.R	Manufacturing optimization through intelligent techniques	CRC Press, Florida.	2006
5.	Gupta.P.K and Hira.D.S	Operations Research	S. Chand & Co, New Delhi.	2012
6.	Panneerselvam.R	Production and Operations Management, 2 nd Edition	Prentice Hall of India (P) Ltd.	2007

Course Objectives:

- To learn the construction and fundamentals of robots.
- To provide knowledge on types of drives and end effectors in robots.
- To impart knowledge on sensors and machine vision system.
- To provide knowledge on the applications of robots in industries.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Identify the components and construction of robot manipulator.
- Understand the sensors
- Select a suitable drive and an end effectfor industrial robots.
- Choose sensors and machine vision system for industrial robots.
- Discuss the usage and applications of robots in industries.
- Understand the economic analysis of robots

PART – I FUNDAMENTALS OF ROBOT

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Their Functions – Need for Robots – Different Applications. Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features. End Effectors – Grippers. Requirements of a sensor, Principles and Applications of sensors – Position of sensors, Proximity Sensors, Touch Sensors - Camera, Frame Grabber, Sensing and Digitizing Image.

PART – II ROBOT CELL DESIGN

Robot cell design – simulation software (Robo Wave). Robot cell layouts – Multiple robots and machine interference – robot cell planning – robot cycle time analysis for assembly, welding and painting shop. Safety Considerations for Robot Operations, Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

PART I CPU-CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory. Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

PART-II Interface

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench marks.

PART I MANUFACTURE OF FUELS AND LUBRICANTS

Structure of petroleum, refining process, fuels, thermal cracking, catalytic cracking, polymerization, alkylation, isomerisation, blending, products of refining process. Manufacture of lubricating oil base stocks, manufacture of finished automotive lubricants.

Engine friction: introduction, total engine friction, effect of engine variables on friction, hydrodynamic lubrication, elasto hydrodynamic lubrication, boundary lubrication, bearing lubrication, functions of the lubrication system, introduction to design of a lubricating system.

PART II PROPERTIES AND TESTING OF FUELS

Thermo-chemistry of fuels, properties and testing of fuels, relative density, calorific value, distillation, vapour pressure, flash point, Fire point, Self Ignition Temperature, Higher calorific value, Lower calorific value, spontaneous ignition temperature, viscosity, pour point, flammability, ignitability, diesel index, API gravity, aniline point, etc.

SI Engines – flame propagation and mechanism of combustion, normal combustion, knocking, octane rating, fuel requirements. CI Engine, mechanism of combustion, diesel knock, cetane rating, fuel requirements. Additive - mechanism, requirements of an additive, petrol fuel additives and diesel fuel additives – specifications of fuels.

PART I VEHICLE ERGONOMICS:

Introduction, seating dimensions, interior ergonomics, ergonomics system design, seat comfort, suspension seats, split frame seating, back passion reducers, dash board instruments, electronic displays, commercial vehicle cabin ergonomics, mechanical package layout, goods vehicle layout.

ENVIRONMENTAL CONDITIONS: Illumination, heat ventilation and air conditioning, noise, motion, speed and acceleration, sound, vibration.

PART II HUMAN FACTORS APPLICATIONS: Human error, accidents, human factors and the automobile, organizational and social aspects, steps according to ISO/DIS6385, OSHA's approach, virtual environments.

SAFETY: Seat belt, air bag, collapsible steering, warning systems, ABS braking system, collision safety systems, global safety standards in automotive applications

OPEN ELECTIVES
(Offered by other Departments)

SCIENCE AND HUMANITIES

15BESH0E01

INDUSTRIAL MATHEMATICS I

3 0 0 3100

COURSE OBJECTIVES:

1. To develop analytical skills for solving engineering problems
2. To teach the students the basic concepts of LPP,
3. To learn the techniques to solve transportation problems
4. To learn the techniques to solve Assignment problems
5. To make the students to study about the Integer Programming and Network Analysis
6. Analyse the results and propose recommendations to the decision-making processes in Management Engineering

COURSE OUTCOMES:

1. To define and formulate linear programming problems and appreciate their limitations.
2. To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
3. To be able to build and solve Transportation Models, Assignment Models,
4. To construct linear integer programming models and discuss the solution techniques.
5. To formulate and solve problems as networks and graphs.
6. To be able to solve problems in different environments and develop critical thinking

UNIT I LINEAR PROGRAMMING PROBLEM 9

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method.

UNIT II TRANSPORTATION PROBLEM 9

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM 9

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING 9

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS 9

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TEXT BOOKS

TOTAL 45 PERIODS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P.,	Operations Research	Pearson Education,	2005
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007

3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004
---	---------	--	------------------	------

WEB REFERENCES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

COURSE OBJECTIVES

1. To kindle analytical skills for solving engineering problems
2. To impact the knowledge about inventory models
3. To learn replacement models
4. To learn about simulation models
5. To provide techniques for effective methods to solve nonlinear programming and decision making.
6. To analyse the results and propose recommendations to the decision-making processes in Management Engineering

COURSE OUTCOMES

The students will

1. To be able to solve simple models in Inventory problems and Replacement problems.
2. To understand different queuing situations and find the optimal solutions using models for different situations.
3. Simulate different real life probabilistic situations using Monte Carlo simulation technique.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non integer programming.

UNIT I INVENTORY MODELS 9

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT II NONLINEAR PROGRAMMING 9

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT III SIMULATION MODELS 9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT IV DECISION MODELS 9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk–
Decision – Tree Analysis.

UNIT V REPLACEMENT MODELS 9

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time- Replacement of items that fail suddenly and completely.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P.,	Operations Research	Pearson Education,	2005
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007

3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004
---	---------	--	------------------	------

WEB REFERENCES

1. www.mathcentre.ac.uk
2. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
3. www.mit.edu

COURSE OBJECTIVES

1. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
2. To understand the basic concepts of probability, one- and two-dimensional random variables
3. To introduce some standard distributions applicable to engineering which can describe real life phenomenon.
4. To understand the basic concepts of random processes which are widely used in IT fields.
5. To understand the concept of correlation and spectral densities.
6. To understand the significance of linear systems with random inputs.

COURSE OUTCOMES

Upon successful completion of the course, students should be able:

1. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. To understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
3. To apply the concept random processes in engineering disciplines.
4. To understand and apply the concept of correlation and spectral densities.
5. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable.
6. To analyze the response of random inputs to linear time invariant systems.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY 9

Measures of central tendency – Mean, Median, Mode - Standard Deviation Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT II STANDARD DISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma (one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT IV CLASSIFICATION OF RANDOM PROCESS 9

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES 9

Autocorrelation-Crosscorrelation-Properties-Power spectral density-Cross spectral density-Properties – Wiener-Khinchine relation – Relationship between cross power spectrum and cross correlation function Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

**TEXT
BOOK**
TOTAL 45 PERIODS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002
2	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
3	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014

4	Veerarajan, T.	Probability, Statistics and Random process	Tata McGraw-Hill Publications, Second Edition, New Delhi	2012
---	----------------	--	--	------

WEB REFERENCES

1. www.cut-the-knot.org/probability.shtml
2. www.mathcentre.ac.uk
3. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)

1. This course aims at providing the required skill to apply the statistical tools in engineering problems.
2. To introduce the basic concepts of probability and random variables.
3. To introduce about the concepts of random distributions
4. To introduce the basic concepts of two dimensional random variables.
5. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
6. To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

COURSE OUTCOMES

1. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
3. To apply the concept of testing of hypothesis for small and large samples in real life problems.
4. To apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
5. To have the notion of sampling distributions and statistical techniques used in engineering and management problems.
6. To make the student acquire sound knowledge of techniques in quality control that model engineering problems.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY 9

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration.

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem - Probability mass function - Probability density functions.

UNIT II STANDARD DISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions

- Moment generating functions, Characteristic function and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT IV TESTING OF HYPOTHESIS 9

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT V DESIGN OF EXPERIMENTS 9

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

TOTAL 45 PERIODS

Note: Use of approved statistical tables permitted in the examination.

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta. S.C. and Kapur. V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios Papoulis and S Pillai	Probability Random variables and Stochastic Processes	McGraw-Hill Publications, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Walpole. R.E., Myers. R.H., and Ye. K	Probability and Statistics for Engineers and Scientists	Pearsons Education, Delhi.	2007
2	Lipschutz. S. and Schiller. J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross. S	A first Course in Probability	Pearson Education, Delhi	2014
4	Johnson. R.A	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEB REFERENCES

1. www.cut-the-knot.org/probability.shtml
2. www.mathcentre.ac.uk
3. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)

COURSE OBJECTIVES

1. To understand the fundamental knowledge of probability theory.
2. To introduce the concept of random variable and functions of random variables.
3. To introduce the basic concepts of two dimensional random variables.
4. To introduce the concepts of random processes and Markov chain
5. To understand the different Queuing models
6. To understand how to solve problems using various models

COURSE OUTCOMES

1. The student gain the knowledge in measures of central tendency and probability
2. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
3. Understand the basic concepts of two dimensional random variables and apply in engineering applications.
4. Understand the concepts of random process and markov chains
5. They will be able to solve the Queuing models
6. The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT I PROBABILITY AND RANDOM VARIABLE 9

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT IV RANDOM PROCESS AND MARKOV CHAINS 9

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT V QUEUEING THEORY 9

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ross.S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi.J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan.T	Statistics and Random Processes	Tata McGraw-Hill, 2nd Edition, New Delhi.	2008
2	Allen.O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross.D. and Harris. C.M	Fundamentals of Queuing theory	John Wiley and Sons, New York.	2008

4	Taha.H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006
---	----------	---------------------------------------	---	------

WEB REFERENCES

1. www.mathcentre.ac.uk
2. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
3. www.mit.edu

COURSE OBJECTIVES

Students should

1. Be able to understand basic knowledge of fuzzy sets and fuzzy logic
2. Be able to apply basic knowledge of fuzzy operations.
3. Able to know the basic definitions of fuzzy relations
4. Be able to know about the fuzzy measures
5. Be able to apply basic fuzzy inference and approximate reasoning
6. To know the applications of fuzzy Technology.

COURSE OUTCOMES

1. To gain the main subject of fuzzy sets.
2. To understand the concept of fuzziness involved in various systems and fuzzy set theory.
3. To gain the methods of fuzzy logic.
4. To comprehend the concepts of fuzzy relations.
5. To analyze the application of fuzzy logic control to real time systems.
6. The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZYSETS 9

Fuzzy Sets: Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – Fuzzy functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZYSETS 9

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, t-conorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZYRELATIONS 9

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZYMEASURES 9

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZYINFERENCE 9

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL 45PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall NJ	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.J. Zimmermann	Fuzzy Set Theory and its Applications	Allied Publishers, New Delhi	2001
2	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman	1998

3	Michal Baczynski and Balasubramaniam	Fuzzy Implications	Springer Verlag, Heidelberg	2008
---	---	--------------------	-----------------------------	------

WEB REFERENCES

1. www.mathcentre.ac.uk
2. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
3. www.doc.ic.ac.uk
4. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

COURSE OBJECTIVES

1. To know the fundamentals of Tensors
2. To know the series solutions to differential equations
3. To introduce the concepts of special functions
4. To study about Calculus of variations
5. To study about the integral equations
6. To know how to solve problems for above functions and equations

COURSE OUTCOMES

1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. Learn about special type of matrices that are relevant in physics and then learn about tensors.
3. Get introduced to Special functions like Bessel, Legendre, Hermite and Laguerre functions and their recurrence relations
4. Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
5. Students will master in calculus of variations and linear integral equations.
6. The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS 8

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudotensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS 8

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation -examples

UNIT III SPECIAL FUNCTIONS 8

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre, Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS 9

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS 12

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations – integro-differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	40 th edition, Khanna Publishers	2013
2	Stephenson, G, Radmore. P.M	Advanced Mathematical Methods for Engineering and Science students	Cambridge University Press	1990
3	Andrews, Larry C.	Special Function for Engineers and Applied Mathematicians	Macmillan, New York	1997

4	Murray R Spiegel, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010
---	--------------------------------------	-----------------	---	------

WEB REFERENCES

1. <http://www.doitpoms.ac.uk/>
2. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE.aspx>

COURSE OBJECTIVES

1. To introduce the concepts of special functions.
2. To find the solutions to partial differential equations and their applications
3. To study about mathematical physics and perturbation techniques
4. To learn replacement models and simulation models
5. To provide techniques for effective methods to solve nonlinear programming
6. To provide techniques for decision making

COURSE OUTCOMES

1. Students know the concepts of improper integrals, Beta and Gamma functions.
2. The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
3. Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non-integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS**9**

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS**9**

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT III PERTURBATION TECHNIQUES**9**

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT IV SIMULATION MODELS**9**

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1)$: $(\infty/FIFO)$, $(M/M/c)$: $(\infty/FIFO)$ Models.

UNIT V DECISION MODELS**9**

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk– Decision – Tree Analysis.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig. E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta. A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao. K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008

5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi.	2010
---	----------------	---------------------	--	------

WEB REFERENCES

1. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
2. www.maths.manchester.ac.uk/~bl/teaching/math34011/
3. pubsonline.informs.org/journal/opre

COURSE OBJECTIVES

1. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
2. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
3. To acquaint the student with Fourier, transform techniques used in wide variety of situations.
4. To introduce the basic concepts of PDE for solving standard partial differential equations
5. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
6. To develop Z transform techniques for discrete time systems.

COURSE OUTCOMES

1. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
2. The learners can equip themselves in the transform techniques and solve partial differential equations
3. Understand how to solve the given standard partial differential equations.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
6. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES**9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM**9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS**9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**9**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT V Z - TRANSFORM AND DIFFERENCE EQUATIONS**9**

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TEXT**BOOKS****TOTAL****45 PERIODS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd.	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEB REFERENCES

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx>

COURSE OBJECTIVES

1. Develop abilities to write technically and expressively,
2. Recognize writing as a constructive, meaningful process,
3. Practice using reading strategies for effective writing.
4. Design effective technical documents for both print and digital media
5. Identify the qualities of good technical writing
6. To learn avoiding similarity index.

COURSE OUTCOMES

- Construct simple sentences, correct common grammatical errors in written English.
- Develop confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.
- Elevate them to minimize word, sentence, and paragraph length without sacrificing clarity or substance
- Familiarize with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
- Demonstrate the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.

UNIT I *BASICS OF WRITING* 9

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT II *PARAGRAPHS AND ESSAYS* 9

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT III *LETTERS, MEMOS AND EMAIL* 9

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT IV *THE ART OF CONDENSATION AND TECHNICAL PROPOSALS* 9

Steps to Effective précis writing–Guidelines–Technical Proposals–Types of Proposals–Characteristics– Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review
– Travelogue – Dialogue Writing.

UNIT V *REPORTS AND RESEARCH ARTICLES* 9

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V.N. Arora and Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing	Collins; First edition	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2010

COURSE OBJECTIVES

1. To inculcate the basics of brief history of Earth sciences
2. To divulge knowledge on the basics of structure of earth and earth's gravitational field.
3. To disseminate the fundamentals of magnetic field and thermal distribution of earth.
4. To introduce the concepts of seismology and seismic waves .
5. To impart the basic knowledge of oceans
6. To Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

COURSE OUTCOMES

1. Gain knowledge on the basics of history of Earth sciences.
2. Acquire knowledge on concepts of structure of earth and earth's gravitational field.
3. Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
4. Obtain knowledge on the basics of seismic waves.
5. Understand the basics of oceans and properties of sea water.
6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNITI ORIGINOF EARTH 9

A brief history of the development of Earth Sciences and of Geophysics in particular, An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition

UNIT II STRUCTURE OF EARTH 9

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH 9

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle

UNITIV SEISMOLOGY 9

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its historical perspective and essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, trenches and island arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNITV OCEANS 9

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TOTAL 45PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A.Jacobs, R.D.Russel	Physics and Geology	McGraw-Hill	2002

WEB REFERENCES

1. www.ocw.mit.edu
2. www.physicsclassroom.com
3. www.nptel.ac.in
4. www.physics.org

COURSE OBJECTIVES

1. To disseminate the fundamentals of acoustic waves.
2. To inculcate the characteristics of radiation and reception of acoustic waves.
3. To teach the concepts of radiation and reception of acoustic waves
4. To divulge knowledge on the basics of pipe resonators and filters.
5. To introduce the features of architectural acoustics.
6. To impart the basic knowledge of transducers and receivers.

COURSE OUTCOMES

1. Develop the idea of the fundamentals of acoustic waves.
2. Apply the concepts of radiation and reception of acoustic waves.
3. Explain the basic ideas of pipe resonators and filters.
4. Illustrate the basics of architectural acoustics.
5. Illustrate the transducers and receivers and its applications in various electronic devices.
6. Apply the knowledge inputs of the course for engineering applications.

UNITI INTRODUCTION 9

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves -Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS 9

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNITIV ARCHITECTURALACOUSTICS 9

Sound in endosse – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNITV TRANSDUCTION 9

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

TEXTBOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lawrence E. Kinsler, Austin R. Frey,	Fundamentals of Acoustics	4th edition, John Wiley & Sons	2000

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	F. Alton Everest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	2014

WEB REFERENCES

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

COURSE OBJECTIVES

1. To understand about the fuel
2. To study about the alcohols
3. To study importance of alcohols in engine
4. To gain knowledge on the fuel gas and oils
5. To get the information on fuel cell
6. To understand electric, hybrid and solar cars

COURSE OUTCOMES

1. Students will know about the basic concepts of alternate fuels
2. Students will know about the basic concepts of alcohols.
3. Students will understand about fuel gas and oils
4. Students can enrich their knowledge about the alternate fuels and energy systems
5. Develop their knowledge in studies of vegetable oils
6. Students know about the importance of electric, hybrid and solar cars

UNIT I INTRODUCTION**9**

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS**9**

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS**9**

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications

UNIT IV VEGETABLE OILS**9**

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS**9**

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Richard.L.Bechfold	Alternative Fuels Guide Book	SAE International Warren dale	2002
2	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nagpal G R	Power Plant Engineering	Khanna Publishers	2002
2	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing	Gulf Professional Publisher, USA	2012

WEB REFERENCES

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. <http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
3. <http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

COURSE OBJECTIVES:

1. To make the students conversant with basics of Solid wastes and its classification.
2. To make the student acquire sound knowledge of different treatments of solid wastes.
3. To acquaint the student with concepts of waste disposals.
4. To develop an understanding of the basic concepts of Hazardous waste managements.
5. To acquaint the students with the basics of energy generation from waste materials.
6. To get the information on energy conservation.

COURSE OUTCOMES:

1. Outline the basic principles of Solid waste and separation of wastes (K)
2. Identify the concepts of treatment of solid wastes (S)
3. Identify the methods of wastes disposals. (S)
4. Examine the level of Hazardousness and its management. (S)
5. Examine the possible of the energy production using waste materials. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLIDWASTE 9

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTETREATMENT 9

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTEDISPOSAL 9

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV HAZARDOUS WASTEMANAGEMENT 9

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE 9

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, energy recovery systems. Biological & chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Dara.S.S, Mishra.D.D	A Text book of Environmental chemistry and pollution control	S.Chand and company Ltd	2011
---	----------------------	--	-------------------------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nagpal H.Theisen, S. Vigil	Integrated Solid Waste management- Engg. Principles and management issues	George Tchobanoglous, McGraw Hill	2013
2	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management- 2ndedition	McGraw Hill Publishing Ltd., Newyork	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall	1999

WEB REFERENCES

1. www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2. <http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
3. www.alternative-energy-news.info/technology/garbage-energy/
4. nzic.org.nz/ChemProcesses/environment/

COURSE OBJECTIVES:

1. To make the students conversant about the green chemistry
2. To make the student acquire sound knowledge of the atom efficient process
3. Able to synthesis elaborately the atom efficient process.
4. To acquaint the student with concepts of green technology.
5. To develop an understanding of the basic concepts of renewable energy resources.
6. To acquaint the students with the basic information on catalysis.

COURSE OUTCOMES:

1. Outline the basic principles of green chemistry (K)
2. Examine the different atom efficient process and synthesis elaborately (S)
3. Apply the concepts combustion of green technology (S)
4. Identify and apply the concepts of renewable energy (S)
5. Apply the concepts of green catalysts in the synthesis (S)
6. *Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)*

UNIT I INTRODUCTION TO GREENCHEMICALPRINCIPLES 9

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES 9

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis

UNIT III BIOTECHNOLOGY AND GREENCHEMISTRY 9

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES 9

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion

UNIT V CATALYSIS IN GREENCHEMISTRY 9

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V. K. Ahluwalia and M. Kidwai	New Trends in Green Chemistry	Anamaya publishers. New Delhi. Second Edition	2007
2	Sanjay K. Sharma, Akmezh Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K. R. Desai	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
2	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons	2012
3	A. S. Matlack	Introduction to Green Chemistry	Marcel Dekker: New York	2001
4	Mukesh Doble	Green Chemistry and Engineering	Academic Press	2007

WEB REFERENCES

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>
5. <http://www.amazon.in/Green-Chemistry-Catalysis>

COURSE OBJECTIVES:

1. To make the students conversant with **the information on electrochemical material**.
2. To make the student acquire sound knowledge of **conducting polymers**.
3. To acquaint the student with concepts of Energy storage devices.
4. To develop energy storage devices.
5. To impart knowledge on basic principles of solar cells
6. To know the applications of energy storage

COURSE OUTCOMES:

1. Outline the basic principles of chemistry in electrochemical material (K)
2. Examine the properties of conducting polymers (S)
3. Apply the concepts of electrochemistry in storage devices. (S)
4. Identify the concepts of storage devices and its applications. (S)
5. Apply the suitable materials for the manufacturing of storage devices. (S)
6. *Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)*

UNIT I METALFINISHING 9

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS 9

Electropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers-poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I 9

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II 9

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE 9

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990
2	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elsevier., UK	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.M.Baizer	Organic electrochemistry	Dekker Inc. New York	1983
2	M. Barak	Electrochemical power sources	IEEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
3	K.L. Chopra and I. Kaur	Thin film devices and their application	Plenum Press, New York.	1983
4	Bruno Scrosati	Applications of Electroactive polymers	Chapman & Hall, London	1993

WEB REFERENCES

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

COURSE OBJECTIVES:

1. To make the students conversant with **cement and lime** and its uses.
2. To make the student acquire sound knowledge of abrasives
3. To make the student acquire sound knowledge of refractories.
4. To acquaint the student with concepts of inorganic chemicals.
5. To develop an understanding of the basic concepts of **explosives**.
6. To acquaint the students with the basics of **agriculture chemicals**.

COURSE OUTCOMES:

1. Outline the basic chemistry of **cement and lime (K)**
2. Examine the uses of abrasives and refractories (S)
3. Identify the usage of the inorganic chemicals. (S)
4. Identify the concepts of explosives and smoke screens (S)
5. Identify the usage of the **agriculture chemicals** (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME**9**

Manufacture of Portland cement – setting and hardening of Portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES**9**

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS**9**

Common salt and soda ash – Manufacture – Different grades – products – alkalis – Na_2CO_3 , Caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, Sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES**9**

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS**9**

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut	2000
2	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	R.N. Sherve	Chemical process industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
3	James A. Kent	Hand Book of Industrial Chemistry, 9th edition	New York, Van Nostrand Reinhold.	1992
4	S.D. Shukla and G.N. Pandey	A text book of chemical technology	Vikas publishing house pvt. Ltd, New Delhi.	1979

WEB REFERENCES

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>
4. <http://toxics.usgs.gov/topics/agchemicals.html>

COURSE OBJECTIVES:

1. To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
2. To study decision structures and loops
3. To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
4. To understand the process and skills necessary to effectively deal with problem solving
5. To discuss in relation to writing programs
6. To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
2. Structure simple Python programs for solving problems
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries
5. Read and write data from/to files in Python Programs
6. Understand various program object and graphics based on python

UNIT I FUNDAMENTALS 9

The Universal Machine-Program power- What is Computer Science?-Hardware Basics- Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II DECISION STRUCTURES AND LOOPS 9

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops- common loop patterns-Booleans

UNIT III FUNCTIONS 9

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV SEQUENCES 9

String data type- String Processing - List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V OBJECTS AND GRAPHICS 9

Overview - Object of Objects - Simple Graphics Programming - Using Graphical Objects - Choosing Coordinates - Interactive Graphics-Graphics module reference

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Zelle	Python Programming: An Introduction to Computer Science	Franklin & Associates	2009
2	Mark Lutz	Learning Python	OReily	2013

3	David Beazly& Brian K. Jones	Python Cookbook	OReily	2013
---	---------------------------------	-----------------	--------	------

COURSE OBJECTIVES:

1. To study concepts of Internet, IP addresses and protocols
2. To explain the concept of web page development through HTML
3. To introduce the PERL and explore its current strengths and Weaknesses
4. To write working Java code to demonstrate the use of applets for client-side programming
5. To study Internet telephony and various multimedia applications
6. To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

1. Learn the advanced concepts & techniques of Internet and Java.
2. Analyze the requirements for and create and implement the principles of web page development
3. Understand the concepts of PERL
4. Implement client-side programming using java applets
5. Generate internet telephony based upon advanced concepts
6. Develop applications on internet programming based on java applets and scripts

UNIT I INTRODUCTION**9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML**9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, IFrame, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL**9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV CLIENT-SERVER PROGRAMMING**9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V INTERNET TELEPHONY**9**

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning, Delhi	2013
2	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011

COURSE OBJECTIVES:

1. To impart the fundamental concepts of Computer Animation and Multimedia
2. To study the graphic techniques and algorithms using flash
3. Explain various concepts available in 3D animation
4. Explain various devices available for animation
5. To study the multimedia concepts and various I/O technologies for concept development
6. To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Develop their creativity using animation and multimedia
2. Understand the concepts of Flash and able to develop animation using it
3. Understand about various latest interactive 3D animation concepts
4. Know the various devices and software available in motion capture
5. Understand the concept development process
6. Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I INTRODUCTION 9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II CREATING ANIMATION IN FLASH 9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D ANIMATION & ITS CONCEPTS 9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV MOTION CAPTION 9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V CONCEPT DEVELOPMENT 9

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ranjan Parekh	Principles of Multimedia	TMH	2007
2	Ashok Banerji, Ananda Mohan Ghosh	Multimedia Technologies	McGraw Hill Publication	2007
3	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning	2010

4	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011
---	--------------	---	--------------------	------

COURSE OBJECTIVES:

1. To study the basic parts of computer in detail
2. Introduce various peripheral devices available for computer and its detailed working concepts
3. Overview of various interfaces and other hardware overview
4. Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
5. To study basic concepts and methods in troubleshooting
6. To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

1. Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
2. Identify various peripheral devices available and its working
3. Understand various concepts of hardware and its interface and control
4. Perform basic installation of PC. Importance of maintenance is understood
5. Understand Various faults and failures are identified and troubleshooting in detail
6. Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I INTRODUCTION**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	TMH	2002
2	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	Pearson Education	2007
3	Scott Mueller	Repairing PC's	PHI	1992

COURSE OBJECTIVES:

1. To understand the basic requirements, installation and structure of gaming using Java
2. Discuss various aspects of safe cracker projects
3. Discuss various aspects of match game projects
4. Discuss various aspects of pizza delivery projects
5. Discuss various aspects of moon landing projects
6. Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Interpret various concepts of gaming based on Java
2. Design the frame and code to develop safe cracker project
3. Design the frame and code to develop match game project
4. Design the frame and code to develop pizza delivery project
5. Design the frame and code to develop moon landing project
6. Design and develop various games using Java

UNIT I INTRODUCTION 9

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II SAFECRACKERPROJECT 9

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design- Code Design-Adding Events-Adding Sounds

UNIT III MATCHGAMEPROJECT 9

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV PIZZADELIVERYPROJECT 9

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V MOONLANDINGPROJECT 9

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

TOTAL 45PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Philip Conrod, Lou Tylee	Programming Games with Java	Cengage Learning PTR	2013
2	Timothy M.Right	Fundamental 2D Game Programming with Java	Cengage Learning PTR	2015

3	Wayne Holder,Doug Bell	Java Game Programming for Dummies	Cengage Learning PTR	2013
---	---------------------------	--------------------------------------	----------------------	------

ELECTRICAL AND ELECTRONICS ENGINEERING

15BEEEOE01

ELECTRICHYBRIDVEHICLES

3 0 0 3100

Course Objectives

1. To understand the basic concepts of electric hybrid vehicle.
2. To gain the knowledge about electric propulsion unit.
3. To gain the concept of Hybrid Electric Drive-Trains.
4. To gain the different Energy Management Strategies.
5. To study about the efficiency manipulation in drives
6. To understand and gain the knowledge about various energy storage devices

Course Outcomes:

1. Summarize the basic concepts in bioprocess Engineering.
2. Explain the concept of Hybrid Electric Vehicles.
3. Understand the concept of Hybrid Electric Drive-Trains.
4. Identify the different Energy Management Strategies.
5. Understand the concept of different Energy Storage devices.
6. Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION 9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRIDELECTRICDRIVE-TRAINS 9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRICPROPULSIONUNIT 9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGYSTORAGE 9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGYMANAGEMENTSTRATEGIES 9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL 45PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Mehrdad Ehsani, Yimi Gao, Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2012

COURSE OBJECTIVES:

1. To gain the knowledge about energy management.
2. To understand the basic concepts in economic analysis in energy management.
3. To understand the basic principles of energy audit.
4. To gain the knowledge about the basic concept of types of Energy Audit
5. To gain and Evaluate the different energy efficient motors
6. Understand the concept of Energy conservation.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand the concept of Energy Management.
2. Analyze the different methods for economic analysis
3. Knowledge about the basic concept of Energy Audit and types.
4. Evaluate the different energy efficient motors
5. Understand the concept of Energy conservation.
6. Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT 9

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS 9

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT 9

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS 9

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-
Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system-energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS 9

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005

2	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons, 7th Edition	2013
3	Paul o' Callaghan	Energy Management	Mc-Graw Hill Book Company – 1st edition	1998

COURSE OBJECTIVES

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

COURSE OUTCOMES

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3. 3 Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS 9

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS 9

Potentiometer – Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER 9

Self inductive transducer – Mutual inductive transducers – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLANEOUS TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2003
2	Patranabis. D	Sensors and Transducers	Prentice Hall of India	2003
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2004
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2010

COURSE OBJECTIVES

1. To understand the basic principles of PLC systems.
2. To gain the knowledge about data handling functions.
3. To gain the knowledge of storage techniques in PLC
4. To acquire the knowledge about how to handle the data and functions
5. To study about flow charts of ladder and spray process system
6. To understand the principles of PID.

COURSE OUTCOME

1. At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
2. To acquire the knowledge of storage techniques in PLC
3. Students know how to handle the data and functions
4. Students known about advanced controller in PLC applications
5. Students gather real time industrial application of PLC
6. Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION**9**

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING**9**

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS**9**

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS**9**

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES**9**

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing, analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006
---	-------------------------------------	--	---------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2009

WEB REFERENCE

1. <http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm>, - Introduction to programmable Logiccontroller

COURSE OBJECTIVES

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

1. Analyze the Energy Scenario in India
2. Understand the concept of Solar Energy
3. Understand the concept of Wind Energy
4. Understand the concept of Hydro Energy
5. Analyze the different energy sources
6. Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION**9**

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY**9**

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY**9**

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY**9**

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES**9**

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers ,Fourth edition	2011

2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009
---	----------	-----------------------------------	----------------------------------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao.S. &Parulekar	Energy Technology	Khanna publishers, Fourth edition	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2015
4	Mittal K.M	Non-Conventional Energy Systems	Wheeler Publishing Co. Ltd	1997

WEB REFERENCE

1. www.energycentral.com
2. www.catelectricpowerinfo.com

COURSE OBJECTIVES:

1. To study the state variable analysis
2. To provide adequate knowledge in the phase plane analysis and also describing function analysis.
3. To study the analysis discrete time systems using conventional techniques.
4. To analyze the stability of the systems using different techniques.
5. To study the design of optimal controller.
6. To study the types of compensators

COURSE OUTCOMES:

At the end of the course the student will be able to

1. understand the state variable analysis, Z- transform, state equation
2. Construct the frequency response of the system using various plots
3. Correlate the time and frequency domain specifications and
4. Correlate the effect of compensation
5. Design the different types of compensators using frequency response plots to stabilize the control system
6. Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT I STATE VARIABLE ANALYSIS 9

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement –State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS 9

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non- linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM 9

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM 9

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL 9

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press	1992
4	George J. Thaler	Automatic Control Systems'	Jaico Publishers	1993

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	George J. Thaler	Automatic Control Systems	Jaico Publishers	1993
2	M.Gopal	Modern control system theory	New Age International Publishers	2002
3	Gene F. Franklin, and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
4	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

ELECTRONICS AND COMMUNICATION ENGINEERING

15BEECOE01

REAL TIME EMBEDDED SYSTEMS

3 0 0 3100

COURSE OBJECTIVES

1. To introduce students to the embedded systems, its hardware and software.
2. To introduce devices and buses used for embedded networking.
3. To study about task management
4. To learn about semaphore management and message passing
5. To study about memory management
6. To impart knowledge on

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand overview of embedded systems architecture
2. Acquire knowledge on embedded system, its hardware and software.
3. Gain knowledge on overview of Operating system
4. Discuss about task Management
5. Gain knowledge about semaphore management and message passing.
6. Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM

9

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT II OPERATING SYSTEM OVERVIEW

9

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT III TASK MANAGEMENT

9

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

9

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT V MEMORY MANAGEMENT

9

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008

3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000
---	--------------	----------------------------------	--	------

COURSE OBJECTIVES

1. To study about various speakers and microphone
2. To learn the fundamental of television systems and standards
3. To learn the process of audio recording and reproduction
4. To study various telephone networks
5. To discuss about the working of home appliances
6. To familiarize with TV services like ISDN.

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand working of various type of loud speakers
2. Acquire knowledge on various types of picture tubes
3. Demonstrate the working of various optical recording systems
4. Distinguish various standards for color TV system
5. Acquire knowledge on various telecommunication networks
6. *Demonstrate the working of various home appliances*

UNIT I LOUDSPEAKERS AND MICROPHONES 9

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDS AND SYSTEMS 9

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III OPTICAL RECORDING AND REPRODUCTION 9

Audio Disc – Processing of the Audio signal – readout from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IV TELECOMMUNICATIONS SYSTEMS 9

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT V HOME APPLIANCES 9

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.P. Bali	Consumer Electronics	Pearson Education	2005

COURSE OBJECTIVES

1. To familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application
2. To have a solid understanding of Nanotechnology concepts.
3. To introduce the basic concepts of Nanotechnology and its applications in various domain
4. To understand the molecular structure of carbon nano tube
5. To educate how to use Nanotechnology to solve real-world problems
6. To familiar with the structure and application of carbon nano tube

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand the basic concepts of Nanotechnology and its applications in various domain
2. Ability to develop how to use Nanotechnology to solve real-world problems
3. Understand solid understanding of Nanotechnology concepts
4. Understand the important concepts applicable to small electronic devices, their fabrication, characterization and application
5. Understand the molecular structure of carbon nano tube
6. Familiar with the structure and application of carbon nano tube

UNIT I LIMITATIONS OF CMOS 9

Fundamentals of MOSFET devices - Scaling of CMOS - Limitations - Alternative concepts in materials - Structures of MOS devices: SOI MOSFET, FINFETs, Dual Gate MOSFET, Ferro electric FETs.

UNIT II MICRO AND NANOFABRICATION 9

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.

UNIT III CHARACTERIZATION EQUIPMENTS 9

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV NANO DEVICES – I 9

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V NANO DEVICES – II 9

Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3rd Edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson,	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

COURSE OBJECTIVES

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study the image compression procedures.
4. To study the image segmentation and representation techniques.
5. To study the video processing fundamentals
6. To know the concepts of motion estimation

COURSE OUTCOMES:

1. Understand the image fundamentals and mathematical transforms necessary for image processing.
2. Understand the image enhancement techniques
3. Understand the image compression procedures.
4. Understand the image segmentation and representation techniques.
5. Understand the video processing fundamentals
6. Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 9

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES 9

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION 9

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING 9

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION 9

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gonzalez and Woods	Digital Image Processing	Pearson	2012
2	Yao wang, and Ya – qin Zhang	Video processing and communication	PHI	2013

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	M. Tekalp	Digital video Processing	Prentice ll International	2011
2	Aner ozdemi R	Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms	JohnWiley& Sons	2012
3	Chris Solomon, Toby Breckon	Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab	JohnWiley& Sons	2000

Course Objectives

1. To learn the processing steps in fabrication of VLSI devices.
2. To learn the concepts of assembling and packaging for VLSI devices.
3. To impart a good knowledge in reactive plasma etching techniques and equipment.
4. To familiarize the students with the NMOS and CMOS IC technology.
5. To make the student acquire reactive Plasma Etching techniques and Equipment.
6. To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

1. List out various fabrication techniques
2. Understand the etching principle in IC fabrication
3. Gain knowledge on deposition and diffusion methods
4. Understand the process simulation and integration.
5. Assembling and packing techniques
6. various technologies used for fabricating VLSI devices

UNIT 1 INTRODUCTION TOMOS TECHNOLOGIES**9**

MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: Ids-Vds relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II LAYOUT DESIGNANDTOOLS**9**

Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools. Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III COMBINATIONALLOGICNETWORKS**9**

Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IVSEQUENTIALSYSTEMS**9**

Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V FLOOR PLANNING &ARCHITECTUREDESIGN**9**

Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOC's and Embedded CPUs, Architecture testing.

TOTAL 45PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K. Eshraghian, Eshraghian. D	Essentials of VLSI Circuits and Systems	PHI	2005
2	Wayne Wolf	Modern VLSI Design	Pearson Education	1997

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.H.EWeste, K.Eshraghian	Principals of CMOS VLSI Design	Adisson Wesley	2005

Course Objectives

1. To study materials used for MEMS and its working
2. To study the fabrication process used for MEMS
3. To study the packaging process used for MEMS
4. To familiarize the students with various micro actuators and micro sensors.
5. To learn the survey of materials central to micro engineering.
6. To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

1. Appreciate the underlying working principles of MEMS devices.
2. Understand the working of Micro sensors and actuators
3. Explain the IC fabrication processes
4. Gain knowledge on bulk manufacturing
5. Understand the Design of Micro systems.
6. Design and model MEMS devices.

UNIT I INTRODUCTION TO MEMS AND MICROFABRICATION 9

History of MEMS Development, Characteristics of MEMS-Miniaturization - Microelectronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing, Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS 9

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION 9

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors-Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS 9
AND ACTUATOR

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application- Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties- quartz- PZT-PVDF - ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V POLYMER AND OPTICAL MEMS 9

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP)- PDMS - PMMA - Parylene - Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gabriel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K. Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

Course Objectives

1. To introduce the basic concepts of neural networks and its applications in various domain
2. To educate how to use Soft Computing to solve real-world problems
3. To have a solid understanding of Basic Neural Network.
4. To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
5. To gain exposure in the field of neural networks and relate the human neural system into the digital world
6. To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

1. Understand the basic concepts of neural networks and its applications in various domains
2. Gain knowledge about learning process in Neural Networks
3. Apply perception concept in design
4. Design using ART phenomena
5. Gain knowledge on SOM concepts
6. Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS 9

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks

UNIT II LEARNING PROCESS 9

Error – correction learning – memory based learning - hebbian learning-competitive learning- Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION 9

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm- Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm

UNIT IV ATTRACTOR NEURAL NETWORK AND ART 9

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain- Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP

UNIT V SELF ORGANIZATION 9

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Simon Haykin	Neural Networks and Learning Machines	Pearson/ Prentice Hall	2009
2	Satish Kumar	Neural Networks - A Classroom Approach	TMH	2008
3	Freeman J.A., Skapura D.M	Neural networks, algorithms, applications, and programming techniques	Addition Wesley	2005

4	Laurene Fausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/ Prentice Hall	1997
---	-----------------	--	------------------------	------

COURSE OBJECTIVES

1. To introduce the basic concepts of Fuzzy logic and its applications in various domain
2. To educate how to use Fuzzy computation to solve real-world problems
3. To have a solid understanding of Basic fuzzy models.
4. Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
5. To learn about applications on Fuzzy based systems
6. To familiarize with fuzzy inference and defuzzy inference procedures

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand the basic concepts of Fuzzy logic and its applications in various domain
2. Gain knowledge on theory of Reasoning
3. Develop fuzzy controllers
4. Understand concepts of adaptive fuzzy control
5. Ability to develop how to use Fuzzy computation to solve real- world problems
6. Design fuzzy based model for any application

UNIT I BASICS OF FUZZY LOGIC 9

Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT II THEORY OF APPROXIMATE REASONING 9

Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT III FUZZY KNOWLEDGE BASED CONTROLLERS (FKBC) 9

Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT IV ADAPTIVE FUZZY CONTROL 9

Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V FUZZY BASED SYSTEMS 9

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications- Introduction to ANFIS.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. Diankar, H. Hellendoom	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G. J. Klir and T. A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

BIOTECHNOLOGY

15BTBTOE01

BIOREACTORDESIGN

3 0 0 3100

COURSE OBJECTIVES:

1. To impart basic knowledge in bioprocessEngineering
2. To design the bioreactors for variousoperations.
3. To understand the principle and working of heat transferequipments.
4. To extend the knowledge in principle of heat transfer inside abioreactor
5. To construct the equipments used in mass transferoperations.
6. To learn the equipments used in separationprocess.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

1. Summarize the basic concepts in bioprocessEngineering.
2. Design the bioreactors for variousoperations.
3. Understand the principle and working of heat transferequipments.
4. Develop the heat transfer equipments for BioprocessEngineering.
5. Construct the equipments used in mass transferoperations.
6. Categorize the equipments used in separationprocess.

UNITI ENGINEERING PROPERTIES ANDSTORAGETANK 9

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNITII REACTORDESIGN 9

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNITIII HEATTRANSFEREQUIPMENTS 9

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulationevaporator.

UNITIV MASS TRANSFEREQUIPMENTS 9

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNITV SEPERATIONEQUIPMENTS 9

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker crystallizer.

TOTAL 45PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw- Hill	2007
2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw- Hill Companies, Inc.	2008

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

COURSE OBJECTIVES

1. To learn the scope and importance of food processing.
2. To impart basic knowledge in different food processing methods carried out in the food tech companies.
3. To extend the brief knowledge in food conservation operations.
4. To study the methods of food preservation by cooling.
5. To familiarize the students on the concepts of preservation methods for fruits.
6. To create deeper understanding on preservation methods for vegetables.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Describe the scope and importance of food processing.
2. Outline the various processing methods for foods.
3. Extend the knowledge in food conservation operations.
4. Describe the methods of food preservation by cooling.
5. Summarize the preservation methods for fruits.
6. Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING 9

Properties of food - Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS 9

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS 9

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING 9

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES 9

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar
- Heat preservation– Food irradiation- Combined preservation techniques.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000
3	Mircea EnachescuDauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin no.119	1995

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

COURSE OBJECTIVES

1. To understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. To use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. To study reaction mechanisms, relative free energies and structural dynamics
4. To compute different experimental properties and spectra using computational techniques.
5. To understand how to construct, interpret and utilise potential energy surfaces.
6. To understand the theoretical and practical challenges associated with computational modeling.

COURSE OUTCOMES

1. Understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. Can use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. Study reaction mechanisms, relative free energies and structural dynamics
4. Compute different experimental properties and spectra using computational techniques.
5. Understand how to construct, interpret and utilise potential energy surfaces.
6. Understand the theoretical and practical challenges associated with computational modeling.

UNIT I MOLECULAR MODELLING 9

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima

UNIT II QUANTUM MECHANICS 9

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semi empirical methods.

UNIT III MOLECULAR MECHANICS 9

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non – bonded interactions; force field parameterization and transferability; energy minimization; derivative and non – derivative methods, applications of energy minimization.

UNIT IV MOLECULAR DYNAMICS 9

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamic simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT V MODELLING AND DRUG DESIGN 9

Macromolecular modeling, design of ligands for known macro molecular target sites, Drug- receptor interaction, classical SAR /QSAR studies and their implications to the 3 D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yvonne C. Martin, Peter Willett	Designing bioactive molecules :three-dimensional techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; Har	1998

COURSE OBJECTIVES

1. To understand the basics of biology
2. To gain knowledge about different biomolecules
3. To get familiarize with human diseases.
4. To learn about DNA & RNA.
5. To learn about different clinical investigations
6. To know the recent advances in biology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non-communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the concept of biomechanics

UNIT I OVERVIEW OF BIOREMEDIATION 9

Pollution: Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT II BIOFILM PROCESSES 9

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media

Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes

UNIT III BIOREMEDIATION FOR SOIL ENVIRONMENT 9

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination

UNIT IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMENT 9

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream-Biofiltration, Bio-trickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters

UNIT V BIOREMEDIATION OF METALS 9

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Biobenification, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rittmann, B.E., and McCarty, P.L.,	Environmental Biotechnology: Principles and Applications.	McGraw Hill,	2001
2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill Education	1995

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Prescott, L. M., Harley, and Klein, D. A	Microbiology	McGraw- Hill Higher Education	2008

COURSE OBJECTIVES

1. To study selected biological phenomena using physical principles.
2. To understand the biological and environmental sciences.
3. To gain the knowledge on technical enormous impact of the biological sciences.
4. To acquire the knowledge about molecular structure of biological systems.
5. To know the uses of proteins and its functions.
6. To understand the biological structure & function: Size and shape of macromolecules.

COURSE OUTCOMES

1. Study selected biological phenomena using physical principles.
2. Understand the biological and environmental sciences.
3. Gain the knowledge on technical enormous impact of the biological sciences.
4. Acquire the knowledge about molecular structure of biological systems.
5. Know the uses of proteins and its functions.
6. Understand the biological structure & function: Size and shape of macromolecules.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS 9

Intramolecular bonds – covalent – ionic and hydrogen bonds – biological structures -general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS 9

Primary structure – the bases – sugars and the phosphodiester bonds- double helical structure – A, B and Z forms – properties of circular DNA – topology – polymorphism and flexibility of DNA – structure of ribonucleic acids – hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS 9

Conformation of the peptide bond – secondary structures – ramachandran plots – use of potential functions – tertiary structure – folding – hydration of proteins – hydropathy index.

UNIT IV ENERGY & DYNAMICS OF BIOLOGICAL SYSTEMS 9

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bi molecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES 9

Techniques for the study of biological structure & function: Size and shape of macromolecules – methods of direct visualization macromolecules as hydrodynamic particles – macromolecules diffusion – ultra centrifugation – viscometry x-ray crystallography determination of molecular structures, X-ray fibre diffraction electron microscopy neutron scattering – light scattering.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Roland Glaser	Biophysics	Springer Science & Business Media	2001

2	Michel Daune	Molecular Biophysics: Structures in Motion	Oxford University Press	1999
---	--------------	--	-------------------------	------

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Charles R. Cantor	Biophysical Chemistry, Part 2: Techniques for the Study of Biological Structure and Function	W.H. Freeman and Company	1980

COURSE OBJECTIVES

1. To understand the available tools and databases for performing research in bioinformatics.
2. To expose students to sequence alignment tool in bioinformatics.
3. To construct the phylogenetic trees for evolution.
4. To get familiar with the 3D structure of protein and classification.
5. To acquire basic knowledge in protein secondary structure prediction.
6. To extend the brief knowledge in Micro array data analysis.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. *Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.*

UNIT I OVERVIEW OF BIOINFORMATICS**9**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**9**

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**9**

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**9**

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS**9**

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharma informatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayne	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D., F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

COURSE OBJECTIVES

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nanodevices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nanodevices.
6. Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION**9**

Introduction, Scope and Overview, Length scales, Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANOPARTICLES**9**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS**9**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**9**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinyl chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**9**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TOTAL 45PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Niemeyer. C.M. and Mirkin. C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell. D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shoseyov. O., Levy. I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan. B.	Springer Handbook of Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	FreitasJrR.A	Nanomedicine	Landes Biosciences	2004
4	Kohler. M. and Fritzsche. W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

AUTOMOBILE ENGINEERING

15BEAE0E01**AUTOMOBILE ENGINEERING****3 0 0 3100****COURSE OBJECTIVES:**

1. To impart the knowledge on constructional details and principle of operation of various automobile components.
2. To learn the function and working of various components in transmission and drivelines.
3. To study the concept and working of steering and suspension systems in an automobile.
4. To give the knowledge on wheels, tyres and brakes of automobiles.
5. To provide the information on current trends
6. To provide the information on future trends in automobiles.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to:

1. Demonstrate the operating principles and constructional details of various automobile components.
2. Explain the function and working of components in transmission and drivelines.
3. Identify and explain the types of steering system
4. Identify and explain the types of suspension system.
5. Classify and describe the types of wheels, tyres and brakes of automobiles.
6. Discuss the current and future trends in the automobiles.

UNIT I ENGINE AND FUEL FEED SYSTEMS 9

Classification of Engine, construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT II TRANSMISSION SYSTEMS 9

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III SUSPENSION SYSTEM 9

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension - Pneumatic suspension - Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV BRAKES 9

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory. Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT V ELECTRICAL SYSTEM 9

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods - Horn, wiper system and trafficator. Starting System and charging system.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2	Crouse.W.H	Automobile Electrical Equipment	McGraw-Hill Book Co., Inc., New York.	1986
3	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

COURSE OBJECTIVES

1. The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
2. Construct the frames of two and three wheelers of different layouts.
3. Demonstrate the constructional details and principle of operation of various engine components.
4. Identify and explain the types of transmission systems.
5. Identify and explain the types of steering and suspension systems.
6. Classify and describe the types of wheels, tyres and brakes for two and three wheelers

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to:

1. Construct the frames of two and three wheelers of different layouts.
2. Demonstrate the constructional details and principle of operation of various engine components.
3. Identify and explain the types of transmission systems.
4. Identify and explain the types of steering and suspension systems.
5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
6. Explain the servicing of two and three wheelers

UNIT I INTRODUCTION**9**

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS**9**

2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION**9**

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES**9**

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREEWHEELERS**9**

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992
2	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978
2	Bruce A. Johns and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

COURSE OBJECTIVES

1. The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.
2. Describe and differentiate the types of maintenance.
3. List the procedure for dismantling, servicing and assembling of engine components.
4. Demonstrate the servicing of transmission and driveline components.
5. Discuss the procedure for steering and suspension
6. Discuss the procedure for wheel and brake maintenance.

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to:

1. Describe and differentiate the types of maintenance.
2. List the procedure for dismantling, servicing and assembling of engine components.
3. Demonstrate the servicing of transmission and driveline components.
4. Discuss the procedure for steering and suspension
5. Discuss the procedure for wheel and brake maintenance.
6. Explain the fault diagnosis in the electrical and air conditioner systems

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES 9

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE 9

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE 9

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE 9

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION**9 SYSTEM AND VEHICLE BODY**

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle

body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL 45PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Doke	Fleet Management	McGraw Hill Co	1984
2	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011

REFERENCE

1. Service Manuals from Different Vehicle Manufacturers

COURSE OBJECTIVES:

1. To impart knowledge on trends in the vehicle power plants.
2. To learn the various advanced driver assistance systems.
3. To study the working of advanced suspension and braking systems in an automobile.
4. To give information about motor vehicle emission and noise pollution control.
5. To provide knowledge of the vehicle telematics.
6. To give information about the noise control techniques

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to:

1. Distinguish and describe the various modern vehicle power plant systems.
2. List and explain the various driver assistant mechanisms.
3. Identify and describe the working of advanced suspension and braking systems.
4. Apply the knowledge of motor vehicle emission and noise pollution control.
5. Describe the noise control techniques
6. Describe the vehicle telematics and its applications

UNIT I TRENDS IN POWER PLANTS 9

Hybrid vehicles - Stratified charged / lean burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS 9

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY 9

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION 9

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V TELEMATICS 9

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ljubo Vlacic and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001

2	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems –Progress in Technology	Automotive Electronics Series, SAE, USA.	1998
---	-----------------	---	--	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William B Riddens	“Understanding Automotive Electronics”	Butterworth Heinemann Woburn.	1998
2	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3	Robert Bosch,	“Automotive HandBook”	SAE	2000

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOMES

The students will be able to

1. Know the Importance of basic housing policies and building bye laws.
2. Use Housing Programmes and Schemes.
3. Plan and Design of Housing projects.
4. Examine Innovative construction methods and Materials.
5. Know Housing finance and loan approval procedures.
6. Understand Construction as well as managing techniques.

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	CMA	Development Control Rules for Chennai Metropolitan Area	CMA, Chennai	2002
2	UNCHS	National Experiences with Shelter Delivery for the Poorest Groups	UNCHS (Habitat), Nairobi	2000

COURSE OBJECTIVES

1. Defining and identifying of engineering services systems in buildings.
2. The role of engineering services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOMES

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES 9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS 9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN 9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS 9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION 9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2	NBC	Handbook for Building Engineers in Metric systems	NBC, New Delhi	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	-	Philips Lighting in Architectural Design	McGraw-Hill, New York	2000
2	A.F.C. Sherratt	Air-conditioning and Energy Conservation	The Architectural Press, London	2005
3	National Building Code			

COURSE OBJECTIVES

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

COURSE OUTCOMES

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone.

UNIT I COASTAL ZONE**9**

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries –
Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVE DYNAMICS**9**

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure
– Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES**9**

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES**9**

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS**9**

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Richard Sylvester	Coastal Engineering, Volume I and II	Elsevier Scientific Publishing Co	2006

2	Quinn, A.D	Design & Construction of Ports and Marine Structures	McGraw-Hill Book Co	2007
---	------------	--	---------------------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ed. A.T. Ippen	Coastline Hydrodynamics	McGraw-Hill Inc., New York	2002
2	Dwivedi, S.N., and Ramachandran, S	Coastal Zone Management in Tamilnadu	McGraw-Hill Inc., New York	2000

COURSE OBJECTIVES

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

COURSE OUTCOMES

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS 9

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc)

UNIT II GAUGING 9

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES 9

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading - Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES 9

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE 9

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dally J W and Riley W.F	Experimental stress Analysis	McGraw-Hill, Inc. New York	2005

2	Srinath L S	Experimental Stress Analysis	Tata McGraw-Hill Publishing co., Ltd., New Delhi	2006
---	-------------	------------------------------	---	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rangan C S	Instrumentation – Devices and Systems	Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2002
2	Sadhu Singh	Experimental Stress Analysis	Khanna Publishers, New Delhi	2006

COURSE OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

COURSE OUTCOMES

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I IRRIGATION SYSTEM REQUIREMENTS 9

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II IRRIGATION SCHEDULING 9

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III MANAGEMENT 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV OPERATION 9

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V INVOLVEMENT OF STAKEHOLDERS 9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000

2	R.T. Gandhi	Hand book on Irrigation Water Requirement	Water Management Division, Department of Agriculture	1990
---	-------------	---	---	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Technical report No. 33,	Hand Book on Irrigation System Operation Practices	CWC, New Delhi	2000
2	Maloney, C. and Raju, K.V	Managing Irrigation Together - Practice and Policy in India	, Stage Publication, New Delhi, India	2000

COURSE OBJECTIVES

1. To learn how to Develop Parametric design and the conventions of formal engineering drawing
2. To learn how to Produce and interpret 2D & 3D drawings
3. To learn about how to Communicate a design idea/concept graphically/visually
4. To know how to Examine a design critically and with understanding of CAD - The student learns to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5. To discuss how to Get a Detailed study of an engineering artifact
6. To know how to Plan and design structures

COURSE OUTCOMES

The students will be able to

1. Develop Parametric design and the conventions of formal engineering drawing
2. Produce and interpret 2D & 3D drawings
3. Communicate a design idea/concept graphically/visually
4. Examine a design critically and with understanding of CAD - The student learns to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5. Get a Detailed study of an engineering artifact
6. Plan and design structures

UNIT I INTRODUCTION**9**

Fundamentals of CAD - Hardware and software requirements - Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS**9**

Graphic primitives - Transformations - Wire frame modeling and solid modeling - Graphic standards - Drafting packages

UNIT III STRUCTURAL ANALYSIS**9**

Fundamentals of finite element analysis - Principles of structural analysis - Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION**9**

Principles of design of steel and RC Structures - Applications to simple design problems - Optimisation techniques - Algorithms - Linear Programming - Simplex method

UNIT V EXPERT SYSTEMS**9**

Introduction to artificial intelligence - Knowledge based expert systems - Rules and decision tables - Inference mechanisms - Simple applications.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Groover M.P. and Zimmers E.W. Jr	CAD/CAM, Computer Aided Design and Manufacturing	Prentice Hall of India Ltd, New Delhi	2005
2	Krishnamoorthy C.S. Rajeev S	Computer Aided Design	Narosa Publishing House, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harrison H.B	Structural Analysis and Design	Part I and II Pergamon Press, Oxford	2002
2	Rao S.S	Optimisation Theory and Applications	Wiley Eastern Limited, New Delhi	2002
3	Richard Forsyth (Ed)	Expert System Principles and Case Studies	Chapman and Hall, London	2000

COURSE OBJECTIVES

1. To discuss about the various pavement types
2. To study about the stress distribution in layered systems
3. To design the flexible pavements
4. To learn about the concepts of rigid pavements
5. To learn about the performance evaluation and maintenance of pavements
6. To know how to stabilization of pavements

COURSE OUTCOMES

Students will be able to

1. Recognize the various pavement types
2. Understand the stress distribution in layered pavements
3. Design a flexible pavement
4. Explain about the rigid pavements
5. Perform pavement performance evaluation and maintenance
6. Know how to stabilize the pavements

**UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION
ON LAYERED SYSTEM**
9

Introduction - Pavement as layered structure - Pavement types - rigid and flexible - Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS
9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS
9

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE
9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS
9

Stabilisation with special reference to highway pavements - Choice of stabilisers - Testing and field control - Stabilisation for rural roads in India - use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kadiyali, L.R	Principles and Practice of Highway Engineering	Khanna tech. Publications, New Delhi	2007
2	Croney, D	Design and Performance of Road Pavements	HMO Stationary Office	2005
3	Wright, P.H	Highway Engineers	John Wiley & Sons, Inc., New York	2001

4	Ministry of rural roads	Design and Specification of Rural Roads (Manual)	Government of India, New Delhi	2001
---	-------------------------	--	--------------------------------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yoder R.J and Witczak M.W	Principles of Pavement Design	John Wiley	2003
2	IRC:37	Guidelines for the Design of Flexible Pavements	The Indian roads Congress, New Delhi	2001
3	IRC:58	Guideline for the Design of Rigid Pavements for Highways	The Indian Roads Congress, New Delhi	2001

COURSE OBJECTIVES

1. To provide the knowledge on classification of rocks
2. To learn about the properties of rocks
3. To learn about the rock failure modes
4. To learn about the initial stresses and measurements
5. To know the applications of rock mechanics
6. To understand the concepts of rock bolting

COURSE OUTCOMES**Students will be able**

1. Recognize the various forms of rocks
2. Say the various properties of rocks
3. Explain the failure modes of the rocks
4. Understand the initial stresses and how to measure the same
5. Say the various applications of rock mechanics
6. Explain the concepts of rock bolting

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 9

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 9

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 9

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of in situ stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING 9

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Goodman P.E	Introduction to Rock Mechanics	John Wiley and Sons	2005
2	Stillborg B	Professional User Handbook for rock Bolting	Tran Tech Publications	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Brow E.T	Rock Characterisation Testing and Monitoring	Pergaman Press	2002

2	Arogyaswamy R.N.P	Geotechnical Application in Civil Engineering	Oxford and IBH	2000
3	Hock E. and Bray J	Rock Slope Engineering	Institute of Mining and Metallurgy	1991

COURSE OBJECTIVES:

1. To build on the student's background in hydrology and hydraulics and understanding of water resources systems
2. To develop the skills in modeling of flood flows and flood routing
3. To develop skills in the ground water flow, type of aquifer and yield from the well
4. To provide the knowledge of design of reservoir, operation and sedimentation
5. To study the effect, causes and remedial measures of water logging
6. To know about various concrete bunkers and silos

COURSE OUTCOMES:

Students will be able to

1. Understand about the steel water tanks
2. Understand about the concrete water tanks
3. Explain about the steel bunkers
4. Say the working of silos
5. Give basics of concrete bunkers
6. Understand the basics of prestressed concrete water tanks

UNIT I STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

UNIT II CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Code provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS**9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rajagopalan K	Storage Structures	Tata McGraw-Hill, New Delhi	2002
2	Krishna Raju N	Advanced Reinforced Concrete Design	CBS Publishers and Distributors, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.G.Hopkinson and J.D.Kay	The Lighting of buildings	Faber and Faber, London	2000
2	William H.Severns and Julian R.Fellows	Air-conditioning and Refrigeration	John Wiley and Sons, London	2000

COURSE OBJECTIVE

1. To provide knowledge on wind data
2. To explain about the various factors involved in wind engineering
3. To study about the effect on wind on various structures
4. To learn about the effect of typical buildings
5. To learn about the design of multistorey buildings
6. To know about the basics of wind tunnel

COURSE OUTCOMES

Students will be

1. Able to know about the wind data
2. Able to explain the factors involved in wind engineering
3. Able to recognize the effects of wind on various structures
4. Able to provide the details on typical buildings
5. Able to give the basics of design of multistorey buildings
6. Able to explain the basics of wind tunnel

UNIT I INTRODUCTION 9

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES 9

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES 9

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN 9

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL 9

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peter Sachs	Wind Forces in Engineering	Pergamon Press, New York	2002
2	Lawson T.V	Wind Effects on Buildings, Vol. I & II	Applied Science and Publishers, London	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Devenport A.G	Wind Loads on Structures	Division of Building Research, Ottawa	2003
2	Course Notes	Wind Force on Structures	Building Technology Centre, Anna University	2002

COURSE OBJECTIVES

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

COURSE OUTCOMES:

1. The students will gain an experience in the implementation of new construction technology on engineering concepts
2. the students will learn about how to apply in field of Advanced construction technology.
3. The students will get a diverse knowledge of Advanced technology practices applied to real life problems.
4. The students will learn to understand the theoretical and practical aspects of new technology in civil engineering
5. The students will learn to design and
6. The students will learn about management applications

UNIT I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT III MODERN CONSTRUCTION EQUIPEMENTS-I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS-II 9

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peurifoy, R. L., Ledbetter, W.B	Construction Planning , Equipment and Methods	Mc Graw Hill Co	2000
2	Antill J.M., PWD	Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Varma, M	Construction Equipment and its Planning & Applications	Metropolitan Book Co	2000
2	Nunnally, S.W	Construction Methods and Management	Prentice – Hall	2000

3	Ataev, S.S	Construction Technology	MIR , Pub	2000
---	------------	-------------------------	-----------	------

OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)

15BEMEOE01

INTRODUCTION TO MEMS

3 0 0 3100

COURSE OBJECTIVES

1. To know the characteristics of micro electromechanical system.
2. To understand the working of electrostatic sensors.
3. To understand the working of actuators.
4. To learn the principle of micromachining.
5. To understand the concept of polymer MEMS.
6. To understand the concept of optical MEMS.

COURSE OUTCOMES

1. Understand the characteristics of micro electromechanical system.
2. Understand the working of electrostatic sensors.
3. Understand the working of actuators.
4. Learn the principle of micromachining.
5. Understand the concept of polymer MEMS.
6. Understand the concept of optical MEMS.

UNIT I INTRODUCTION

9

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I

9

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II

9

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING

9

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistraction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS

9

Polymers in MEMS– Polyimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Chang Liu	Foundations of MEMS	Pearson Education Inc	2006
2	Stephen D Senturia	Microsystem Design	Springer Publication	2000
3	Tai Ran Hsu	MEMS & Micro systems Design and Manufacture	Tata McGraw Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nadim Maluf	An Introduction to Micro Electro Mechanical System Design	Artech House	2000
2	Mohamed Gad-el-Hak	The MEMS Handbook	CRC press Baco Raton	2000
3	Julian w. Gardner, Vijay K. Varadan	Micro Sensors MEMS and Smart Devices	John Wiley & Son LTD	2002
4	James J. Allen	Micro Electro Mechanical System Design	CRC Press Publisher	2010
5	Thomas M. Adams and Richard A. Layton	Introduction MEMS, Fabrication and Application	Springer	2012

COURSE OBJECTIVES

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Understand the fundamentals of therobots
2. Describe the robot celldesign
3. Know the safety considerations in roboticapplications.
4. The student with knowledge of the singularity issues associated with the operation of robotic systems.
5. The student with some knowledge and analysis skills associated with trajectory planning.
6. The student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OFROBOT 9

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations andproblems.

UNIT II DRIVES ANDSENSORS 9

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMINGANDAPPLICATIONS 9

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINEVISION 9

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION ANDROBOTECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL 45PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics -Technology Programming and Applications	McGraw Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig J.J	Introduction to Robotics Mechanics and Control	Pearson Education	2008
2	Deb S.R	Robotics Technology and Flexible Automation	Tata McGraw Hill Book Co	1994
3	Koren Y	Robotics for Engineers	Mc Graw Hill Book Co	1992
4	Fu.K.S.,Gonzalz R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	McGraw Hill Book Co	1987
5	JanakiramanP.A	Robotics and Image Processing	Tata McGraw Hill	1995
6	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company	2008
7	Surender Kumar	Industrial Robots and Computer Integrated Manufacturing	Oxford and IBH Publishing Co. Pvt. Ltd	1991

COURSE OBJECTIVES

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS 9

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN 9

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS 9

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES 9

Structuring the SC, SC and new products, functional roles in SC - SC design framework - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM 9

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP, - Case study, ERP Software's

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain management	The St. Lencie press	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Nicolas.J.N	Competitive manufacturing management - continuous improvement, Lean production, customer focused quality	McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

COURSE OBJECTIVES

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

COURSE OUTCOMES

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS 9

General overview of transport phenomena including various applications, Transport of momentum, heat and mass, Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS 9

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT 9

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non-Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT 9

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometries in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT 9

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

TOTAL 45 PERIODS**REFERENCE**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Geankoplis, C. J	Transport Processes and Separation Processes Principles	Prentice Hall	2003

WEB REFERENCE

COURSE OBJECTIVES

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

COURSE OUTCOMES

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION 9

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEYMECHANICALCONCEPTS 9

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY 9

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements
- Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION 9

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM 9

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch- Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

TOTAL 45 PERIODS

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science+ Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act 1956)

Pollachi Main Road, Eachanari Post, Coimbatore – 641 021. INDIA

Phone : 0422-6471113-5, 6453777 Fax No : 0422 -2980022-3

Email : info@karpagam.com Web : www.kahedu.edu.in

B.E. CIVIL ENGINEERING (FULL TIME)

COURSE OF STUDY AND SCHEME OF EXAMINATIONS

SUB. CODE	TITLE OF THE COURSE	PE O	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECC101	Communicative English –I	1	10	3	0	0	3	40	60	100
15BECC102	Engineering Mathematics - I	1	1	3	2	0	4	40	60	100
15BECC103	Engineering Physics	1,2	3	3	0	0	3	40	60	100
15BECC104	Engineering Chemistry	1,2	3	3	0	0	3	40	60	100
15BECE105	Basic Electrical & Electronics Engineering	1	1	3	0	0	3	40	60	100
PRACTICAL										
15BECC111	Engineering Physics and Chemistry Lab	1,2	3	0	0	3	2	40	60	100
15BECE112	Engineering Practice Laboratory	1	1	0	0	3	2	40	60	100
15BECE113	Engineering Graphics	1	1	1	0	4	3	40	60	100
TOTAL				28 hrs			23	320	480	800
VALUE ADDED COURSE										
15BECC151	Human values	1	12	1	1	0	1	100	-	-
Total Contact Hours					30 hrs					

SEMESTER II

SUB. CODE	TITLE OF THE COURSE	PE O	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECC201	Communicative English –II	1	10	3	0	0	3	40	60	100
15BECC202	Engineering Mathematics – II	1	11	3	2	0	4	40	60	100
15BECC203	Materials Science	1,2	3	3	0	0	3	40	60	100
15BECC204	Environmental Studies	3	7,12	3	0	0	3	40	60	100
15BECE205	Basic Mechanical Engineering	1	1	3	0	0	3	40	60	100
15BECE206	Computer fundamentals and C Programming	1	2	3	0	0	3	40	60	100
PRACTICAL										
15BECE211	Computer Practice and programming Lab	1	2	0	0	3	2	40	60	100
15BECE212	Building Drawing	1	4,5	1	0	3	2	40	60	100
TOTAL					27 hrs		23	320	480	800
VALUE ADDED COURSE										
15BECC251	Elementary Biology	1	12	1	1	0	1	100	-	-
Total Contact Hours					29 hrs					

L-Lecture T-Tutorial P-Practical CRE-Credit

Total Credit = 23+23=46

*# The passing minimum for value added course is 50 marks out of 100 marks. There will be two tests, of which one will be class test covering 50% of syllabus for 50 marks and other for 50 marks.

SEMESTER III

(Applicable to the students admitted from the Academic year 2015)

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECE301	Methods of Applied Mathematics	1	1	3	2	0	4	40	60	100
15BECE302	Construction Materials & Geology	1	2	3	0	0	3	40	60	100
15BECE303	Mechanics of Fluids	1	3	3	0	0	3	40	60	100
15BECE304	Engineering Mechanics	1	1	3	1	0	4	40	60	100
15BECE305	Surveying I	1	6	3	0	0	3	40	60	100
PRACTICAL										
15BECE311	Survey Practical - I	1	6	0	0	3	2	40	60	100
15BECE312	Construction Materials Laboratory	1,2	2	0	0	3	2	40	60	100
TOTAL					24 hrs		21	280	420	700
VALUE ADDED COURSE										
15BECE351	Communication Skills Development	1	12	0	0	2	1	100	0	100
Total Contact Hours					26 hrs					

SEMESTER IV

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECE401	Water Resources Engineering	1,3	6	3	0	0	3	40	60	100
15BECE402	Soil Mechanics	1	3	3	0	0	3	40	60	100
15BECE403	Mechanics of Solids - I	1	3	3	1	0	4	40	60	100
15BECE404	Applied Hydraulics and machinery	1	7	3	0	0	3	40	60	100
15BECE405	Surveying – II	1	6	3	0	0	3	40	60	100
15BECE406	Environmental Engineering I	1,3	6	3	0	0	3	40	60	100
PRACTICAL										
15BECE411	Hydraulics and Hydraulic Machinery Laboratory	1,3	7	0	0	3	2	40	60	100
15BECE412	Scientific Computing Lab	1	1	2	0	2	3	40	60	100
15BECE413	Survey Practical - II	1	6	0	0	3	2	40	60	100
TOTAL					29 hrs		26	360	540	900
VALUE ADDED COURSE										
15BECE451	Soft Skill Development	1	12	0	0	2	1	100	0	100
	Total Contact Hours			31 hrs						

L-Lecture T-Tutorial P-Practical CRE-Credit

Total Credit = 21+26=47

SEMESTER V

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECE501	Environmental Engineering II	1	6	3	0	0	3	40	60	100
15BECE502	Foundation Engineering	1,3	7	3	0	0	3	40	60	100
15BECE503	Mechanics of Solids – II	1	3	3	1	0	4	40	60	100
15BECE504	Structural Analysis –I	1	2,3	3	1	0	4	40	60	100
15BECE5E--	Department Elective I	1	3	3	0	0	3	40	60	100
PRACTICAL										
15BECE511	Strength of Materials Laboratory	1,2	4,9	0	0	3	2	40	60	100
15BECE512	Geotechnical Laboratory	1,3	7	0	0	3	2	40	60	100
15BECE513	Environmental Engineering Laboratory	1	3	0	0	3	2	40	60	100
TOTAL				26 Hrs			23	320	480	800
VALUE ADDED COURSE										
15BECE551	In-plant Training	1	6	0	0	0	1	100*	0	100
15BECE552	Technical Presentation	1	12	0	0	2	1	100**	0	100
	Total Contact Hours			28 Hrs						

SEMESTER VI

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECE601	Concrete Technology	1	2	3	0	0	3	40	60	100
15BECE602	Structural Analysis –II	1	3	3	1	0	4	40	60	100
15BECE603	Design of Steel Structures	1	3	3	1	0	4	40	60	100
15BECE604	Design of RC Structures-I	1	3	4	0	0	4	40	60	100
15BECE6E--	Department Elective II	1	3	3	0	0	3	40	60	100
15BECE6E--	Department Elective III	1	3	3	0	0	3	40	60	100
PRACTICAL										
15BECE611	Computer Aided Design Laboratory	1	4,5	0	0	3	2	40	60	100
15BECE612	Concrete and Highway Laboratory	1,2	4,9	0	0	3	2	40	60	100
TOTAL					27 Hrs		25	320	480	800
VALUE ADDED COURSE										
15BECE651	Planning and Execution of Civil Projects	1	6	0	0	2	1	100*	-	100
	Total Contact Hours			29 hrs						

L-Lecture T-Tutorial P-Practical CRE-Credit

Total Credit = 23+25=48

NOTE: Credits for value added courses are not counted for computation of CGPA

SEMESTER VII

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECC701	Principles of Management and Entrepreneurship Development	3	8	3	0	0	3	40	60	100
15BECE702	Design of RC Structures-II	1	2,3	3	1	0	4	40	60	100
15BECE703	Estimation and Quantity Surveying	1	11	4	0	0	4	40	60	100
15BECE7E--	Department Elective IV	1	3	3	0	0	3	40	60	100
15BECE7E--	Department Elective V	1	3	3	0	0	3	40	60	100
15BECEOE--	Open Elective	1	3	3	0	0	3	40	60	100
PRACTICAL										
15BECE711	Irrigation and Environmental Engineering Drawing	1	3	0	0	3	2	40	60	100
15BECE712	Structural Detailing and Drawing	1	11	0	0	3	2	40	60	100
TOTAL				26 Hrs			24	320	480	800
VALUE ADDED COURSE										
15BECE751	Mini Project	1,2,3	4,5,9,11	0	0	2	1	100*	0	100
Total Contact Hours				28hrs						

SEMESTER VIII

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
THEORY										
15BECE801	Pre-stressed Concrete Structures	1	3	3	1	0	4	40	60	100
15BECE8E--	Department Elective VI	1	3	3	0	0	3	40	60	100
15BECE8E--	Department Elective VII	1	3	3	0	0	3	40	60	100
PROJECT										
15BECE891	Project Work & Viva voce	1,2,3	4,5,9,11	0	0	24	12	120	180	300
TOTAL				34 hrs			22	240	360	600
#	Open Elective	1	3	3	0	0	3	40	60	100
Total Contact Hours				37hrs						

L-Lecture T-Tutorial P-Practical CRE-Credit

Total Credit = 24+22=46

Total credits -187

Total Marks - 4800

Note: Interested Students can select one Self Study Course in eighth semester from the list of Open Elective which will be reflected in Mark Sheet only if he/she passes in the course.

***To be evaluated internally by a committee of members**

Final report + (certificate if necessary) – 50 marks

Final presentation and viva voce – 50 marks

**** To be evaluated internally by a committee of members**

Review 1& 2 – 60 marks

Final presentation and viva voce – 40 marks

List of Department Elective Subjects

Fifth Semester

List of Department Elective Subjects

Sixth Semester

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
15BECE5E01	Hydrology	1,2	2,4,7,1 5	3	0	0	3	40	60	100
15BECE5E02	Ground water Engineering	1,2	2,3,7	3	0	0	3	40	60	100
15BECE5E03	Cartography	1,2	5,6	3	0	0	3	40	60	100
15BECE5E04	Transportation Engineering	1,2	2,3	3	0	0	3	40	60	100

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
15BECE6E01	Highway Engineering	1,2	1,3,5 ,5,14	3	0	0	3	40	60	100
15BECE6E02	Design of biological treatment systems	1,2	3,5,7 ,10	3	0	0	3	40	60	100
15BECE6E03	Ground Improvement Techniques	1,2	2,3,4	3	0	0	3	40	60	100
15BECE6E04	Irrigation Engineering	1,2	7,9,1 1	3	0	0	3	40	60	100
15BECE6E05	Structural Dynamics	1,2	2,3,4	3	0	0	3	40	60	100
15BECE6E06	Urban Water Resource Management	1,2	5,7,9	3	0	0	3	40	60	100
15BECE6E07	Remote sensing Techniques and Applications	1,2	5,9,6	3	0	0	3	40	60	100
15BECE6E08	Soil Pollution Engineering	1,2	2,3,4	3	0	0	3	40	60	100
15BECE6E09	Railways, Airports and Harbours	1,2	1,3,4 ,5,14	3	0	0	3	40	60	100

List of Department Elective Subjects

Seventh Semester

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
15BECE7E01	Bridge Structures	1,2	1,9,1 2,15	3	0	0	3	40	60	100
15BECE7E02	Tall Buildings	1,2	1,9,1 2,15	3	0	0	3	40	60	100
15BECE7E03	Prefabricated Structures	1,2	1,9,1	3	0	0	3	40	60	100

			2,15							
15BECE7E04	Smart Structures and smart Materials	1,2	5,9,6	3	0	0	3	40	60	100
15BECE7E05	Finite Element Techniques	1,2	1,2,5,9,6	3	0	0	3	40	60	100
15BECE7E06	Municipal Solid Waste Management	1,2	4,7,11,14	3	0	0	3	40	60	100
15BECE7E07	Geographical Information System	1,2	5,9,6	3	0	0	3	40	60	100
15BECE7E08	Construction resource Planning and Management	1,2	1,9,12,15	3	0	0	3	40	60	100

List of Department Elective Subjects

Eighth Semester

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
15BECE8E01	Industrial Structures	1,2	1,9,12,15	3	0	0	3	40	60	100
15BECE8E02	Seismic Design of Reinforced Concrete Structures	1,2	1,2,5,9,6	3	0	0	3	40	60	100
15BECE8E03	Introduction to Soil Dynamics and Machine Foundations	1,2	2,3,4	3	0	0	3	40	60	100
15BECE8E04	Repair And Rehabilitation Of Structures	1,2	1,9,12,15	3	0	0	3	40	60	100
15BECE8E05	Environmental Impact assessment of Water resources development	1,2	4,7,11,14	3	0	0	3	40	60	100
15BECE8E06	Industrial Waste Management	1,2	4,7,11,14	3	0	0	3	40	60	100
15BECE8E07	Air Pollution Management	1,2	3,4,5,7	3	0	0	3	40	60	100
15BECE8E08	Construction Management	1,2	3,4,5	3	0	0	3	40	60	100
15BECE8E09	Traffic Engineering and management	1,2	1,3,4,5,14	3	0	0	3	40	60	100

COURSES OFFERED BY OTHER DEPARTMENTS
LIST OF OPEN ELECTIVES

SUB. CODE	TITLE OF THE PAPER	PEO	PO	L	T	P	CRE	CIA	ESE	T
SCIENCE AND HUMANITIES										
15BESH0E01	Industrial Mathematics I	1	1	3	0	0	3	40	60	100
15BESH0E02	Industrial Mathematics II	1	1	3	0	0	3	40	60	100
15BESH0E03	Probability and Random Process	1	1	3	0	0	3	40	60	100
15BESH0E04	Probability and statistical Methods	1	1	3	0	0	3	40	60	100
15BESH0E05	Probability and Queuing Theory	1	1	3	0	0	3	40	60	100
15BESH0E06	Fuzzy Mathematics	1	1	3	0	0	3	40	60	100
15BESH0E07	Mathematical Physics	1	1	3	0	0	3	40	60	100
15BESH0E08	Advanced Engineering Mathematics	1	1	3	0	0	3	40	60	100
15BESH0E09	Linear Algebra	1	1	3	0	0	3	40	60	100
15BESH0E10	Transforms and Partial Differential Equation(Only for BE CSE students)	1	1	3	0	0	3	40	60	100
15BESH0E11	Technical Writing	1,2	9,10	3	0	0	3	40	60	100
15BESH0E12	Geophysics	1,2	1,3,5	3	0	0	3	40	60	100
15BESH0E13	Engineering Acoustics	1,2	1,3,5	3	0	0	3	40	60	100
15BESH0E14	Alternate Fuels and Energy Systems	1,2	2,3,5	3	0	0	3	40	60	100
15BESH0E15	Solid Waste Management	1,2	7,11,14	3	0	0	3	40	60	100
15BESH0E16	Green Chemistry	1,2	1,3,5	3	0	0	3	40	60	100
15BESH0E17	Applied Electrochemistry	1,2	1,3,5	3	0	0	3	40	60	100
15BESH0E18	Industrial Chemistry	1,2	1,3,5	3	0	0	3	40	60	100

COMPUTER SCIENCE ENGINEERING

15BEC SOE01	Python Programming	1,2	1,3	3	0	0	3	40	60	100
15BEC SOE02	Internet Programming	1,2	1,3	3	0	0	3	40	60	100
15BEC SOE03	Multimedia and Animation	2	1,3	3	0	0	3	40	60	100

15BEC SOE04	PC Hardware and Trouble shooting	2	5,6	3	0	0	3	40	60	100
15BEC SOE05	Game Programming	1,2	1,3	3	0	0	3	40	60	100

ELECTRICAL & ELECTRONICS ENGINEERING

15BEEEOE01	Electric Hybrid Vehicles	1,2	1,5	3	0	0	3	40	60	100
15BEEEOE02	Energy Management & Energy Auditing	1,2	1,6,7	3	0	0	3	40	60	100
15BEEEOE03	Sensors & Transducers	1	1,4	3	0	0	3	40	60	100
15BEEEOE04	Programmable Logic Controller	1	1,4	3	0	0	3	40	60	100
15BEEEOE05	Renewable Energy Resources	1,2	1,6,7	3	0	0	3	40	60	100
15BEEEOE06	Advanced Control Systems	1,2	1,4	3	0	0	3	40	60	100

ELECTRONICS COMMUNICATION ENGINEERING

15BEECOE01	Real Time Embedded Systems	1,2	1,2	3	0	0	3	40	60	100
15BEECOE02	Consumer Electronics	1	1	3	0	0	3	40	60	100
15BEECOE03	Fundamentals of Nanotechnology	1,2	1	3	0	0	3	40	60	100
15BEECOE04	Image & Video Processing	1,2	1,3,5	3	0	0	3	40	60	100
15BEECOE05	VLSI Technology	1,2	1,3,5	3	0	0	3	40	60	100
15BEECOE06	Fundamentals of MEMS	1,2	1,3,5	3	0	0	3	40	60	100
15BEECOE07	Neural Networks and its Applications	1,2	1,5	3	0	0	3	40	60	100
15BEECOE08	Fuzzy Logic and its Applications	1	1,5	3	0	0	3	40	60	100

BIOTECHNOLOGY (B.Tech)

15BTBTOE01	Bioreactor Design	1,2	1,3,6	3	0	0	3	40	60	100
15BTBTOE02	Food Processing and Preservation	1	1	3	0	0	3	40	60	100
15BTBTOE03	Molecular Modeling	1	1	3	0	0	3	40	60	100
15BTBTOE04	Bioremediation	1	1	3	0	0	3	40	60	100
15BTBTOE05	Biophysics	1	1	3	0	0	3	40	60	100
5BTBTOE06	Basic Bioinformatics	1	1	3	0	0	3	40	60	100
15BTBTOE07	Fundamentals of Nano Biotechnology	1,2	1	3	0	0	3	40	60	100

MECHANICAL ENGINEERING

15BEME0E01	Introduction to MEMS	1,2	1	3	0	0	3	40	60	100
15BEME0E02	Robotics	1,2	1,3	3	0	0	3	40	60	100
15BEME0E03	Industrial Safety and Environment	1,2	1,3,1 2	3	0	0	3	40	60	100
15BEME0E04	Transport Phenomena	1,2	1,3,5	3	0	0	3	40	60	100
15BEME0E05	Introduction to Biomechanics	1	1,2	3	0	0	3	40	60	100

AUTOMOBILE ENGINEERING

15BEAEOE01	Automobile Engineering	1	1,2	3	0	0	3	40	60	100
15BEAEOE02	Materials and Manufacturing of Automobile Component	1	1,2	3	0	0	3	40	60	100
15BEAEOE03	Automobile Maintenance	1	1,12	3	0	0	3	40	60	100

15BEAEOE04	Introduction to Modern Vehicle Technology	1	1,12	3	0	0	3	40	60	100
CIVIL ENGINEERING (COURSES OFFERED TO OTHER DEPARTMENT)										
15BECEOE01	Housing, Plan and Management	1,2	5,9,6	3	0	0	3	40	60	100
15BECEOE02	Building Services	1,2	8	3	0	0	3	40	60	100
15BECEOE03	Coastal Zone Management	1,2	1,5	3	0	0	3	40	60	100
15BECEOE04	Experimental Methods and Model Analysis	1	1,2	3	0	0	3	40	60	100
15BECEOE05	Management of irrigation systems	1,2	3,4,5,7	3	0	0	3	40	60	100

15BECEOE06	Computer Aided Design of Structures	1,2	1,5,6	3	0	0	3	40	60	100
15BECEOE07	Pavement engineering	1,2	1,3,4,5,14	3	0	0	3	40	60	100
15BECEOE08	Rock engineering	1,2	3,4	3	0	0	3	40	60	100
15BECEOE09	Storage structures	1,2	3,4	3	0	0	3	40	60	100
15BECEOE10	Wind engineering	1,2	3,4	3	0	0	3	40	60	100
15BECEOE11	Advanced construction technology	1,2	3,4,5,7	3	0	0	3	40	60	100

REFERENCE

L – Lecture Hour

T – Tutorial Hour

P – Practical Hour

CRE – Credit

CIA – Continuous Internal Assessment

ESE – End semester Examination

CC – Common Course

NB – Non-circuit branches (Mechanical and Civil Engineering)

CB – Circuit branches (Electrical and Electronics, Electronics and Communication and Computer Science Engineering)

****-- Skill Development**

****-- Employability**

****--Entrepreneurship**

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO-1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO-2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO-3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO-4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO-5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO-6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO-7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO-8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO-9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO-10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO-11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES (PSO)

The B.E. Degree Programme in Civil Engineering is offered in the department with the following programme specific COURSE OUTCOMES(COs):

PSO-13 The Graduates of this Programme with proficiency in mathematics and physical sciences will excel in the core areas of civil engineering such as structural, environmental and water resources engineering.

PSO-14 Utilize principles, methods, software's and codes of practices to excel in the areas of planning, analysis and designs related to Civil Engineering systems.

PSO-15 Prepare detailed drawings, cost estimates, reports, walk through views, interact with clients, manage workers, work in a team and executes construction works.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Civil Engineering education at KAHE, Coimbatore, mainly based on practical oriented learning. The courses offered are focused on training the students to make them adaptable to any type of role in different fields of Civil Engineering.

The B.E. Degree Programme in Civil Engineering is offered in the department with the following educational objectives:

PEO-1 To equip the graduates with sufficient knowledge and experience to become leaders in industry and academia

PEO-2 To offer platform for research and development

PEO-3 To impart professional ethics with a commitment to the society and environment

PEO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	✓	✓	✓		✓			✓	✓		✓	✓
PEO2	✓	✓		✓	✓		✓		✓	✓	✓	✓
PEO3			✓		✓	✓	✓	✓		✓	✓	✓

PEO-PSO mapping

	PSO1	PSO2	PSO3
PEO1	✓	✓	✓
PEO2	✓	✓	✓
PEO3		✓	✓

SEMESTER I

OBJECTIVES:

1. To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
2. To help students acquire their ability to speak effectively in real life situations.
3. To inculcate the habit of reading and to develop their effective reading skills.
4. To ensure that students use dictionary to improve their active and passive vocabulary.
5. To enable students to improve their lexical, grammatical and communicative competence
6. To acquire good vocabulary for sentence structure and sentence formation.

COURSE OUTCOMES(COS):

1. Use English language for communication: verbal & non –verbal.
2. Enrich comprehension and acquisition of speaking & writing ability.
3. Gain confidence in using English language in real life situations.
4. Improve word power: lexical, grammatical and communication competence.
5. Acquire good vocabulary for easy communication.
6. Be familiar with sentence structure and sentence formation

Unit I

Listening– Types of listening - Listening to class reading - Video tapes/ audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II

Listening – Understanding the passage in English –Pronunciation Practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical Reading – Finding key information in a given text (Skimming - scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar**– Parts of Speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit III

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction Writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate, Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence Pattern – Voice (active and passive voice). **Vocabulary**– One word substitution.

Unit V

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students to have hands on experience in the language lab @ two periods per unit.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
2	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006
3	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008

WEBSITES:

www.learnerstv.com www.usingenglish.com www.englishclub.com www.ispeakyouspeak.blogspot.com www.teachertube.com www.Dictionary.com
--

OBJECTIVES:

1. To develop analysing skills for solving different engineering problems.
2. To understand the concept of Matrices, Sequence and Series.
3. To remember the basics of differential calculus and its applications.
4. To Create knowledge about Hyperbolic functions, Beta and Gamma functions.
5. To apply the problems in differential equations.
6. To enhance the knowledge on the concepts of sequences and series

COURSE OUTCOMES(COS):

1. Acquire the basic knowledge and understanding of mathematics
2. Apply advanced matrix knowledge to engineering problems.
3. Improve their ability in evaluating geometrical applications of differential calculus problems.
4. Understand the concepts of sequences and series.
5. Evaluating engineering problems involving hyperbolic functions, Beta and Gamma functions.
6. To solve the problems by applying the differential Equations.

UNIT I MATRICES

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – **Maxima and Minima of functions of two or more Variables** – **Method of Lagrangian Multipliers**

UNIT III SEQUENCES AND SERIES

Sequences: Definition and examples – **Series:** Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – **Method of variation parameters.**

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi	2014

2	Sundaram, V. Lakhminarayan,K.A. &Balasubramanian,R.	Engineering Mathematics for first year.	Vikas Publishing Home , New Delhi	2006
---	---	---	--------------------------------------	------

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
2	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2011
3	BhaskarRao. P. B, Sri Ramachary SKVS, BhujangaRao. M	Engineering Mathematics I	BS Publications	2008
4	ShahnazBathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2006

WEBSITES :

1. www.efunda.com 2. www.mathcentre.ac.uk 3. www.intmath.com/matrices-determinants

15BECC103**ENGINEERING PHYSICS****3 0 0 3 100****OBJECTIVES:**

1. To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology
2. Understand the basics of laser and optical fiber with appropriate applications.
3. Introduce the concepts of quantum mechanics for diverse applications.
4. Impart the basic knowledge of crystal and its various crystal structures.
5. Disseminate the fundamentals of nuclear physics and their applications.
6. To Illustrate the basic ideas of nuclear reactors for energy resources

COURSE OUTCOMES(COS):

1. Identify the elastic nature of materials and its thermodynamic properties.
2. Infer the characteristics of laser and optical fibers for engineering applications.
3. Develop the idea of quantum mechanics through applications.
4. Identify the different atomic arrangements of crystals and its defects
5. Make use of the concepts of sound waves for medical applications
6. Illustrate the basic ideas of nuclear reactors for energy resources

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER - CO₂, Semiconductor LASER Applications of LASER in industry and Medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (Block diagram)

UNIT III QUANTUM PHYSICS

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box. Scanning electron microscope.

UNIT IV CRYSTAL PHYSICS

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V NUCLEAR PHYSICS

Introduction – basics about nuclear fission and fusion, nuclear composition – stable nuclei- liquid drop model, Radiation detectors – scintillation counter, semi conductor detector, cloud chamber. Reactors – essentials of nuclear reactor- power reactor, pressurized water reactor, Fast breeder reactor.

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with	Thomson Brooks/Cole, Indian reprint, New Delhi	2007
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	DhanpatRaiPublications, New Delhi.	2003

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu

4. www.physics.org

OBJECTIVES:

1. To gain knowledge on adsorption phenomena.
2. To make the students conversant with basics of water technology.
3. To make the student acquire sound knowledge of electrochemistry and storage devices.
4. To acquaint the student with concepts of fuels and rocket propellants.
5. To develop an understanding of the basic concepts of corrosion science.
6. To acquaint the students with the basics of surface chemistry.

COURSE OUTCOMES(COS):

1. Outline the basic principles of chemistry for water treatment (K)
2. Examine the electrochemical properties to design non – conventional energy storage devices (S)
3. Apply the concepts combustion of different fuels (S)
4. Identify the concepts of corrosion and its protection in the engineering field (S)
5. Apply the concepts of surface chemistry in the field of engineering (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes –Standard Hydrogen electrode - Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, $\text{H}_2\text{-O}_2$ Fuel Cell -Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water- Applications of adsorption.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr.S.Vairam	Engineering chemistry	Gems publishers	2014
2.	Ravikrishnan, A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Kuriakose, J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
2.	Sharma, B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001
3.	Raman sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., New Delhi, 3 rd reprint.	2013
4.	Dara, S.S	Text book of Engineering Chemistry.	S.Chand&Co.Ltd., New Delhi	2008

WEBSITES:

1. <http://www.studynotes.ie/leaving-cert/chemistry/>
2. <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>

3. <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>
4. <https://www.sophia.org/subjects/chemistry>
5. <http://ocw.mit.edu/courses/#chemistry>

15BECE105 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING3 0 03 100**COURSE OBJECTIVES:**

1. To impart the basic knowledge about the Electric circuits.
2. To understand the working of various Electrical Machines.
3. To know about various measuring instruments.
4. To understand the basic concepts in semiconductor devices and digital electronics.
5. To understand and analyze basic electric and magnetic circuits.
6. To gain the basic knowledge about the Electric circuits

COURSE OUTCOMES(COS):

1. The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, basics of electronics and be able to apply them in practical situation.
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low-voltage electrical installations.
4. Gained the knowledge in working of Electrical Machines and Transformers.
5. Students will gain the applications of transformers.
6. To understand and analyze basic electric and magnetic circuits.

UNIT I ELECTRIC CIRCUITS

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II ELECTRICAL MACHINES

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.

UNIT III MEASURING INSTRUMENTS

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV SEMICONDUCTOR DEVICES AND APPLICATIONS

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation, Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT VDIGITAL ELECTRONICS

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

TEXT BOOKS

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	Sedha R.S	Applied Electronics	S. Chand & Co	2006

REFERENCE BOOKS

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Muthusubramanian R, Salivahanan S and Muraleedharan K A	Basic Electrical, Electronics and Computer Engineering	Tata McGraw Hill, Second Edition	2006
2	Nagsarkar T K and Sukhija M S	Basics of Electrical Engineering	Oxford press	2005
3	Premkumar N	Basic Electrical Engineering	Anuradha Publishers	2003
4	MahmoodNahvi and Joseph A. Edminister	Electric Circuits	Schaum' Outline Series, McGraw Hill	2002

OBJECTIVES:

1. To develop basic laboratory skills and demonstrating the application of physical principles.
2. To prepare for the lab experiment and perform individually a wide spectrum of experiments.
3. To present experimental data in various appropriate forms like tabulation, and plots.
4. To analyze, Interpret and Summarize experimental results.
5. To communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
6. To develop the skills for understanding basic electric circuits.

COURSE OUTCOMES(COS):

1. The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.
2. Prepare for the lab experiment and perform individually a wide spectrum of experiments.
3. Present experimental data in various appropriate forms like tabulation, and plots.
4. Analyze, Interpret and Summarize experimental results.
5. Communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
6. Prepare to develop the skills for understanding basic electric circuits.

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of Chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Determination of molecular weight and degree of polymerization using viscometry.
6. Conductometric Titration (Simple acid base).
7. Conductometric Titration (Mixture of weak and strong acids).
8. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
9. pH Titration (acid & base).
10. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Estimation of Ferric iron by spectrophotometry.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

Semester-I

15BECE112ENGINEERING PRACTICE LABORATORY0032 100

COURSE OBJECTIVES:

- | |
|---|
| <ol style="list-style-type: none">1. To provide exposure to the students with hands on experience on various basic Engineering practices in Civil and Mechanical Engineering.2. To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical and Electronics Engineering. |
|---|

PART – A (CIVIL & MECHANICAL)

1. WELDING

- i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING

- i. Simple Turning and Taper turning
- ii. Drilling and Tapping

3. SHEET METAL WORK

- i. Model making – Trays, funnels, etc.

4. DEMONSTRATION ON

- i. Smithy operations
- ii. Foundry operations
- iii. Plumbing Works
- iv. Carpentry Works

PART –B (ELECTRICAL & ELECTRONICS)

5. ELECTRICAL ENGINEERING

- i. Study of electrical symbols and electrical equipments.
- ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
- iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.

v. Measurement of energy using single phase energy meter.

6. ELECTRONICS ENGINEERING

- i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
- ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- iii. Study of logic gates AND, OR, NOT, NOR and NAND.
- iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapoovan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, VikasPuplishing House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

***This course is offered in the first semester to the branches CIVIL,MECH,AUTO and in the second semester to the branches CSE, EEE and ECE.**

COURSE OBJECTIVES:

1. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
2. To give exposure to solid modeling, computer-aided geometric design, creating working drawings and engineering communication.
3. To develop graphic skill for communication of concepts, ideas and design of engineering products.
4. To give exposure to existing national standards related to technical drawings.
5. To gather skills in technical drawing.
6. To expose them to existing national standards related to technical drawings.

COURSE OUTCOMES(COS):

On Completion of the course the student will be able to

1. perform free hand sketching of basic geometrical constructions and multiple views of objects.
2. do orthographic projection of lines and plane surfaces.
3. draw projections and solids and development of surfaces.
4. prepare isometric and perspective sections of simple solids.
5. demonstrate computer aided drafting.
6. Will gather skills in technical drawing

UNIT I INTRODUCTION

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam):

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TEXT BOOKS

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

COURSE OBJECTIVES:

1. To educate the values and meaning of life in the young minds
2. To transform the human values as responsible citizens.
3. To gain self-development of students.
4. To know about student's individual quality.
5. To Analyse the mental strength.
6. To get awareness on physical and mental fitness.

UNIT – I : Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT – II : Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT – III : Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT – IV : Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT - V : Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings

Reference Books

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

SEMESTER II

OBJECTIVES:

1. To motivate learners to acquire listening & speaking skills in both formal and informal context
2. To focus on question forms & to make them understand the important of using question tags and also the functional use of transformation of sentences.
3. To improve their reading habit and to train them in critical and analytical reading
4. To equip them to write for academic as well as work place context
5. To enable students to face interviews
6. To develop admire and appreciate elegancy in communication.

COURSE OUTCOMES(COS):

1. Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
2. Enhance them reading texts critically and analytically
3. Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
4. Enrich the ability to face interviews with confidence.
5. Enable to write documents and formal written communication
6. Admire and appreciate elegancy in communication.

UNIT-1

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a Covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentence - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II**Listening –**

Note Taking- Improving grasping ability. **Speaking** – Welcome Address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid Reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing -Minutes of Meeting - Agenda – **Grammar** - Active and Passive voice - Purpose Expression. **Vocabulary** - Same words used as noun and verb - often misspelt and confused words.

UNIT-IV

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading Comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job Application - Resume Writing - Checklist Preparation. **Grammar** - Numerical Expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V

Listening – Types of Listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - voice, quality, volume, pitch etc., **Reading** -Note Making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation Writing – Short Essays Writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabulary with their meanings.

Note: Students to have hands on experience in the language lab @ two periods per unit.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	<u>Sangeeta</u> <u>Sharma ,</u> <u>Meenakshi</u> <u>Raman</u>	<u>Technical</u> <u>Communication:</u> <u>Principles And</u> <u>Practice</u> 2 nd Edition	OUP	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
2	Rutherford Andrea,J.	Basic Communication Skills for Technology 2 nd Edition	Pearson Education, New Delhi.	2006
3	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008

WEBSITES :

www.learnerstv.com www.usingenglish.com www.englishclub.com www.ispeakyouspeak.blogspot.com www.teachertube.com www.Dictionary.com
--

OBJECTIVES:

1. To understand the concepts and applications of partial differential equations
2. Determine mathematical tools needed in evaluating multiple integrals and their usage.
3. Utilize Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
4. Apply the knowledge of Mathematics in various Engineering fields by making them to identify the functions in engineering problems as analytic function and their analyze as a function of a complex variables.
5. Develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, to specify some difficult integration that appear in applications can be solved by complex integration in application areas such as fluid dynamics and flow of the electric current.
6. To Analyse the concept of complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.

COURSE OUTCOMES(COS):

1. The student will be able to Understand how to solve the given standard partial differential equations.
2. The students will be able to understand mathematical tools needed in evaluating multiple integrals and their usage. Find the areas and volumes using multiple integrals
3. To calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.
4. Improve their ability in Vector calculus
5. To find the Analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions. They will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.
6. To Evaluate complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.

UNIT- I PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions
– Solution of standard types of first order partial differential equations – Lagrange's linear equation –
Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II MULTIPLE INTEGRALS

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple
integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields –
Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement
Only)- Surfaces : hemisphere and rectangular parallelopipeds.

UNIT-IV ANALYTIC FUNCTIONS

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition
for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an
analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series
and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue
theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011

REFERENCES:

S.	Author(s) Name	Title of the book	Publisher	Year of
----	----------------	-------------------	-----------	---------

No.				Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2004
3	Narayanan. S, Manicavachagampillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2006

WEBSITES:

1. www.maths-dur.ac 2. www.efunda.com 3. www.mathcentre.ac.uk 4. www.sosmath.com/diffeq/laplace/basic/basic.html
--

OBJECTIVES:

1. To enrich the understanding of various types of materials and their applications in engineering and technology
2. Introduce the concepts of classical and quantum electron theories for diverse applications.
3. Understand the basics of magnetic materials and its properties.
4. Impart the basic knowledge of superconducting and dielectric materials.
5. Inculcate the technology in synthesization of nano materials.
6. To Summarize the basics of nano structures and synthesizing techniques

COURSE OUTCOMES(COS):

1. Explain the ideas of classical and quantum electron theories and energy band structures.
2. Illustrate the basics of semiconductor physics and its related concepts.
3. Compare the different magnetic materials, its properties and infer its role in various fields.
4. Identify the properties of superconducting materials and its engineering applications.
5. Extend the various polarization techniques and applications of dielectric materials.
6. Summarize the basics of nano structures and synthesizing techniques

UNIT I CONDUCTING MATERIALS

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and

impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application.

Composite materials, Aircraft materials and non-metallic materials.

Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition- 2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D CallisterJr	Material Science and Engineering-An Introduction	John Wiley and Sons Inc., , New York,	6 th Edition 2003

2	James F Shackelford	Introduction to materials Science for Engineers	Macmillan Publication Company, New York	6 th Edition 2004
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	7 th Edition 2007

WEBSITES:

<ol style="list-style-type: none"> 1. www.nptel.ac.in 2. www.physicsclassroom.com 3. www.oyc.yale.edu 4. www.physics.org
--

OBJECTIVES:

1. To give a comprehensive insight into natural resources, ecosystem and biodiversity.
2. To educate the ways and means of the environment
3. To protect the environment from various types of pollution.
4. To impart some fundamental knowledge on human welfare measures
5. To impart knowledge on ecosystem and biodiversity.
6. To Integrate the environmental principles in the projects undertaken in field of engineering and technology

COURSE OUTCOMES(COS):

1. Recognize the importance of natural resources (S)
2. Associate themselves with the various ecosystems (S)
3. Describe the importance of biodiversity (S)
4. Identify and minimize the difference pollutions (S)
5. Prioritize and analyses the social issues (S)
6. Integrate the environmental principles in the projects undertaken in field of engineering and technology (A)

UNIT I: INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources-role of an individual in conservation of natural resources.

UNIT II: ECOSYSTEM

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, food web and ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III: BIODIVERSITY

Introduction to biodiversity, Definition- Genetic diversity, species diversity and ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity-Hot Spots of biodiversity-Threats to biodiversity-Endangered and endemic Species of India – Conservation of biodiversity- In- Situ and Ex-Situ conservation of biodiversity.

UNIT IV: ENVIRONMENTAL POLLUTION

Definition – Causes, effects and control Measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-.Causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management:-earthquake, tsunami, cyclone and landslides.

UNIT V: SOCIAL ISSUES AND ENVIRONMENT

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and global warming, acid rain, ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value Education, Role of Information Technology in Environment and human health-Population growth, variation of population among nations-Population explosion.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubhakaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (p) Ltd., New Delhi.	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Linda D. Williams	Environmental Science Demystified	Tata McGraw -Hill Publishing Company Limited, New Delhi.	2005
2.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004

3.	William P.Cunningham	Principles of Environmental Science	Tata McGraw -Hill Publishing Company, New Delhi.	2008
4.	BharuchaErach	Environmental Science Demystified	Mapin Publishing Private Limited, Ahmadabad	2005
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications.	2003

WEBSITES:

1. <http://people.eku.edu/ritchisong/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=120>
3. www.newagepublishers.com/samplechapter/001281.
4. www.unesco.org/ext/field/beijing/scienceb.htm, www.infinitepower.org/education.html
5. <http://www.sciencedaily.com/news/top/environment>

COURSE OBJECTIVES:

1. To impart the basic knowledge of various basic fields of Mechanical Engineering.
2. To Study about basic manufacturing and machining processes.
3. To study about power plants.
4. To study about basic machining process.
5. To study about power plants.
6. To study about automobile engineering

COURSE OUTCOMES(COS):

1. To impart the basic knowledge of various basic fields of mechanical engineering.
2. To Study about basic manufacturing processes.
3. To study about basic machining process.
4. To study about power plants.
5. To study about automobile engineering
6. The principles of refrigeration and air- conditioning

INTRODUCTION (Not included for examination)

Engineering and Technology - History of Mechanical Engineering- Mechanics - Statics and dynamics - Broad areas in Mechanical Engineering.

UNIT I MANUFACTURING PROCESSES

FOUNDRY - Principles - Patterns - Types, Molding Processes, Cupola and Induction Furnaces. **METAL FORMING** - Principles - Hot and cold working of metals - Forging, rolling, extrusion and wire drawing, sheet metal operations. **WELDING** - Principles - Oxy-Acetylene Welding and Manual Metal Arc Welding, Brazing and Soldering.

UNIT II MACHINE TOOLS

Machining principles - Construction and working principles of basic machine tools - Lathe, Drilling, Shaper, Planer and Milling machine. Introduction to CNC machines.

UNIT III AUTOMOBILE ENGINEERING

Working principle of petrol and diesel engines - Four stroke and two stroke cycles - Comparison between four stroke and two stroke engines - Working principle of simple carburetor - Lubrication system and cooling system.

UNIT IV ENERGY ENGINEERING&HYDRAULIC MACHINES

Introduction to Boilers - Working principle of Thermal, Hydro - Electric and Nuclear Power Plants - Merits and demerits. Solar – Wind power plants.

Turbines - Impulse turbine - Pelton wheel, Reaction turbines - Kaplan and Francis turbines - Pumps - Working principle of Reciprocating pumps and Centrifugal pumps.

UNIT V REFRIGERATION AND AIR- CONDITIONING

Terminology of Refrigeration and Air Conditioning - Basic principles of Vapour Compression and Absorption Refrigeration System – Window and Split Room Air Conditioners.

TEXT BOOKS:

S.No	Title of the book	Author(s) Name	Publisher	Year of Publication
1	Basic Mechanical Engineering	Shanmugam, G	Tata McGraw Hill Publishing company Limited, New Delhi	2008
2	Basic Mechanical Engineering	Rajput, R.K	Laxmi Publications (P) Ltd, New Delhi	2008

Semester-II

15BECE206 COMPUTER FUNDAMENTALS AND C PROGRAMMING 3 0 0 3 100**COURSE OBJECTIVES:**

1. Identify and understand the working of key components of a computer system.
2. Identify and understand the various kinds of input-output devices associated with computer.
3. Identify and understand the different types of storage media commonly associated with a computer
4. To gain the knowledge of the basic computer networks.
5. To work more effectively in the spreadsheet.
6. To run a programme using a C Programming language

COURSE OUTCOMES(COS):

At the end of the course, student will be able to

1. Understand the concepts of computer systems.
2. Find the various kinds of input-output devices associated with computer
3. understand the different types of storage media commonly associated with a computer
4. Gain the knowledge of the basic computer networks.
5. Work more effectively in the spreadsheet.
6. Run a programme using a C Programming language.

UNIT I Overview of Computer

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types- Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II Overview of 'C'

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types- Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III Selection and Iteration

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop- break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV Functions

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V Arrays and Strings

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays- Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Character

REFERENCES:

1. E. Balagurusamy, “ Computing Fundamentals and C Programming”, TMH Education, 5th Edition, 2014
2. Yashavant Kanetkar, “ Let us C”, BPB Publications, 13th Edition, 2013
3. H. M. Deitel and D. J. Deitel, ‘C: How to Program’, Prentice Hall, 7th Edition, 2012
4. E. Balagurusamy, “ Programming in ANSI C”, TMH Education, 6th edition, 2012

***This course is offered in the first semester to the branches CSE, EEE, ECE and in the second semester to the branches CIVIL, MECH and AUTO.**

Semester-II

15BECE211COMPUTER PRACTICE AND PROGRAMMING LAB 0032100

COURSE OBJECTIVES:

1. Identify and understand the working of key components of a computer system.
2. Identify and understand the various kinds of input-output devices and different types of storage media commonly associated with a computer
3. Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure
4. Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language.

COURSE OUTCOMES(COS):

At the end of the course, student will be able to

1. Understand the concepts of computer systems.
2. Find the various kinds of input-output devices associated with computer
3. understand the different types of storage media commonly associated with a computer
4. Gain the knowledge of the basic computer networks.
5. Work more effectively in the spreadsheet.
6. Run a programme using a C Programming language.

List of Experiments

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and funct

***This course is offered in the first semester to the branches CSE, EEE, ECE and in the second semester to the branches CIVIL, MECH and AUTO.**

Semester-II

15BECE212

BUILDING DRAWING

1 0 3 2 100

Objectives:

1. At the end of this course students should have learnt to draft on building drawings using computers
2. (Plan, elevation and sectional views) in accordance with development.
3. To gain the software knowledge in building drawings.
4. To gain the knowledge of detailed drawings.
5. To Gain Planning Knowledge
6. To gain the Drawing skills in software.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the principles of planning and bylaws used for building planning.
2. Draw plan, elevation and section for various structures.
3. To gain the software knowledge in building drawings.
4. To gain the knowledge of detailed drawings.
5. To Gain Planning Knowledge
6. To gain the Drawing skills in software.

Drawing manually by Conventional methods

1. Conventional signs
2. Bonds in brick and stone masonry
3. Plan, elevation and section of simple buildings.

Computer Aided Drawing

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows
2. Detailed drawings of floor plans, Elevations and Sections to show various features in a Building
3. Preparation of plot plans with study of property lines and Location of Buildings on site
4. RCC framed structures
5. Industrial buildings – North light roof structures – Trusses
6. Perspective view of one and two storey buildings

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building Drawing	Shah, Kale and	Tata McGraw-Hill Co.	2004

		Patki	Ltd, New Delhi	
--	--	-------	----------------	--

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building planning & Drawing	Dr.N. Kumaraswamy, A. Kameswara Rao	Charotar Publishing, Gijarat	2007
2	Civil Engineering. Drawing & House Planning	B.P. Verma	Khanna Publishers, Delhi	2013

WEBSITES:

<ul style="list-style-type: none"> ➤ http://www.icivilengineer.com ➤ http://www.engineeringcivil.com/ ➤ http://www.aboutcivil.com/ ➤ http://www.engineersdaily.com ➤ http://www.asce.org/ ➤ http://www.cif.org/ ➤ http://icevirtuallibrary.com/ ➤ http://www.ice.org.uk/ ➤ http://www.engineering-software.com/ce/

15BECC251

ELEMENTARY BIOLOGY

Semester-II

1101100

OBJECTIVE

1. To understand the basics of biomolecules, human anatomy and physiology.
2. To have better understanding of advancements in biology.
3. To understand the basics of biology
4. To gain knowledge about different biomolecules
5. To get familiarize with human diseases
6. To learn about different clinical investigations

Course Outcomes

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the applications of biology in concrete technology

UNIT-I: BASICSOFCCELLBIOLOGY

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT-II: BIOMOLECULES

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins-classification and functions; Nucleic acids- basic structure; Hormones- definition, importance; Vitamins.

UNIT-III: HUMANANATOMYANDPHYSIOLOGY

Levels of Structural organization, the eleven systems of human body, central nervous system- cardio vascular system and immune system.

UNIT-IV: GENETICSANDGENETICDISORDERS

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information- gene mutation, disorders due to mutant genes.

UNIT-V: TECHNOLOGICAL ADVANCES IN BIOLOGY

Biopharmaceuticals, Genetherapy, genetically modified crops, probiotics.

Text Book

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	Verma,P.S.,Agarwal,V.K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S.Chand &Compan y Ltd.,	2006

Reference Books

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	Nelson,D. L.andCox,M.M	Lehninger Principles of Biochemistry4 th Edition	Freeman, W.H.&Company	2004
2	Tortora,G.J.,Derrickson,B	Principles of Anatomy And Physiology, 11 th Edition	John Wiley&Sons	2006

Website

1. <http://www.biotechonweb.com/Application-of-biotech-in-Medical.html>

SEMESTER III

Semester-III

15BECE301

METHODS OF APPLIED MATHEMATICS

3 2 0 4 100

OBJECTIVES:

1. The purpose of this unit to gain familiarity with Laplace transforms, including the Laplace transforms of step functions and related functions.
2. Fourier series to apply physical science and signal systems.
3. Some standard functions and some of the properties of the Fourier transform.
4. To study the basic principles of different transforms and Partial Differential Equations.

5. In mathematics and signal processing, the Z-transform converts a discrete time-domain signal, which is a sequence of real or complex numbers, into a complex frequency-domain representation.
6. To enhance the transform techniques.

COURSE OUTCOMES(COS):

1. Apply Laplace transform for analyzing linear time invariant systems.
2. To apply Fourier series in sinusoidal signals, such as engineering, physics and applied mathematics.
3. To be able to solve wave equation using Fourier transform.
4. To recognize the heat conduction equation and the wave equation and have some knowledge of their applicability.
5. To equip the student with the capability of applying Z-transform to solve difference equations.
6. The Learners can equip themselves in the transform techniques.

UNIT- I LAPLACE TRANSFORM

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions

UNIT- II FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT -III FOURIER TRANSFORM

Fourier integral theorem (Statement Only) – Fourier transform pair –Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT- IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded)

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TEXT BOOK:

S.	Author(s)	Title of the book	Publisher	Year of
----	-----------	-------------------	-----------	---------

No.	Name			Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011
2	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2003
2	Narayanan, S., ManicavachagomPillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd.	2000
4	Ramana B V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Co. Ltd. New Delhi.	2007

WEBSITES:

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. http://www.math.umn.edu/~olver/pdn.html
4. http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx

Semester-III

15BECE302 CONSTRUCTION MATERIALS & GEOLOGY

3 0 0 3 100

COURSE OBJECTIVES:

1. At the end of this course the students should have learnt about the various materials, (both conventional and modern) that are commonly used in civil engineering construction.
2. Further students should be familiar about the geological processes, minerals/ rock classification,
3. Students are able to know the engineering properties of rocks and geological structures of outer surface which help in construction of dam, bridge, building etc.
4. Students will gain the knowledge of different materials used in construction.
5. To gain the knowledge of manufacturing of different construction materials.
6. To gain the applications of materials in various fields.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
2. Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor
3. Can choose the types of foundations and other related aspects.
4. Students are able to know the engineering properties of rocks and geological structures of outer surface which help in construction of dam, bridge, building etc.
5. Students will gain the knowledge of different materials used in construction.
6. To gain the knowledge of manufacturing of different construction materials.

UNIT- I: STONES, BRICKS, CONCRETE BLOCKS

9

Stone as building material – criteria for selection – test on stones – Deterioration and preservation of stone work – Bricks – classification and types– Tests on bricks – Bricks for special use – Refractory bricks – Concrete hollow blocks.

UNIT- II: CEMENT, AGGREGATE AND SAND

9

Cement – Ingredients – Manufacturing processes – Types and grades – Properties of cement and cement mortar – Hydration- applications

Aggregate – Natural stone aggregate – crushing strength – Impact strength – Flakiness – abrasion - Sand – bulking – code practices. Concrete – Ingredients- types – manufacturing, Batching Plants

UNIT- III: TIMBER, STEEL, PAINTS AND OTHER MODERN MATERIALS.

9

Timber –Market forms –Industrial timber– Plywood, Veneer, laminates.

Steel, Aluminum & other materials – composition– uses – market forms– Mechanical treatment.

Paints, varnishes, distempers.

Glass– ceramic– sealants for joints – fiber glass reinforced plastic– clay products– glass refractoriness.

UNIT- IV: GENERAL GEOLOGY, STRUCTURAL GEOLOGY & THEIR APPLICATIONS.

9

Geology in civil engineering– Earth processes– weathering– geological work of river, wind and sea– seismic activity– seismic zones in India – ground water.

Structural geology –study of structures – dip and strike – fold, faults and joints – Their significance.

UNIT -V: MINERALS, ROCKS AND THEIR ENGINEERING SIGNIFICANCE

9

Elementary knowledge on minerals – Physical properties of minerals – study of following rock forming minerals – Quartz , Feldspar, Pyroxene, Hornblende & Mica family –Ore minerals – Clays minerals and their significance. Classification of rocks-Igneous, Sedimentary, Metamorphic rocks

TOTAL HRS:45

Text Books:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Engineering materials	Dr. R.K. Bansal	Lakshmi publications Pvt. Ltd., New Delhi	2010
2.	Engineering and General Geology	Parbin Singh	S.K.Kataria& sons, New Delhi	2011

Reference books:

S.No.	Title of the book	Author of the book	Publisher	Year of publication
1.	Building construction	S.C. Rangwala	Charotar Publishing Company, Anand- 388 001	2009
2.	Engineering Geology and Geotechniques	Krynine and Judd	McGraw-Hill Book company, Newyork	2002
3.	Geology and Engineering	Legeet	McGraw-Hill Book company, Newyork	2004
4.	Engineering materials	Dr. R.K. Rajput	S. Chand & Company Ltd., New Delhi	2000

WEBSITES

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>
- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-III**15BECE303****MECHANICS OF FLUIDS****3 0 0 3 100****COURSE OBJECTIVES:**

1. At the end of this course students should have learnt the definition and properties of fluid, principles of fluid statics, kinematics and dynamics.
2. Understand the basic principles of fluid mechanics.
3. Understand the concepts of statics and dynamics of fluid flow.
4. Develop skills in analyzing fluid flows through the proper use of modeling and the application of the basic fluid-flow principles.
5. Acquire knowledge in the selection of type of turbine required with reference to available head of water and also used for Identification of type of turbine with estimated specific speed.
6. Capable of estimating efficiency of different pumps and performance of the pumps with the study of characteristics curves.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Understand the basic principles of fluid mechanics.
2. Understand the concepts of statics and dynamics of fluid flow.
3. Develop skills in analyzing fluid flows through the proper use of modeling and the application of the basic fluid-flow principles.
4. Acquire knowledge in the selection of type of turbine required with reference to available head of water
5. Identification of type of turbine with estimated specific speed.
6. Capable of estimating efficiency of different pumps and performance of the pumps with the study of characteristics curves.

UNIT I

9

Properties of fluids: Introduction of Basic properties – Viscosity compressibility, surface tension – Real and ideal fluids.

Fluid statics:

Fluid Pressure-various methods of measurement. Total pressure and centre of pressure – determination on plane surface only – Equilibrium of floating bodies – conditions and analysis.

UNIT II

9

Kinematics of fluid flow: Classification of fluid flow – stream function and velocity potential – (Reynolds number and its application) - Linear acceleration and constant rotation of fluids in a container – application and simple problems.

UNIT III

9

Dynamics of fluid flow: Euler's equation of motion – Bernoulli's theorem – Limitation of Bernoulli's theorem – Application – simple problems. Venturimeter – Flow nozzle meter – Bend meter – Pitot tube – current meter.

UNIT IV

9

Flow through pipes: Laminar and Turbulent flow – friction and minor losses (Study of Moody's diagram). Transmission of power through pipes – flow between reservoirs – parallel, series and siphon pipes – water hammer.

UNIT V

9

Dimensional and model analysis

Dimensional Homogeneity – Need – Rayleigh's method & Buckingham's π theorem – Significance of dimensionless numbers-Reynolds number, Froude number, Euler's number, Mach number and Weber number – Distorted models – Scale effect

TOTAL HRS:45

TEXT BOOKS:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Text book of Fluid Mechanics and Hydraulic Machines	Bansal. R.K	Lakshmi Publications, Madras	2005

REFERENCES:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Fluid Mechanics & Hydraulic Machines	R K Rajput	M/s. S.Chand Co., Madras	2008
2	Engineering Fluid Mechanics	Kumar. K.L	M/s. S.Chand Co., Madras	2003
3	Fluid Mechanics, Hydraulics & Fluid Machinery	Ramamrutham.S	M/s.Dhanpatrai& Sons, New Delhi	2006
4	Hydraulics, Fluid Mechanics & hydraulic Machinery	Modi.P.N, &Seth.S.M	Standard Book House, New Delhi	2005
5	Fluid Mechanics, Hydraulics and Hydraulic machines	Arora K.R	Standard Publishers Distributors, New Delhi	2011

WEBSITES

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE304**ENGINEERING MECHANICS****Semester-III****3 1 0 4 100****COURSE OBJECTIVES:**

1. In this course students should can learnt about basic principles and mechanics of particles and rigid bodies.
2. To explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
3. Provides an understanding of the kinds of stress and deformation and how to determine them in a wide range of simple, practical structural problems.
4. To understanding of the mechanical behavior of materials under various load conditions.
5. To apply Newton's laws of motion in practical experiences.
6. To apply basic knowledge of maths and physics to solve real-world problems

COURSE OUTCOMES(COS):

1. Ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
2. Ability to analyses the forces in any structures.
3. Ability to solve rigid body subjected to dynamic forces.
4. Analyses the forces in any structures.
5. Solve rigid body subjected to dynamic forces.
6. Gain basic knowledge about the forces and moments.

UNIT – I

12

Statics of Particles: Forces in plane and space - Vector addition of concurrent forces in plane and space-Problems involving the equilibrium of a particle - Free body diagram - Equilibrium of particle in space.

UNIT – II

12 Statics of

Rigid Bodies in Two Dimensions: Rigid bodies -Two dimensional structure - Moment of force about a point and about an axis - Moment of a couple - Equivalent systems of coplanar forces - Rigid body in equilibrium - Problems involving equilibrium of rigid body

Application of Statics: Types of supports - Reactions of beams and rigid frames -

UNIT – III

12

Friction: Laws of friction - Coefficient of friction - Problems involving dry friction - Wedge & ladder friction.

Introduction To Vibration: Simple Harmonic Motion - Mass spring system-Free vibration(elementary treatment only)

UNIT – IV

12

Kinematics of Particles: Introduction - Plane, Rectilinear motion -Time dependent motion-Rectangular coordinates - Projectile motion.

Kinetics of Particles: Equation of motion - Rectilinear motion - Work energy method - Potential energy - Kinetic energy - Conservation of energy.

UNIT – V

12

Impulse & Momentum: Impulse - momentum principle - Concept of conservation of momentum - Impact-Direct central impact- Oblique central impact

TOTAL HRS:60

TEXT BOOKS:

S.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Engineering Mechanics- Statics and Dynamics	Kottiswaran N	Sri Balaji Publications	2010

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Vector Mechanics for Engineers, Statics & Dynamics	Beer F P and Johnston E R	Tata Mc-Graw Hill Publishing Co., Ltd, New Delhi.	2007
2	Engineering Mechanics-	Irving H Shames	Pearson	2003

	Statics and Dynamics, IV Edition		Education Asia PvtLtd,Singapore	
3	Engineering Mechanics, Vol I, Statics and Vol II Dynamics	Hibbeller R C	Pearson Education Asia Pvt Ltd, Singapore	2009
4	Engineering Mechanics	Bhavikatti S S&Rajasekarappa KG	New Age International (P) Ltd., New Delhi	2008
5	Engineering Mechanics	Bansal R K	Laxmi Publications (P), New Delhi.	2007
6	Engineering Mechanics- Statics and Dynamics	Rajasekaran S and Sankarasubramanian G	Vikas Publishing House Pvt. Ltd, New Delhi.	2005
7	Engineering Mechanics- Statics and Dynamics	Natesan S.C	Umesh Publications, New Delhi	2002

WEBSITES

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-III

15BECE305

SURVEYING- I

3 0 0 3 100

COURSE OBJECTIVES:

1. To gain basic knowledge about surveying and its principle.
2. To learnt about different types of surveying
3. To gain practical knowledge in the field of surveying.
4. Numerical solutions for carrying out surveying in civil engineering field. Advanced surveying equipment's.
5. Work with survey observations, and perform calculations,
6. To Provides independent knowledge for carrying out individual projects.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Explore the different surveying instruments for surveying.
2. Describe the methods of measurement using level instrument and theodolite.
3. Provides independent knowledge for carrying out individual projects.
4. Able to identify and calculate the errors in measurements
5. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
6. Translate the knowledge gained for the implementation of Civil infrastructure facilities

UNIT I

9

Introduction -Definition , Principles and Classification of surveying- Field work and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging - Reciprocal ranging - Setting perpendiculars – well-conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II

9

Compass Surveying And Plane Table Surveying :Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories –Merits and demerits - Methods - Radiation - Intersection - Resection – Traversing- **Two point and three point problem.**

UNIT III

9

Levelling And Applications: Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV

9

Theodolite Surveying: Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.

UNIT V

9

Engineering Surveys :Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple and reverse curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Transition curves - Functions and requirements

TOTAL HRS:45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying&levelling	N.N.Basak	Tata McGraw Hill	2011
2	Surveyingvol I	Dr.B.C.Punmia	Laxmi Publications	2011

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Plane and Geodetic Surveying, Vols. I and II	Aylmer Johnson	CRC Press	2004
2	Introduction to Surveying	James M.Anderson and Edward M.Mikhail	McGraw-Hill Book Company,New Delhi.	2005

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-III

15BECE311

SURVEY PRACTICAL -I 0 0 3 2 100

COURSE OBJECTIVES:

At the end of the course the student will possess knowledge about Survey field techniques

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection –Three point problem

9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level
12. Check levelling
13. LS and CS
14. Study of Contouring

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying	Bannister A. and Raymond S	ELBS, Seventh Edition, Canada	2004
2	Surveying and Levelling Part 1 & 2 , 23 rd edition,	Kanetkar.T.P. &S.V.Kulkarni,	Punavidyarthigriha , Prakashan,	2008

Semester-III

15BECE312 CONSTRUCTION MATERIALS LABORATORY 0032100

COURSE OBJECTIVES:

At the end of this course students should have learnt the methodology of carrying out various tests on properties of materials used for construction.

COURSE OUTCOMES(COS):

1. Understand the basic building materials to be used in construction work
2. Know the various construction practices in the field and the different construction equipment used in the field
3. Make aware of the various construction techniques, practices and the equipment needed for different types of construction activities.

TEST ON MATERIALS

1. ORDINARY PORTLAND CEMENT:

- Determination of the specific gravity of cement using Le-chaletier flask and the fineness by sieve analysis.
- Determination of the normal consistency and setting times.
- Determination of the soundness of OPC using Lechaletier apparatus.
- Determination of the compressive strength of Ordinary Portland cement.

2. TEST ON AGGREGATE:

- Determination of the Specific gravity, Bulk density and Water Absorption of Aggregates.
- Study of the phenomenon of Bulking of sand – River Sand and M Sand
- Determination of fineness modulus for fine and coarse aggregates by drawing grading curves - River Sand and M Sand.
- Determination of the impurities in aggregates.

3. TEST ON BRICKS:

- Determination of the compressive strength.
- Determination of the water Absorption.
- Determination of the degree of efflorescence.
- Checking of dimensional tolerance and warpage.

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Building Construction, Planning Techniques and Method of Construction	Arora S.P. and Bindra S.P	DhanpatRai and Sons, New Delhi	2008
2	Construction Planning, Equipment and Methods	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C	5th Edition, McGraw Hill, Singapore,	2004

CODE BOOKS

- 1. IS 269 for 33 Grade cement**
- 2. IS 8112 for 43 Grade Cement**
- 3. IS 12269 for 53 Grade Cement**

4. IS 383 for Testing of Aggregates

VALUE ADDED COURSE

15BECE351	COMMUNICATION SKILLS DEVELOPMENT	0 0 2 1 100
------------------	---	--------------------

OBJECTIVES:

1. To assist students to understand the role of thinking in all forms of communication.
2. To help students with neutral accent.
3. To guide students to read and comprehend articles from newspapers and magazines.
4. To equip students with oral and appropriate written communication skills.
5. To assist students with employability and job search skills
6. To make soft skills will be incorporated and have a good listening capability.

COURSE OUTCOMES(COS):

1. Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
2. Write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
3. Listen to/ view and comprehend different spoken discourses/ excerpts in different accents.
4. Take national and international examination and enhance the performance at Placement Interviews.
5. Be motivated to lead a group and able to guide the group with confidence.
6. Soft skills will be incorporated and have a good listening capability.

UNIT - I ESSENTIALS OF COMMUNICATION

Communication: Definition-Process-Scope-Types- Barriers- Dyadic Communication exercises.

UNIT - II SPEECH PROCESS

Pronunciation – Voice quality – Vowels – Consonants – Diphthongs – Syllables – Word stress - Sentence Stress – Pause - Intonation – Accent.

UNIT - III ORAL COMMUNICATION

Distinguishing between Formal and Informal speech – Defining and Describing objects and people – Self Introduction – Extempore talk on a given topic - Asking questions politely, disagreeing politely in formal contexts – Speaking to a group - Giving oral presentations – Group discussion – Debates- Types of Interview.

UNIT - IV WRITTEN COMMUNICATION

Formal Reports - Project Proposals - Book reviews - Official Correspondence - Proof Reading & Editing.

UNIT – V ENGLISH FOR COMPETITIVE EXAMINATION

Synonyms, Antonyms –Grammar and usage – Error Identification – Reading comprehension- Verbal analogy- Verbal Test.

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Jane	Communication	Wiley	2009

	Summers & Brett Smith	Skills Handbook: How to Succeed in Written and Oral Communication		
--	---	--	--	--

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Anderson, Paul V	Technical Communication	Thomson and Wadsworth Publishers.	2007
2	Barun, Mitra K	Effective Technical Communication – A Guide for Scientists and Engineers	Oxford University Press, New Delhi.	2006
3	Seely, John.	The Oxford Guide to Effective Writing and Speaking	Oxford University Press, New Delhi.	2005

WEBSITES :

www.learning-development.hr.toolbox.com www.englishclub.com www.ispeakyouspeak.blogspot.com www.teachertube.com www.Dictionary.com
--

Lab Requirements: (i) Teacher console and Systems for students.
(ii) English Lab Software.

SEMESTER IV

15BECE401	WATER RESOURCES ENGINEERING	3 0 0 3 100	Semester IV
------------------	------------------------------------	--------------------	--------------------

COURSE OBJECTIVES:

1. To build on the student's background in hydrology and hydraulics an understanding of water resources systems.
2. To develop the skills in modeling of flood flows and flood routing
3. To develop skills in the ground water flow, type of aquifer and yield from the well.
4. To provide the knowledge of design of reservoir, operation and sedimentation
5. To know the different aquifers and the water table level.
6. To planning of reservoirs and storage tanks.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Incorporate the analytical abilities in the planning and design of water resource systems.
2. Apply the knowledge on reservoir planning and investigation
3. Model the flood flows and flood routings.
4. Gain the knowledge of design of reservoir, operation and sedimentation

5. Will know the different aquifers and the water table level.
6. Planning of reservoirs and storage tanks.

UNIT I

9

Introduction: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – environmental impacts of irrigation- Classification of irrigation projects - Crop and crop seasons – consumptive use of water – Duty, Delta and Base period – Factors affecting duty – Irrigation efficiencies.

Precipitation: Types of precipitation – Forms of precipitation – Measurement of Rainfall –Losses from precipitation-- Hydrograph - Factors affecting Hydrograph – Base flow separation – Unit hydrograph – S curve hydrograph

UNIT II

9

River Engineering: Rivers –Types and Behavior

Water Logging: Causes of water logging - Effects of water logging – Remedial measures for water logging

Drainage: Necessity – Advantages – Methods.

River structures: Diversion Head works- Brief Description of component parts and their functions- - Seepage theories.

UNIT III

9

Canal Engineering: Alignment of canals – Classification of canals - Distribution network - Canal Losses - Cross sectional details - Sedimentation in canals - Silt theories - Balancing depth of cutting

Canal lining: Types, Construction and Maintenance

Canal and River structures: Canal regulators and Types - Canal Falls and Types

Cross Drainage Works: Types- Selection -River Training works – types.

UNIT IV

9

Rigid Storage Structures: Gravity dams Description– Arch and Buttress dam – Spillways – Factors affecting location and type of dams – Forces on a dam – Galleries and types.

Non Rigid Storage Structures: Earth dams - Causes of failure - Typical cross sections to suit site conditions and available materials - Phreatic line – Tanks – Classification – Components - types of Bunds

UNIT V

9

Reservoir Planning: Reservoirs- Types- Zones of storage – Capacity - Yield- Area - Elevation and capacity- Elevation curves - Mass curve analysis - Capacity for specific demand and yield for given capacity- Fixing reservoir capacity- Reservoir sedimentation and control- Selection of site for reservoir

Other Irrigation Structures: Surplus Weir- Tower Head Sluice- Wing wall type- (Theoretical Approach only)- Culverts- Small ROAD bridges across drains- Canal outlets and flumes- Types (Theoretical Aspect only).

TOTAL HRS:45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering and Hydraulic structures	Garg, S.K	KhannaPublishers,New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation and Water Power Engineering	Punmia B.C., Pande B.B.Lal	Lakshmi Publications, Chennai.	2012
2	Irrigation Engineering and Hydraulic Structures	SahasraBudhe S.R	S.K. Kataria &Sons, Chennai	2014
3	Irrigation Engineering	RK Sharma, TK Sharma	S.Chand& Company Ltd., New Delhi	2009

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>

Semester-IV**15BECE402****SOIL MECHANICS****3 0 0 3 100****COURSE OBJECTIVES:**

1. To explain what Geotechnical Engineering is and how it is important to civil engineering
2. To explain how three phase system is used in soil
3. To know the soil properties estimated using three phase system
4. To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated
5. To determine shear parameters and stress changes in soil due to foundation loads
6. To estimate the magnitude and time-rate of settlement due to consolidation

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out soil classification.
2. Solve three phase system problems.
3. Solve any practical problems related to soil stresses estimation,

4. Gain the knowledge in permeability and seepage including flow net diagram
5. Estimate the stresses under any system of foundation loads.
6. Solve practical problems related to consolidation settlement and time rate of settlement.

UNIT I Basic properties of soils

9

Soil formation-Soil problems in Engineering –Physical properties of soil –Phase relations-Index properties of soil – Grain size distribution –Atterberg limits – classification of soils as per BIS –Fixed identification –simple tests

COMPACTION:

Compaction-laboratory test –Standard proctor's compaction –Modified proctors compaction – moisture density relation –Factors affecting compaction –Field compaction methods –Compaction control.

UNIT II Stresses in soils

9

Soil water statics – Concept of effective and neutral stresses – Capillary phenomenon –Vertical stress distribution in soil –Boussinesq equation – Westerguards equation – Line load –uniformly distributed loads –New marks chart –construction and use –Pressure bulb .

UNIT III Permeability and seepage

9

One dimensional flow through soil –permeability –Darcy's law –field and laboratory permeability tests –Flow through stratified soil –Seepage pressure quick sand condition-Two dimensional flow –Laplace equation –Electrical analogy –Flow net –Methods of construction –properties –Applications –sheet pile cut off and earth dam –Phreatic line.

UNIT IV Consolidation and Settlement

9

Consolidation –consolidation settlement –Laboratory test -Determination of C_v by curve fitting methods –Terzaghi's one dimensional consolidation –Definition of terms –Normally consolidated clay –Over consolidated clay –Under consolidated clay –Field curve –Pre consolidation pressure – e vs p curve –Boundary condition –Time Factor –Time of consolidation. –computation of rate of settlement – Types of Settlements – Components of settlements – Factors affecting settlements

UNIT V Shear strength

9

Shear strength of soil –importance and use –Mohr –coloumbs' theory –Factors affecting the shear strength. –Laboratory test –Direct shear test –Tri-axial compression test –types of triaxial test based on drainage conditions –UCC test –Field test

TOTAL HRS:45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil mechanics and foundations	Punmia. B.C	Laxmi Publications pvt.Ltd,New Delhi	2012

REFERENCE BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic and Applied Soil Mechanics	GopalRanjan and Rao, A.S.R	Wiley eastern Ltd., New Delhi	2009
2	A Text Book of Soil Mechanics and Foundation Engineering.	V.N.S.Moorthy	Marcel Dekker, Inc, Newyork	2013
3	Soil Mechanics and Foundation Engineering	Arora.K.R	Standard Publishers and Distributors, New Delhi	2012

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-IV**15BECE403****MECHANICS OF SOLIDS - I 3 1 0 4 100****COURSE OBJECTIVES:**

1. To determine deflection of a beam for various loading conditions.
2. To apply unit load method to find the deflection of truss.
3. To find impact value and crushing value of coarse aggregates
4. To find the compressive strength of concrete cubes and bricks
5. To find stiffness of open coiled and closed coiled springs
6. To find the physical properties of given coarse aggregate, fine aggregate and cement samples

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the principle of virtual work.
2. Determine deflection of a beam for various loading conditions.

3. Apply unit load method to find the deflection of truss.
4. Determine different stresses developed in thick cylinders.
5. Visualize the behavior of column for combined bending and axial loading.
6. Determine the deflections of beam using different methods

UNIT I

12

Simple stresses and Strains-Hooke's Law-Principle of superposition-Composite Sections-Temperature Stress-Hoop Stress-Elastic Constants-Principal Stresses and Strains-Mohr's Circle-Strain Energy and impact loading-Stresses due to gradual, sudden and impact loading-Proof resilience-Shear resilience.

UNIT II

12

Geometrical properties of Sections-Centroid-Centre of mass-Centre of gravity-Moment of inertia-Area moment of inertia-Mass Moment of inertia-Rectangular moment of inertia-Polar moments of inertia-Radius of gyration of an area-Perpendicular axis theorem-Parallel axis theorem-Moment of inertia.

UNIT III

12

Shear force(S.F) and Bending moment (B.M)-Types of beams-Types of loads-Sketching of B.M.D. and S.F.D for Cantilever beams, Simply Supported beams and Overhanging beams subjected to various types of loading-Udl, Point Load, Uvl-Relation among loading, SFD&BMD.

UNIT IV

12

Deflection of beams-Slope and Deflection at a point-Estimation of slope and deflection for Cantilever, Simply Supported and Overhanging beams subjected to various types of loading (Only application of formulae) -Mohr's theorem-Strain energy method.

UNIT V

12

Torsion of shafts-Assumptions-horse power transmitted by a shaft-Strength of solid shaft, Hollow shafts, composite shafts& stepped shafts-Torsional strain energy.
Spring-Leaf spring-Helical springs-Strain energy stored in a spring.

TOTAL HRS:60

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of Materials (Mechanics of Solids)	Rajput R.K	S.Chand & Company Ltd., New Delhi	2012

REFERENCE BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of Materials and Theory of Structures Vol.I	Dr.B.C.Punima	Laxmi Publication, New Delhi	2013
2	Engineering Mechanics of	EhorP.Popov	Prentice Hall of	2002

	Solids		India Pvt., New Delhi	
3	Strength of Materials	S.Ramamrutham	DhanpatRai Publishing Company, New Delhi	2012
4	Strength of Materials (Mechanics of Solids)	Khurmi R.S.	S.Chand& Company Ltd., New Delhi	2012

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-IV

15BECE404 APPLIED HYDRAULICS AND MACHINERY 3 0 0 3 100

COURSE OBJECTIVES:

1. To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
2. To study about non uniform flows in open channel and longitudinal slopes in open channel
3. To learn about the characteristics of hydraulic jump.
4. To develop an understanding of fluid flow patterns
5. To use boundary layer theory and Drag.
6. To provide insights to the Open channel hydraulics and introduce dimensional analysis for fluid flow problems.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Acquire specific knowledge regarding fluid flow phenomena observed.
2. Understand the basic principles of fluid flow patterns and boundary layer theory

3. Develop skills in analyzing fluid flows in open channel hydraulics and measurements such as weirs and flumes.
4. Will gain knowledge about the Open channel flow.
5. Understand hydraulic jump phenomenon
6. Design open channels for rectangular and non-rectangular channels for GVF and RVF.

UNIT I Uniform flow in open channels:

9

Uniform flow – chezy's equation – Manning's equation-hydraulically best section of rectangular, trapezoidal and circular sections – circular sections not running full-flow measurement using orifices, mouthpieces, notches and weirs.

UNIT II Non-uniform flow in open channels

9

Introduction - Critical depth – Specific Energy – Characteristics of non uniform flow – Analysis of hydraulic Jump – Back water curves – venturiflume – Surges in channels.

UNIT III Impact Of Jets

9

Flow over immersed bodies: Drag and lift – stream lined Bluff bodies – Terminal velocity – Estimation of drags and lift forces. Impulse – Momentum principle – and its application – dynamic force upon a body in motion – Torque in rotating machines – jet propulsion.

UNIT IV Turbine

9

Classifications – velocity triangles for turbines, work done and efficiency – study of pelton wheel, Francis and axial flow turbines – governing of turbines – characteristic curves – Specific speed – Model testing – Selection of turbines – Simple Problems to determine geometric dimensions.

UNIT V Pumps

9

Classification of pumps – Centrifugal pumps – Reciprocating Pumps – Deep well pumps – Airlift Pump – Working principle only – Characteristic curves – Selection of pumps and Simple problems.

TOTAL HRS:45

TEXT BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A Text book of Fluid Mechanics and Hydraulic Machines	Bansal.R.K	Lakshmi Publication, Madras	2012
2	Fluid Mechanics, Hydraulics & Fluid Machines	Ramamrutham. S	DhanpatRai& Sons, New Delhi	2013

REFERENCE BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Engineering Fluid Mechanics	Kumar.K.L	S. Chand Co., Madras	2012
2	Hydraulics, Fluid Mechanics & Hydraulic Machinery	Modi P.M, &Seth.S.M	Standard Book House, New Delhi	2008
3	Fluid Mechanics, Hydraulics and Hydraulic Machines	Arora, K.R	Standard Publishers Distributors, Delhi	2011

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE405

SURVEYING -II

3 0 0 3 100

Semester-IV

COURSE OBJECTIVES:

1. Skill to carry survey and to decide appropriate type of execution in construction works.
2. Numerical solutions for carrying out surveying in civil engineering field. Advanced surveying equipment's.
3. Work with survey observations, and perform calculations,
4. To Provides independent knowledge for carrying out individual projects.
5. To know the different surveys used in civil field.
6. To have confidence in carrying out individual projects

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Explore the different surveying instruments for surveying.

2. Describe the methods of measurement using level instrument and theodolite.
3. Provides independent knowledge for carrying out individual projects.
4. Able to identify and calculate the errors in measurements
5. Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
6. Translate the knowledge gained for the implementation of Civil infrastructure facilities

UINT-I

9

Tacheometric Surveying: Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Analytic lens - Subtense bar.

UINT-II

9

Control Surveying: Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to Centre – Trigonometric levelling - Single and reciprocal observations - Modern trends – Bench marking

UINT-III

9

Survey Adjustments: Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UINT-IV

9

GIS/REMOTE SENSING: Field of Applications –Natural Resources-Agriculture-Soil-Water Resources-Wasteland Management-Social resources-Cadastral Records-LIS

UINT-V

9

Other Topics: Fundamental principal:(Demo)Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax –Introduction to Total Station- Electromagnetic distance measurement - Carrier waves - Principles - Instruments - Trilateration - Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods

TOTAL HRS:45

TEXT BOOKS

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying, Volume I, II and III	Punmia B.C	Laxmi Publications, Delhi	2012

REFERENCES

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Plane and Geodetic Surveying, Volume I and II	Aylmer Johnson	CRC Press , New York	2004

2	Introduction to Surveying	James M.Anderson and Edward M.Mikhail	McGraw-Hill Book Company, New York, Fifth Edition	2009
3	Elements of Cartography	Harley	McGraw-Hill Book Company New York, Fifth Edition	2001
4	Surveying and Levelling, Volume I and II	Kanetkar T.P	United Book Corporation, Pune	2007
5	Surveying	Bannister A. and Raymond S	ELBS, Seventh Edition	2004
6	Surveying and Levelling	Basak.N.N	McGraw-Hill Book Company	2011

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-IV

15BECE406

ENVIRONMENTAL ENGINEERING I

3 0 0 3 100

COURSE OBJECTIVES:

1. To make the students conversant with sources and its demand of water
2. To understand the basic characteristics of water and its determination
3. To expose the students to understand the design of water supply lines
4. To provide adequate knowledge about the water treatment processes and its design
5. To have adequate knowledge on operation and maintenance of water supply
6. To gain the knowledge of distribution system and their methods

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Identify the source of water and water demand.
2. Apply the water treatment concept and methods.
3. Apply water distribution processes and operation and maintenance of water supply.
4. Prepare basic process designs of water and wastewater treatment plants collect, reduce
5. To analyze, and evaluate basic water quality data.

6. Gain the knowledge of distribution system and their methods.

UNIT I

9

Planning for water Supply Systems: Planning Factors for Water Supply schemes-Population forecasting – Design period – Variations in demand pattern-Water demand characteristics - Standards – Water quality parameters & significance

UNIT II

9

Water :Sources of water –Intake structures, Wells, Infiltration Gallery, Tube wells- Construction & Development-Sanitary Protection of wells- yield of wells.

UNIT III

9

Conveyance of water: Pipes and channels for transmitting water -Selection of materials for pipes and conduits-Laying, jointing & testing of pipes – Pipe appurtenances-Various types of pumps-Pump selection–Pumping station.

UNIT IV

9

Water Treatment: General layout of a water treatment plant– Principles of screening, flocculation, flash mixing, sedimentation, filtration-various techniques of disinfection–Brief on water softening, De-mineralization, and aeration

UNIT V

9

Distribution & Storage:

Service reservoirs-elevated and ground level reservoirs-equalizing and service storage-factors affecting storage capacity-distribution network patterns – Analysis of distribution network – Hardy Cross method – Equivalent Pipe method – Leak detection in pipe network - Corrosion control, Lining of pipes-Appurtenances

TOTAL HRS:45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Water Supply Engineering	Garg, S.K	KhannaPublishers,New Delhi	2012

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Hand book on Water Supply and Drainage-SP35		B.I.S,New Delhi	2007
2	Water supply Engineering	Fair G.M, Geyer.J.C	Khanna Publishing Co., New Delhi	2007

3	Water Supply Engineering	Punmia B C Ashok Jain Arun Jain	Laxmi Publications, Delhi	2010
---	--------------------------	---------------------------------------	---------------------------------	------

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-IV

15BECE411 HYDRAULICS & HYDRAULIC MACHINERY LABORATORY

0 0 3 2 100

OBJECTIVES:

1. To understand the flow measurement in a pipe flow
2. To understand the flow measurement in a pipe flow using Constant Head method
3. To determine the energy loss in pipe flow
4. To study the characteristics of turbines
5. To study the characteristics of pumps
6. To measure the discharge in a open channel flow

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Measure discharge in pipes.
2. Determine the energy loss in conduits.

3. Demonstrate the characteristics curves of pumps
4. Demonstrate the characteristics curves of turbines.
5. Carry out discharge measurements in open channel.
6. understand the flow measurement in a pipe flow using Constant Head method

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for venturimeter
3. Determination of co-efficient of discharge for orifice meter
4. Friction losses in pipes(Major& minor)
5. Determination of performance characteristics of Francis turbine
6. Determination of performance characteristics of Centrifugal pumps (Constant speed / variable speed)
7. Study on performance characteristics of Reciprocating pump.
8. Determination of performance characteristics of Submersible pump.
9. Experiment on Bernoulli's theorem

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A text book of Fluid Mechanics	Rajput, R.K	S.ChandPublishers,New Delhi	2012
2	Fluid Mechanics, Hydraulics & Fluid Machines	Ramamrutham. S	DhanpatRai& Sons, New Delhi	2013

COURSE OBJECTIVES:

1. The objective of this course is to familiarize the students with statistical techniques.
2. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
3. To introduce students to numerical methods used to solve engineering problems.
4. Fundamentals of numerical methods/algorithms to solve systems of different mathematical equations (e.g. linear/ non-linear algebraic equations, ordinary /partial differential equations), will be introduced.
5. The course would enable students to write their own computer programs using programming languages like C and software like Excel.
6. To give the practical knowledge on the solving of partial differential equations using programming languages like C and software like Excel.

COURSE OUTCOMES(COS):

1. To solve engineering problems involving Linear and non-linear equations.
2. Hands-on experience will be provided to apply these computer programs to solve problems in different areas of engineering.
3. To acquire skills in handling situations involving linear/ non-linear algebraic equations, ordinary /partial differential equations
4. To solving actual engineering problems through computer programming and coding.
5. To solve ordinary and partial differential equations using programming languages like C and software like Excel.
6. Student will understand procedure-oriented Excel concepts. Student will be capable of writing C and Excel programs efficiently.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule

4. Solution of initial value problems governed by ODE

- i) Runge - Kutta 4th order method
- ii) Modified Euler's method
- iii) Milne's method
- iv) Adam – Bashforth method

5. Solution of BVP governed by PDE

- i) Laplace Equation
- ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
- iii) One dimensional wave equation
 - Implicit method

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009
2	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014

OBJECTIVES:

The Lab sessions would include experiments on

1. Introduction to Chain Surveying
2. Traverse using Compass Surveying.
3. Plane Table Surveying – Radiation, intersection, Traverse, Resection, Leveling.
4. Tachometry and Theodolite survey trigonometric leveling to determine heights/elevations.
5. Total Station.
6. Setting out of curves (horizontal and vertical)

Course outcomes

On completion of the course, the students will be able to:

1. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
2. Apply the procedures involved in field work and to work as a surveying team.
3. Plan a survey appropriately with the skill to understand the surroundings. Take accurate measurements, field booking, plotting and adjustment of errors can be understood.
4. Traverse using Compass Surveying.
5. Plane Table Surveying – Radiation, intersection, Traverse, Resection, Leveling.
6. Setting out of curves (horizontal and vertical)

List of Experiments:

1. Study of Theodolite, Total Station and GPS
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Heights and distances - Triangulation - Single plane method.
4. Tacheometry - Tangential system - Stadia system - Subtense bar.
5. Setting out works - Foundation marking - Simple curve (right/left-handed).
6. Distance, height and area measurements using total station
7. Horizontal curve setting using total station for roads

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Surveying	Bannister A. and Raymond S	ELBS, tenth Edition, Canada.	2008
2	“Surveying and Levelling Part 1 & 2 ”, 23rd edition,	Kanetkar.T.P. &S.V.Kulkarni,	Punavidyarthigriha , Prakashan,	2012

OBJECTIVES:

1. To help students comprehend the role of listening skills in effective communication.
2. To familiarize students with verbal and non-verbal communication.
3. To expose students to neutral accent.
4. To develop emotional intelligence skills in them for enhancing their self-esteem.
5. To assist them in setting goals and developing positive attitude.
6. To enable students to acquire decision making skills, problem solving skills and assertive skills.

COURSE OUTCOMES(COS):

1. Equip students of engineering and technology with effective speaking, writing and listening and reading skills in English.
2. Develop their soft skills and inter personal skills, which will make the transition from college to workplace smoother and help them excel in their job.
3. Equip students of engineering and technology with group discussion and other recruitment exercises.
4. Use both verbal and non-verbal skills cohesively and develop confidence in participating in seminars, conferences, technical and extracurricular activities for lifelong learning.
5. Overall attitude of students will enhanced and know the social responsibilities.
6. Understand the importance of Human values for the betterment of society and nation.

UNIT - I THE ART OF LISTENING

The art of listening - The importance of listening - The difference between listening and hearing- Barriers to listening - Remedies for listening problems - Listening through English.

UNIT - II VERBAL AND NON-VERBAL COMMUNICATION

Non - verbal communication - Eye contact - Facial Expressions - Posture - Gestures - Body language - Etiquette.

Verbal communication - Importance of voice modulation - Accent - Diction – Functional Grammar - Sentence Construction - Effective vocabulary, Idioms, Phrases, Jargons - How to get others to listen.

UNIT - III INTRAPERSONAL AND INTERPERSONAL SKILLS

Intrapersonal skills - Self-analysis - Thought process -Understanding one's potential and limitations - Developing problem solving skills - Ability to self-reflect - Self-control - Improving self-esteem
Interpersonal skills - Confidence building -Resolving conflicts - Negotiation - Handling difficult people - Valuing diversity - Adaptability and Flexibility – Inter Cultural Communication.

UNIT - IV GOAL SETTING AND POSITIVE ATTITUDE

Difference between goals and dreams - SMART goal setting - 3 Ds of goal setting- Determination, Discipline and Direction - Developing the right attitude - Motivation - Intrinsic and Extrinsic motivation - Dealing with change - Dedication - Taking responsibilities - Decision making.

UNIT - V MANAGERIAL SKILLS

Analytical skills - Team Building - Leadership skills - Planning/organizing - Ability to work independently - Professional Ethics - Preparing the résumé - Writing the covering letter - Communicating via e-mail.

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Gopalaswamy Ramesh & Mahadevan Ramesh	The Ace of Soft Skills	Cactus Game Design	2014 August

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jagadeesan, G &Santanakrishnan,R.	Soft Skills Development:Training and Evaluation.	The ICFAI University Press, Hyderabad.	2008
2	Sherfield, Robert M., Rhonda J. Montgomery, & Patricia G. Moody	Developing Soft Skills.	Pearson Education, New Delhi.	2005
3	Murthy, G .R. K.	Soft Skills for Success.	The ICFAI University Press, Hyderabad.	2008

WEBSITES:

www.englishclub.com www.ispeakyouspeak.blogspot.com www.teachertube.com www.learning-development.hr.toolbox.com www.Dictionary.com
--

Lab Requirements: (i) Teacher console and Systems for students.
(ii) English Lab Software.

SEMESTER V

OBJECTIVE

1. To learn the basics of sewage composition and its characteristics
2. To depict the information about various sewage treatment processes
3. To provide the adequate information on various disposal standards for industrial effluents
4. To study the information about air pollution and its effects
5. To understand the knowledge about solid waste generation and disposal methods.
6. To gain knowledge information about various sewage treatment processes

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Determine the sewage characteristics and design various sewage treatment plants.
2. Analyze the status of surface water and ground water quality and the remediation technologies.
3. understand the information about air pollution and its effects
4. gain knowledge information about various sewage treatment processes
5. Carry out municipal water and wastewater treatment system design and operation.
6. Manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design process.

UNIT**9**

Sewerage System: Definitions-Classification – Quantity of sewage – Fluctuations in Flow pattern- Estimation of storm run off-Design of flow for separate and combined systems- Design of sewers — Sewer appurtenances – Pump selection

UNIT II**9**

Sewage Collection: Sanitary Fixtures and Fittings- Systems of House Drainage- General Layout- Anti siphonage- Connection of House sewer to public sewer- Materials for sewers- – Laying, jointing and testing of sewers- Sewer Maintenance- Sewage pumping- Types of pumps

UNIT III**9**

Sewage Treatment- Physico Chemical: Characteristics and Composition of sewage-Analysis- Cycles of decomposition- Objectives and basic principles of sewage treatment- screen chamber, grit chamber, primary sedimentation tanks- Types and Design- Sewagetreatment plants (Principal and working)

UNIT IV**9**

Sewage Treatment- Biological: Fundamentals of microbiology of waste water- Basic Principles of Biological Treatment- Trickling filter –Principles and Description of operation of standard high rate filters- Recirculation- activated sludge process-Modifications- Low cost treatment methods

UNIT V**9**

Sludge Treatment and Effluent Disposal: Objectives of sludge treatment- Properties and characteristics of sludge- Conventional and high rate digesters- Sludge Lagooning- Sludge thickening

methods- Effluent disposal on land- Sewage farming practices- Dilution- Disposal into water bodies
Eutrophication- Oxygen sag curve- Recycle and reuse of waste effluents

TOTAL HRS:45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Sewage and waste Disposal Engineering	Garg, S.K	Khanna Publishers, New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Wastewater Engineering – Treatment & Reuse	Metcalf and Eddy, M.C	Tata McGraw-Hill Publications, New Delhi	2003
2	Water supply Engineering	Fair G.M, Geyer.J.C	Khanna Publishing Co., New Delhi	2002
3	Water Supply and Sanitary Engineering	Birdie G.S	DhanpatRai& Sons, New Delhi	2003
4	Environmental engineering II Waste water engineering (including air pollution)	Punmia B.C Ashok K Jain Arun K Jain	Laxmi Publications, Delhi	2010

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>

COURSE OBJECTIVES:

1. To carry out soil classification.
2. To Solve three phase system problems.
3. To Solve any practical problems related to soil stresses estimation,
4. To Gain the knowledge in permeability and seepage including flow net diagram
5. To Estimate the stresses under any system of foundation loads.
6. To Solve practical problems related to consolidation settlement and time rate of settlement.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out soil classification.
2. Solve three phase system problems.
3. Solve any practical problems related to soil stresses estimation,
4. Gain the knowledge in permeability and seepage including flow net diagram
5. Estimate the stresses under any system of foundation loads.
6. Solve practical problems related to consolidation settlement and time rate of settlement.

UNIT I**9**

Site Investigation And Selection Of Foundation: Scope and Objectives – Methods of exploration - Borings for Exploration – Wash boring and rotatory drilling – Depth of boring - Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Penetration tests (SPT and SCPT) – Corecutter method, its significances and applications- Selection of foundation based on soil condition.

UNIT II**9**

Shallow Foundation: Introduction – Location and depth of foundation — bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) –Settlement – Components of settlement –Methods of minimizing settlement, differential settlement - subsoil stabilization - codal provisions .

UNIT III**9**

Footings and Rafts: Types of foundation – Raft foundation - Deep foundations – Dewatering system – - Contact pressure distribution below footings & raft - Isolated and combined footings – Types – proportioning - Mat foundation – Types – use - proportioning – Floating foundation.

UNIT IV**9**

Piles: Types of piles and their function – Factors influencing the selection of pile – Load Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering News and Hiley's) – Negative skin friction – Settlement of pile groups – Underreamed piles .

UNIT V

9

Retaining Walls: Plastic equilibrium in soils –Types of Retaining Wall – Active and Passive states – Rankine's theory – cohesionless and cohesive soil – Coloumb's wedge theory – Graphical methods (Rebhann and Culmann) - Pressure on the wall due to line load – Stability of Retaining walls.

Introduction to Geo textiles – applications.

TOTAL HRS:45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil Mechanics and Foundations	Punmia B.C	Laximi Publications Pvt. Ltd., New Delhi	2012

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic and Applied Soil Mechanics	GopalRanjan and Rao A.S.R.	Wile Eastern Ltd., New Delhi, India	2012
2	Principles of Foundation Engineering (Fifth edition)	Das, B.M.	Thomson Books, New Delhi	2012
3	Analysis and Design of Structures – Limit state Design	Swami saran	Oxford IBH Publishing Co-Pvt. Ltd., New Delhi	2012
4	Foundation analysis and design	Bowles J.E	McGraw-Hill, New Delhi	2008
5	Theory and Practice of Foundation Design	N.N. Som and S.C. Das	Prentice Hall of India Pvt. Ltd., New Delhi	2003
6	Foundation Engineering Standard	Varghese P C	Publishers Distributors New Delhi	2005

7	Soil Mechanics and Foundations Engineering	Arora K.R	Published by A.K Jain, New Delhi	2012
---	--	-----------	--	------

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>

COURSE OBJECTIVES:

1. To impart to the students the concepts of stresses and strains and Hooke's law.
2. To enlighten the students about different types of truss analysis.
3. To teach the students about the beam analysis
4. To teach about thin cylindrical and spherical shell analysis when subjected to internal pressure
5. To impart ideas of torsional stresses
6. To evaluate it in circular sections and its applications in spring analysis.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out soil classification.
2. Solve three phase system problems.
3. Solve any practical problems related to soil stresses estimation,
4. Gain the knowledge in permeability and seepage including flow net diagram
5. Estimate the stresses under any system of foundation loads.
6. Solve practical problems related to consolidation settlement and time rate of settlement.

UNIT I**12**

Forces in statically determinate frames-Method of joints-Method of sections-Graphical method - Deflection of perfect frames-Unit load method-Graphical method-Forces in redundant frames-Castigliano's theorem-Maxwell's method-Tension Co-efficient method.

UNIT II**12**

Unsymmetrical bending-stresses in beams subjected to unsymmetrical bending-Deflection of beams – simply supported beams – fixed end beams – Over hanging beams – different load conditions (point load, udl, uvl) - under unsymmetrical bending-shear centre.

UNIT III**12**

Combined bending and direct stresses-Eccentric loading-Middle third rule-Core of a section-Wind pressure on masonry dams-Theories of failure.
Columns and struts-types-failure modes-Euler's formula-Rankine's formula-Johnson's-IS code formula-practical end conditions and effective length factors-Built-up columns.

UNIT IV**12**

Thin Cylindrical and Spherical shells- Assumptions-Internal pressure-Change in volume-Minimum thickness of wall plates.

UNIT V

12

Elementary theory of vibrations - Simple harmonic motion - Longitudinal vibration - Helical and Compound springs -Transverse vibrations of beams with point loads and UDL - Torsional vibrations of shafts.

TOTAL HRS:60

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I	Dr. B.C.Punmia	Laxmi Publications, Chennai	2011

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Applied mechanics	V.Devarajan	Padma Publications, New Delhi.	2012
2	Applied Mechanics and Strength of Materials	R.S.Khurmi	Niraja Construction and Development Limited, Tenth Edition, New Delhi,	2012
3	Elements of Strength of materials	Dr.P.Purushothamaraj, VRA.Saathappan, V.Ramasamy	Raamalingaa Publications, New Delhi.	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To understand the concept of analysis of indeterminate structures by various classical methods
2. To study the use of ILD for determinate structure
3. To learn the concepts of moving loads and its effect on structures
4. To understand the concept of equivalent UDL
5. To study the reversal of stress under live load
6. To determine the reversal of stresses in trusses using ILD.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Use various classical methods for analysis of indeterminate structures.
2. Determine the effect of support settlements for indeterminate structures.
3. Apply the concepts of ILD and moving loads on determinate structures.
4. Apply the concept of equivalent UDL.
5. Determine the reversal of stresses in trusses using ILD.
6. To Analyse the building using different methods available for designing and analysing.

UNIT I INTRODUCTION**12**

Degree of static and kinematic indeterminacies of frames- analysis of indeterminate frame- Degree of redundancy-Static and Kinematic indeterminacies-propped cantilever and fixed beams- reaction-B.M.D. and S.F.D.

UNIT II MOMENT DISTRIBUTION METHODS**12**

Moment-Distribution and carryover of moments – Stiffness and carryover of factors – Analysis of Continuous beams – Analysis of Simple frames – Plane rigid frame with and without sway - Two cycle moment distributions method (No problems)

UNIT III INFLUENCE LINE DIAGRAM**12**

Analysis for moving loads-Influence line Diagram (ILD) –ILD for beam with point loads, UDL shorter than span and several point loads at a section -Equivalent UDL-Absolute maximum bending moments for two wheel loads at a fixed distance apart.

UNIT IV ARCHES**12**

Arches as structural forms-Examples of arch structures-types of arches-Three-hinged arches-Horizontal thrust-Effect of Temperature change-Straining actions-Parabolic and Circular arches-Two-hinged arches-Horizontal thrust-Effect of temperature change-Straining actions-Parabolic and Circular arches.

UNIT V CABLES AND SUSPENSION BRIDGES**12**

Equation of the cable-Horizontal thrust on the cable-Tension in the cable-Length of the cable-Effect of temperature on the cable-Stiffening girders in suspension bridges-with three-hinged and two-hinged stiffening girders

TOTAL HRS:60

TEXT BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I& II	Dr. B.C.Punmia	Laxmi Publications, Chennai	2011

REFERENCE BOOKS:

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Intermediate Structural Analysis	C.K. Wang	McGraw Hill, New Delhi	2012
2	Introduction to Structural Analysis	<u>B. D. Nautiyal</u>	New Age International (P) Ltd	2010
3	Theroy of Simple Structures	.C.Shedd&J.Vauter	T, Wiley Eastern Ltd.	2001
4	Fundamentals of Structural Mechanics and Analysis	Gambhir. M.L.	PHI Learning Pvt. Ltd., New Delhi	2011
5	Theory of structures	S.Ramamrutham&R.Narayan	DhanpatRai Publishing Co, New Delhi	2013
6	Structural Analysis – Vol. 1 & Vol. 2	BhavaiKatti, S.S	Vikas Publishing Pvt Ltd., New Delhi	2008

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

Semester-V

15BECE5E--DEPARTMENT ELECTIVE I 3 0 0 3 100

TOTAL HRS:45

COURSE OBJECTIVES:

1. To find the Young Modulus, torsional strength, hardness and tensile strength of given specimens
2. To find impact value and crushing value of coarse aggregates
3. To find the compressive strength of concrete cubes and bricks
4. To find stiffness of open coiled and closed coiled springs
5. To find the physical properties of given coarse aggregate, fine aggregate and cement samples

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Evaluate Young Modulus, torsional strength, hardness and tensile strength of given specimens.
2. Determine the strength of coarse aggregates.
3. Find the compressive strength of concrete cubes and bricks.
4. Find stiffness of open coiled and closed coiled springs.
5. Determine the physical properties of given coarse aggregates, fine aggregates and cement samples.

LIST OF EXPERIMENTS

1. Study of UTM, Torsion testing machine, Hardness tester, Compression testing machine
2. Tension Test on M.S. and HYSD bars
3. Test involving Torsion to obtain the Torque vs. Angle of twist and hence the stiffness
4. Test on Timber beam – Bending test - compression test on timber specimens
5. Tests on Metals
 - Hardness test on metals (Brinell and Rockwell Tests)
 - Impact test. (Izod and Charpy Tests)
 - Shear test
6. Tests on springs for Stiffness

The student should learn the use of deflectometer, extensometer, and strain gauges.

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Solid Mechanics	Kazimi S.M.A	Tata McGraw-Hill Publishing Co, New Delhi	2003
2	Theory and Problems of Strength of Materials	William Nash	Schaum's Outline Series, McGraw-Hill International, Delhi.	2005
3	Advanced Mechanics of Solids	Srinath L.S	Tata McGraw-Hill Publishing Co., Delhi	2003
4	Strength of Materials	R.S. Khurmi	S. Chand & Company Ltd, New Delhi	2008

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>

COURSE OBJECTIVES:

1. To estimate index properties of soils (coarse and fine).
2. To estimate consistency limit of fine grained soils.
3. To estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test.
4. To estimate the engineering properties of the soils by density test, CBR test
5. To estimate the engineering properties of permeability test and consolidation test.
6. To classify the soil by physical observation of soil.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Classify soil by physical observation of the soils.
2. Classify soil based on estimated index and engineering characteristics of soils.
3. Carry out interpolation among the estimated soil design parameters.
4. Estimate shear strength of soils by direct shear test, triaxial shear test, vane shear test & unconfined compressive test.
5. Estimate the engineering properties of the soils by density test, CBR test
6. Estimate the engineering properties of permeability test and consolidation test.

LIST OF EXPERIMENTS

1. Specific gravity of soil grains (Specific gravity bottle & Pycnometer)
2. Grain size distribution - Sieve analysis
3. Relative density of sands
4. Atterberg limits test
 - a) Liquid Limit
 - b) Plastic Limit
 - c) Shrinkage Limit
- Determination of moisture - Density relationship using standard Proctor test.
- Permeability determination (constant head and falling head methods)
- Determination of shear strength parameters.
 - a) Direct shear test on cohesionless soil
 - b) Unconfined compression test on cohesive soil
 - c) Triaxial compression test (Study Experiment)
- One dimensional consolidation test (Determination of co-efficient of consolidation only, Study Experiment)
- Field density test
 - a) Core cutter and
 - b) Sand replacement methods

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual of Soil Laboratory Testing (Vol-1 to 3),	Head, K.H	John Wiley & Sons, Chichester	2009
2	Soil Testing for Engineers	Lambe T.W	John Wiley and Sons, New York	2009
3	Measurement of Engineering Properties of Soils,	Saibaba Reddy, E. and Rama Sastri, K	New Age International Publishers, New Delhi	2002
4	I.S.Code of Practice (2720) Relevant Parts, as amended from time to time			

COURSE OBJECTIVES:

1. To quantify the water and wastewater pollutant
2. To measure the concentration of air pollutants
3. To analyze the characteristics of water
4. To analyze the characteristics of wastewater and ambient air
5. To determine the characteristics of ambient air
6. To study the growth of microorganism and its quantification

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Quantify the pollutant concentration in water, wastewater and ambient air.
2. Recommend the degree of treatment required for the water and wastewater.
3. Analyse the survival conditions for the microorganism and its growth rate.
4. Quantify the water and wastewater pollutant
5. Measure the concentration of air pollutants
6. Analyze the characteristics of water

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of
 - i) PH and turbidity
 - ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Standard methods for the examination of water and wastewater	Handbook	APHA, 20th Edition, Washington	2010
2	Environmental Engineering Vol. I & II	Garg, S.K	Khanna Publishers, New Delhi	2003

OBJECTIVE

- ## Semester-V

COURSE OBJECTIVES:

1. At the end of this course students should have learnt the presentation skills needed for the presentation in national and international conferences.
2. Topics are given in the current real time problems and students are required to present solutions to the problems by referring to Journals, magazines or by consulting experts.

SEMESTER VI

COURSE OBJECTIVES:

1. To understand the properties of ingredients of concrete
2. To study the behavior of concrete at its fresh and hardened state
3. To study about the concrete design mix
4. To know about the procedures in concreting
5. To understand special concrete and their use.
6. To know the recent research technologies.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Test all the concrete materials as per IS code.
2. Design the concrete mix using ACI and IS code methods.
3. Will Determine the properties of fresh and hardened of concrete.
4. To Design special concretes and their specific applications.
5. Ensure quality control while testing/ sampling and acceptance criteria.
6. Recent advancements in the field of concrete Technology.

UNIT I**9**

Cements & admixtures: Portland cement – ferro cement-chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

UNIT – II**9**

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III**9**

Fresh concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT IV**9**

Hardened concrete : Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

Testing of hardened concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT V**9**

Mix design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete

TOTAL HRS:45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.S.Shetty	S.Chand&Co, Uttar Pradesh	2004

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Concrete Technology	M.L. Gambhir	Tata Mc. Graw Hill Publishers, New Delhi	2004
2	Properties of Concrete	A.M.Neville	Canadian GovtPublishing Centre, Ottawa	2011
3	Concrete Technology	A.R.Santha Kumar	Oxford university Press, New Delhi	2006

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To understand the influence line concepts for indeterminate structures
2. To understand the methods of analysis of intermediate trusses for external loads, lack of fit and thermal effect
3. To study behaviour of arches and their methods of analysis
4. To know the concept and analysis of cable stayed bridge
5. To study the multi storey frames subjected to gravity loads and lateral loads
6. To apply the methods of indeterminate truss analysis

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames
2. Apply the methods of indeterminate truss analysis.
3. Demonstrate the behavior of arches and their methods of analysis.
4. Analyse cable suspension bridges.
5. Analyse multistorey frames subjected to gravity loads and lateral loads.
6. Analyse multi storey frames subjected to gravity loads and lateral loads

UNIT I**12**

Slope deflection method - Continuous beams and Rigid beams (with and without sway) – Simplification of hinged end – support displacement- Simple frames - Portal frames - Consistent-deformation method-continuous beams.

UNIT II**12**

Strain energy method- Castigliano's theorem- Deflection by strain energy method – evaluation of strain energy in member under different loading – Application of strain energy method for Beams and frames - Beams curved in plan.

UNIT III**12**

Flexibility method -Equilibrium and Compatibility – Determinate vs Indeterminate structures – Indeterminacy – Primary Structure – Compatibility conditions – Analysis of indeterminate pin – jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT IV**12**

Stiffness method-Beams-Trusses-Simple frames-Portal frames-Grids-Lack of fit-Temperature stresses-Support settlements-Elastic supports.(Direct approach)

Introduction to Finite element: Introduction –Discretization of a structure – Displacement functions – Truss element – Beam element – Plane stress and Plane strain Triangular elements (Theory only)

UNIT V**12**

Plastic Analysis of Structures : Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames.

TOTAL HRS:60

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Strength of materials and Theory of Structures Vol.I, II	Dr.B.C.Punmia	Laxmi Publication, New Delhi	2012

REFERENCE BOOKS:

Sl.No	Title of the Book	Author of the Book	Publisher	Year of Publishing
1	Intermediate Structural Analysis	C.K. Wang	McGraw-Hill, New Delhi	2002
2	Matrix Analysis of Framed structures	W.Weaver and J.M Gere	Van NostrandReinhold,New York	2003
3	Structural analysis, a matrix approach	G.S.Pandit and S.P.Gupta	Tata McGraw Hill	2004
4	Theory of structures	S.Ramamrutham&R.Narayan	DhanpatRai Publishing Co, New Delhi	2013
5	Analysis of Structures-Vol.II	Prof.V.N. Vazirani, Dr.M.M.Ratwani, Dr.S.K.Duggal	Khanna Publishers, Chennai	2012

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES

1. To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
2. To study the behaviour and design of compression and tension members using simple and built-up sections.
3. To understand behaviour of flexural members and the design laterally restrained and unrestrained beams.
4. To study the components of truss, loads on trusses, analysis
5. To design of purlins and truss members.
6. To study the design of bolted and welded connections and arranging field visit to industries.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the IS code of practice for the design of steel structural elements.
2. Design compression and tension members using simple and built-up sections.
3. Calculate forces on the various members of the truss and design them.
4. Analyze the behavior of bolted connections and design them.
5. Design welded connections for both axial and eccentric forces.
6. Design components of truss, loads on trusses, analysis and design of purlins and truss members

UNIT I**12**

Introduction: Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using, welding, bolting – Design of bolted, and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts

UNIT II**12**

Tension Members: Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III**12**

Compression Members: Types–Basis of codal provision for compression member design – Slenderness ratio – Design of single section and compound section– Design of lacing and battening– Design of column bases – Gusseted base

UNIT IV**12**

Beams: Design of laterally supported and unsupported beams – Built up beams – Design of plate girders bolted and welded – Intermediate and bearing stiffeners – flange and Web splices

UNIT V**12**

Roof Trusses and Industrial Structures: types of Roof trusses – Roof and side coverings –Design loads, design of purlin and elements of truss; end bearing - Design of Gantry Girders

TOTAL HRS:60

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Design of Steel Structures – Vol. I & II	Ramachandra, S	Standard Publication, New Delhi	2009

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Design of Steel Structures, Second edition	Dayaratnam, P	S. Chand & Company, Uttar Pradesh	2003
2	Design of Steel Structures	Gaylord, E.H., Gaylord, N.C., and Stall Meyer, J.E	McGraw-Hill Publications. New Delhi	2005
3	IS 800-2007 Code of Practice for General Construction in Steel IS 875 Part I,II,III			

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES

1. To study the stress strain behavior of steel and concrete
2. To understand the concept of working stress and limit state methods
3. To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage
4. To understand the behavior of columns subjected to eccentric load and use of interaction diagrams
5. To design the beams, slab, stairs, column and footing.
6. To draw detailing of various RCC structural elements

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the fundamental concepts of working stress method and limit state method.
2. Use IS code of practice for the design of concrete elements.
3. Design the beams, slab, stairs, column and footing.
4. Draw detailing of various RCC structural elements.
5. understand the behavior of columns subjected to eccentric load and use of interaction diagrams
6. gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage

UNIT I**INTRODUCTION****12**

Materials for concrete-Stress-Strain curve for concrete in compression-Concrete mix proportioning-Design concrete mix and nominal concrete mix-Types of reinforcement-Plain and deformed bars-Stress-strain curve for reinforcing steel.

Concept of WSD (No problems) and LSD-Difference between WSD and LSD-Characteristic loads and strengths-Partial safety factor-Various limit states.

DESIGN FOR FLEXURE:

Design of singly and doubly reinforced rectangular and flanged sections for BM and SF

UNIT II**DESIGN BASICS FOR SHEAR, BOND AND TORSION****12**

Design for shear-concept of bond and anchorage-Design for torsion-IS code provision for the design of beams-Design of lintels-Design of continuous beams using B.M. and S.F. co-efficient as per IS code-detailing.

UNIT III**DESIGN OF SLABS****12**

Types of slabs-IS code regulations-Stiffness requirements-Design of one-way simply supported and continuous slab using BM and SF co-efficient as per IS code-Principles of Rankine-Grashof's method(no problems)-design of two way, simply supported and continuous slab as per IS code.

UNIT IV**DESIGN OF COLUMNS****12**

IS-code regulations-Design of short rectangular and circular columns subjected to axial compressive load-Design of short columns subjected to combined axial compressive load and uni-axial and biaxial bending moments using design aids(SP 16)- Introduction to long column design

UNIT V

DESIGN OF FOOTINGS

12

Design of wall footings- Design of isolated, square and rectangular footings.-combined rectangular and trapezoidal footings.

TOTAL HRS:60

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1.	Reinforced Concrete Design	Unnikrishna Pillai & Devados Menon	Tata McGraw Hill Publishing Co, New Delhi	2012
2.	IS 456-2000 Indian Standard Code of practice for Reinforced Concrete.			
3	SP-16 Design Aids for IS 456-1978. IS 875-1987-Code of Practice for Design Loads			

REFERENCE:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1.	Reinforced Concrete	Mallick, S.K., and Gupta, A.P	Oxford & IBH Publishing Co., New Delhi	2008
2.	Reinforced Concrete Design	Sibha, S.N.	Tata McGraw-Hill Publishing Co, Ltd., New Delhi	2001
3.	Reinforced Concrete Mechanics and Design	MacGregor J.G	Prentice Hall, New Jersey	2008
5	Reinforced Concrete Structural Elements Behaviour Analysis and Design	Purusothaman	Tata McGraw hill Publishing Co., Limited, New Delhi	2012

3.	Reinforced Concrete limit state design	Ashok K Jain	Nem Chand Bros, Roorkee	2012
4.	Limit State Design of R.C.Structures	Varghese, P.C	PHI Learning Pvt. Ltd. New Delhi	2008

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>

Semester-VI

15BECE6E-- DEPARTMENT ELECTIVE II 3 0 0 3 100

TOTAL HRS:45

Semester-VI

15BECE6E-- DEPARTMENT ELECTIVE III 3 0 0 3 100

TOTAL HRS:45

COURSEOBJECTIVES

1. Students should be trained about the STAAD commands and input instructions and command formats and analysis of various structures.
2. They should also get familiar with various unit systems, co-ordinate systems and various structural analysis.
3. To create a building using space coordinates,
4. To import a model from AutoCAD
5. To analyze a structure using software.
6. To get the SFD,BMD and Deflection diagrams through post processing mode.

COURSE OUTCOMES(COS):

1. Students should be trained about the STAAD commands and input instructions and command formats and analysis of various structures.
2. Familiar with various unit systems, co-ordinate systems and various structural analysis.
3. Create a building using space coordinates,
4. Import a model from AutoCAD
5. Analyze a structure using software.
6. Extracting SFD,BMD and Deflection diagrams through post processing mode.

LIST OF EXPERIMENTS

1. Model generation using Node/Beam Editor
2. Assigning Properties, Supports, Loads and Analysis for 2 storey building
3. Analysis of Framed Structure and Applying Floor Loads and Wind load for 3 storey building
4. Analysis of Framed Structure and Applying Seismic Analysis for 3 storey building
5. Analysis of 3 storey school building and generate the stress diagrams on each beam and column
6. Analysis of Retaining Wall

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Design & Drawing – Reinforced Concrete and Steel	N. Krishna Raju	University Press, Chennai	2012

COURSE OBJECTIVES

1. To find impact value and crushing value of coarse aggregates
2. To find the compressive strength of concrete cubes and bricks
3. To find the physical properties of given coarse aggregate, fine aggregate
4. To find the physical properties of given cement samples
5. To learn the characteristics, properties and testing procedures of aggregate
6. To learn the characteristics, properties and testing procedures of bitumen

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Determine the strength of coarse aggregates.
2. Find the compressive strength of concrete cubes and bricks.
3. Determine the physical properties of given coarse aggregates, fine aggregates and cement samples.
4. Characterize the aggregate used for road construction
5. Characterize the bitumen used for road construction.
6. Know the characteristics, properties and testing procedures of bitumen

LIST OF EXPERIMENTS**A. TEST ON CONCRETE**

- Workability test on concrete- Slump, Compaction factor and Vee –Bee test
- Strength test on concrete – Compressive Strength ,Direct tensile strength, Split tensile strength test and Flexural strength test

B. TEST ON AGGREGATE

- Flakiness Index and Elongation Index
- Crushing Value and Impact Value
- Abrasion test- Deval abrasion test

C. TEST ON BITUMEN

- Ductility Test
- Viscosity Test
- Specific Gravity Test
- Flash and Fire Point Test

REFERENCES

S.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Specifications for Road and Bridges, MORTH (India)			1985
2	IS 1489 (Part 1 and 2) Specifications for Portland Pozzolana Cement			1976
3	IS 2386 (Part 1 to 8) Methods of Test for Aggregates for Concrete			1986
4	IS 10262-1982 Recommended Guidelines for Concrete Mix Design			1982
5	IS 1199 1959 methods of Sampling and Analysis of Concrete			1959
6	Bureau of Indian Standards (BIS) Publications on Highway Materials			1965
7	Highway Engineering	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2012
10	Concrete Technology	A.R. Santha Kumar	Oxford university Press, New Delhi	2012

VALUE ADDED COURSE

15BECE651 **PLANNING AND EXECUTION OF CIVIL PROJECTS** **0 0 2 1 100**

OBJECTIVE

1. The students are emphasized to learn the by- laws (NBC),planning,marking, testing of materials and implementation procedures of the building structures
2. Site visit of live project

SEMESTER VII

COURSE OBJECTIVES

1. To enable the students to create an awareness on Engineering Ethics, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.
2. To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
3. To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour.
4. To give an understanding of Intellectual Property Rights, Patents.
5. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
6. To develop good ideas of the legal and practical aspects of their profession

COURSE OUTCOMES(COS):

1. To familiarize the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
2. To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour.
3. To give an understanding of Intellectual Property Rights, Patents.
4. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
5. To develop good ideas of the legal and practical aspects of their profession
6. Gathered ideas of the legal and practical aspects of their profession

UNIT I**MANAGEMENT AND PLANNING****9**

Definition - nature - functions – Levels of Management-Roles of a Manager- Evolution of management thought -Planning - Definition - Nature and importance – steps involved in planning - types of planning -Objectives - MBO -policy and strategy -Forecasting -Decision making

UNIT II**ORGANIZING AND STAFFING****9**

Definition - Nature - purpose - organizational structure - Theories of organization – Types of Business Organization- span of control - Line and staff functions - centralization and decentralization - Recruitment, selection, training and development.

UNIT III**DIRECTING AND CONTROLLING****9**

Nature of directing - leadership qualities - styles -motivation – Theories of motivation – communication-process and types of communication- The objectives and process of control –types of control- Controlling techniques –budgetary and non budgetary.

Entrepreneur –Meaning – Definition -characteristics and Functions of entrepreneur -types of entrepreneurs – IntrapreneurVs Entrepreneur- Role of Entrepreneurship in economic development – Factors affecting entrepreneur growth

UNIT – V BUSINESS PLAN PREPARATION**9**

Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria

TOTAL HRS:45**Text Books**

1. Koontz H and Weihrich H, Essentials of Management: An International Perspective, Tata McGraw Hill, 2007
2. Prasad L M, Principles and Practices of Management, Sultan Chand and Sons, 2001
3. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001

Reference Books

- 1.T.Ramasamy,2010,"Principles of management", Himalaya publishing House.
2. Vasant Desai – Dynamics of ED and Management, Mumbai – Himalaya Publishing house.

COURSE OBJECTIVES

1. To understand the design concept of various structures and detailing of reinforcements.
2. To understand the design of underground and elevated liquid retaining structures.
3. To study the design of material storage structures.
4. To know the effect of temperature on concrete structures.
5. To study the design of bridges subjected to IRC loading.
6. To draw the various reinforcements of structures

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the concepts of liquid retaining structures.
2. Design material storage structures using various theories.
3. Apply the concepts of environmental and transportation structures.
4. Demonstrate the detailing of reinforcement.
5. Draw the various RCC structures.
6. design of material storage structures

UNIT 1**YIELD LINE THEORY****12**

Introduction-Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment- Application of virtual work method - square, rectangular, circular and triangular slabs With point load and UDL (Simply support and Fixed support)- Design problems.

UNIT II**BUILDING FRAMES**

Multi storeyed load bearing structures and framed structures-Elastic analysis ,Suitable substitute frames for gravity loadings-Approximate analysis of single and two bay frames up to three storeys using portal method and cantilever method.

UNIT III**RETAINING WALLS**

Design of Cantilever retaining wall – Design of Counterfort Retaining walls-Stability Analysis.

UNIT IV**WATER TANKS 12**

Classification-IS code provisions-Principles of design-Design of rectangular and circular water tanks , below ground level, tanks resting on ground and Elevated tanks – Intze type water tank (Theory only)

UNIT V**SELECTED TOPIC****12**

Design of staircases (ordinary and doglegged) – Design of flat slabs – Design Principles of Mat foundation and box culvert.

TOTAL HRS:60**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	R.C.C. Designs Reinforced Concrete Structures	Punmia B.C, Ashok Kumar Jain, ArunK.Jain	Laxmi Publications Pvt. Ltd., New Delhi	2006

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Advanced Reinforced Concrete Design	Varghese.P.C	Prentice Hall of India Pvt. LtdNew Delhi.	2012
2	Reinforced Concrete	Mallick, D.K. and Gupta A.P	Oxford and IBH Publishing Company, New York	2003
3	Reinforced Concrete Structures	Syal, I.C. and Goel, A.K	A.H. Wheelers & Co. Pvt. Ltd.,Chennai	2001
4	Design of Reinforced Concrete Structures	Gambhir.M.L	Prentice Hall of India Private Limited, New york	2012

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES

1. To know the importance of preparing the types of estimates under different conditions.
2. To know about the rate analysis and bill preparations.
3. To study about the specification writing.
4. To understand the valuation of land and buildings.
5. To gain the knowledge of contracts.
6. To rate analysis and bill preparations

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply different types of estimates in different situations.
2. Carry out analysis of rates and bill preparation at different locations.
3. Demonstrate the concepts of specification writing.
4. Carry out valuation of assets.
5. The rate analysis and bill preparations
6. The types of estimates under different conditions

UNIT-I**Introduction****12**

Types of estimates – Units of measurements – Methods of estimates – Advantages - cost analysis – Detailed Estimate- Abstract estimate – Calculation of quantities by centre line method – Long wall – Short wall method – Load bearing and framed structures.

UNIT-I**12**

Estimate of Buildings: Detailed and abstract estimate–Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT-III**12**

Estimate of other structures: Estimating of septic tank, soak pit – water supply pipe line – sewer line – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts.

UNIT-IV**12**

Rate, Specifications and Tenders: Data – Schedule of rates – Analysis of rates – Specifications – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements.

UNIT-V**12**

Valuation & Report Preparation: Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease -

Principles for report preparation – report on estimate of residential building , Culvert , Roads , Water supply and sanitary installations , Tube wells and Open wells.

TOTAL HRS:60

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Estimating and Costing in Civil Engineering	Dutta, B.N	UBS Publishers & Distributors Pvt. Ltd, Delhi	2013

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Civil Estimating and Costing	Mahajan	SathyaPrakashan,New Delhi	2012
2	Civil Estimating Costing and Valuation	Aggarwal	B.D Kataria and Sons, Ludhiana	2012
3	A Text Book of Estimating and Costing (Civil	Kohli, D.D and Kohli, R.C	S.Chand& Company Ltd, Uttar Pradesh	2012

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE7E-- DEPARTMENT ELECTIVE -IV 3 0 0 3 100

TOTAL HRS:45

15BECE7E-- DEPARTMENT ELECTIVE - V 3 0 0 3 100

TOTAL HRS:45

15BECEOE-- OPEN ELECTIVE 3 0 0 3 100

TOTAL HRS:45

COURSEOBJECTIVES:

1. To learn the software developing skills for structural design.
2. To understand the computing techniques in the field of transportation.
3. To gain knowledge in problem solving in water resources.
4. To apply computing techniques to transportation engineering.
5. To apply computing skills to water resources and environmental engineering.
6. To apply computing skills to geotechnical engineering.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the software skills in the design of infrastructure.
2. Apply computing techniques to transportation engineering.
3. Apply computing skills to water resources and environmental engineering.
4. Apply computing skills to geotechnical engineering.
5. Learn the software developing skills for structural design.
6. Understand the computing techniques in the field of transportation.

1. Tank surplus weir
2. Tank sluice with tower head
3. Canal drop(Notch Type)
4. Canal regulator
5. Siphon aqueduct

ENVIRONMENTAL ENGINEERING DRAWING

1. General layout of water and waste treatment plants
2. Sedimentation aided with coagulation
3. Slow sand filter
- 4 Rapid sand filter
- 5 Trickling filter
- 6 Septic tank

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering and Design of Structures	Garg, S.K	Published by Mrs. L.Banumathi,Tuni	2012
2	Irrigation Design and Drawing	Satyanarayana Murthy	East Godavari District, A.P	2002
3	Irrigation Engineering and Hydraulic Structures	Sharma R.K	Oxford and IBH Publishing Co., New Delhi	2002

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi			1999
2	Manual of Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi			1993
4	Environmental Engineering	Peary, H.S., Rowe, D.R., and Tchobanoglous, G	McGraw-Hill BookCo., New Delhi	2005
5	Wastewater Engineering (Treatment and Reuse)", 4th Edition	Metcalf & Eddy	Tata McGraw- Hill, New Delhi	2003

COURSE OBJECTIVES

1. To learn the software skills in structural engineering.
2. To learn the software skills in the field of transportation engineering.
3. To learn the software skills in water resources engineering.
4. To apply the software skills in the field of transportation engineering.
5. To apply the software skills in the field of water resource engineering.
6. To apply the software skills in the field of geotechnical engineering.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the software skills in the field of structural engineering.
2. Apply the software skills in the field of transportation engineering.
3. Apply the software skills in the field of water resource engineering.
4. Apply the software skills in the field of geotechnical engineering.
5. Learn the software skills in structural engineering.
6. Learn the software skills in the field of transportation engineering.

Concrete structures:

1. Design and detailing of R.C (Residential building)
2. Design and detailing of frame structure
3. Design and detailing of underground structure

The drawing includes

Design and detailing of RC beams (Simple Beam/Lintel, 'T' Beam floor)
 Design and detailing of RC slabs
 Design and detailing of RC columns
 Design and detailing of RC footings
 Design and detailing of RC retaining walls

Steel structures:

1. Design and detailing of industrial structures

The drawing includes

Design and detailing of beam column connection
 Design and detailing of column and gusset plate connection
 Design and detailing of trusses
 Design and detailing of beams
 Design and detailing of columns
 Design and detailing of simple beam to column connection

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Design & Drawing – Reinforced Concrete and Steel	N. Krishna Raju	University Press, Chennai	2012

VALUE ADDED COURSE**15BECE751****MINI PROJECT****0 0 2 1 100****OBJECTIVE**

1. At the end of this course, the students shall be able to work individually on a project involving theoretical and experimental studies related to Civil Engineering.
2. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.
3. This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability

SEMESTER VIII

OBJECTIVE

1. To gain the knowledge of pre stresses concrete structures.
2. To Design the structures in pretension.
3. To Gain the knowledge of composite construction.
4. To Design and Analyse the bridge structures.
5. To Design the structures-based n IS codal specifications.
6. To Applications of pre stresses structures.

COURSE OUTCOMES(COS):

At the end of course, students will be able to

1. Gain the knowledge of pre stresses concrete structures.
2. Design the structures in pretension.
3. Gain the knowledge of composite construction.
4. Design and Analyse the bridge structures.
5. Design the structures-based n IS codal specifications.
6. Applications of pre stresses structures.

UNIT-I Introduction – Theory and Behaviour: Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

UNIT II**12**

Design: Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

UNIT III**12**

Circular Prestressing: Methods of circular prestressing – types classifications - merits and demerits – effects - Design of prestressed concrete tanks – Poles and sleepers –Applications.

UNIT IV**12**

Composite Construction : Various types of composite construction - Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

UNIT V**12**

Pre-Stressed Concrete Bridges : General aspects –Methods of pre and post tensioning- pre-tensioned slabs- pre-tensioned bridge decks – Post tensioned pre-stressed bridge decks – Principles of design only.

TOTAL HRS:60

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Prestressed concrete	Krishna Raju N	Tata McGraw Hill Company, New Delhi	2012
2.	IS 1343-2000 –Code of Practice For Prestressed Structures SP-16 Design Aids for IS 456-1978. IS 875-1987-Code of Practice for Design Loads			

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Modern prestressed concrete design	Ramaswamy G.S	Arnold Heinimen, New Delhi	2003
2	Design of prestressed concrete	Raymond Ian Gilbert and Neil Mickleborough	CRC Press, Pune	2004
3	Plant Cast precast and prestressed concrete – A design guide	David.A. Sheppard, William.R..and Philips	McGrawHill, New Delhi.	2003
4	Prestressed concrete	Mallic S.K. and Gupta A.P.,	Oxford and IBH publishing Co. Pvt. Ltd. New York	2010

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE8E-- DEPARTMENT ELECTIVE -VI 3 0 0 3100

Semester-VII

TOTAL HRS:45

15BECE8E-- DEPARTMENT ELECTIVE -VII 3 0 0 3 100

Semester-VII

TOTAL HRS:45

15BECE891 PROJECT WORK & VIVA VOCE 0 0 24 12 300**COURSE OUTCOMES(COs):**

1. To work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering.
2. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions.
3. This experience of project work shall help the student in expanding his / her knowledge base
4. Will provide opportunity to utilise the creative ability and inference capability.
5. Students will gain the presentation skills.
6. To explain his/her project to the external examiner and can publish the projects in a reputed journal.

#OPEN ELECTIVE 3 0 0 3 100

TOTAL HRS:45

List of Department Elective Subjects

Fifth Semester

15BECE5E01

HYDROLOGY

3 0 0 3 100

COURSE OBJECTIVES:

1. To know the types of aquifers
2. To understand the surface and subsurface investigation in detail
3. To integrate the fundamental and basic knowledge of ground water movement
4. To understand the process of sea water intrusion and recharge
5. To introduce the different model studies
6. To visualize the occurrence and movement of groundwater.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Identify types of aquifers.
2. Carry out surface and subsurface investigation to locate groundwater.
3. Visualize the occurrence and movement of groundwater.
4. Select suitable type of ground water recharge.
5. Assess sea water intrusion and its control.
6. Understand the process of sea water intrusion and recharge

UNIT I

9

Precipitation: Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship – Probable maximum precipitation.

UNIT II

9

Abstraction From Precipitation: Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

UNIT III

9

Hydrographs: Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph

UNIT IV

9

Floods And Flood Routing: Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control

UNIT V

9

Ground Water Hydrology: Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Engineering Hydrology	Subramanya, K	Tata McGraw-Hill Publishing Co,Ltd.New Delhi	2000
2	Hydrology	Raghunath, H.M	Wiley Eastern Ltd, New York	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Hydrology for Engineers	Chow, V.T. and Maidment	McGraw-Hill Inc., Ltd, New Delhi	2000
2	Hydrology	Singh, V.P	McGraw-Hill Inc.,Ltd. New Delhi	2000

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

OBJECTIVES:

1. To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
2. To understand the techniques of development and management of groundwater.
3. To understand aquifer properties and its dynamics after the completion of the course.
4. It gives an exposure towards well design and practical problems of groundwater aquifers.
5. To understand the importance of artificial recharge and groundwater quality concepts.
6. To know the State of aquifers

COURSE OUTCOMES

1. Students will be able to understand aquifer properties and its dynamics after the completion of the course.
2. It gives an exposure towards well design and practical problems of groundwater aquifers.
3. Students will be able to understand the importance of artificial recharge and groundwater quality concepts.
4. Understand the techniques of development and management of groundwater.
5. Understand aquifer properties and its dynamics after the completion of the course.
6. Exposure towards well design and practical problems of groundwater aquifers.

UNIT I**9**

Fundamentals of Ground Water: Introduction – Characteristic of Ground water – Distribution of water - ground water column –Permeability - Darcy's Law - Laboratory permeability test - Types of aquifers - Hydrogeological Cycle – water level fluctuations.

UNIT II**9**

Hydraulics of Flow: Storage coefficient - Specific field - Heterogeneity and Anisotropy - Transmissivity - Governing equations of ground water flow - Steady state flow - Dupuit Forchheimer assumptions - Velocity potential - Flow nets

UNIT III**9**

Estimation Of Parameters: Transmissivity and Storativity – Pumping test - Unsteady state flow - Thiess method - Jacob method - Image well theory – Effect of partial penetrations of wells - Collectors wells.

UNIT IV**9**

Ground Water Development: Infiltration gallery - Conjunctive use - Artificial recharge -Safe yield - Yield test – Geophysical methods – Selection of pumps.

UNIT V**9**

Water Quality: Ground water chemistry - Origin, movement and quality - Water quality standards - Saltwater intrusion –Environmental concern requirements.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Water Hydrology	Raghunath H.M	Wiley Eastern Ltd., New York	2000
2	Ground Water Hydrology	Todd D.K	John Wiley and Sons, New York	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Water Resource Evaluation	Walton.C	McGraw-Hill Publications, New Delhi	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To develop an understanding of cartography (earth-map relationship, map design, sources of data)
2. To expose the students to the integration of computers, automated surveying, remote sensing, GPS, and GIS for the cartographic process.
3. To get the sources of data's from maps.
4. To produce map.
5. To learnt the Nature and history of cartography
6. To learn about the Earth-Map relation

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. learnt the Nature and history of cartography
2. Earth-Map relation
3. Sources of data
4. Perception and design
5. Map production
6. Reproduction.

UNIT I**9**

Introduction: Cartography today - Nature of Cartography - History of Cartography - Graticules – Cartometry – applications.

UNIT II**9**

Earth: Earth-Map Relations - Basic Geodesy - Map Projections, Scale, Reference and Coordinate system - Transformation - Basic Transformation - Affin Transformation.

UNIT III**9**

Sources of Data: Sources of data - Ground Survey and Positioning - Remote Sensing data collection - Census and sampling - data - Models for digital cartographic information, Map digitizing.

UNIT IV**9**

Perception and Design: Cartographic design - Color theory and models - Color and pattern creation and specification - Color and pattern - Typography and lettering the map - Map compilation.

UNIT V**9**

Cartography Abstract: Selection and Generalisation Principles - Symbolisation - Topographic and thematic maps - Map production and Reproduction - Map series.

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Basic Cartography for students and Technicians. Vol. I, II and III	Anson. R.W. and F.J. Ormeling	Elsevir Applied Science Publishers 2nd Edition, Canada	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Elements of Cartography, Sixth Edition	Arthur, H. Robinson Et al	John Wiley and Sons, New York	2001
2	Cartography: Visualisation and spatial data	Kraak M J and Ormeling F J	Prentice Hall, Canada	2013

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I**9**

Classification of roads-Highway alignment and surveys-Highway economics and financing.

Geometric design of High way-design speed-Cross sectional elements-super elevation-sight distances-Gradients-extra widening at curves.

UNIT II**9**

Highway Materials-Aggregates and Bituminous Materials-Selection and testing-Construction methods for Earth roads,gravel,W.B.M, roads, Bituminous pavements and Cement concrete pavements

UNIT III**9**

Traffic Engineering-Traffic volume-Speed and delay studies-Parking and accident studies-Traffic signs, marking and signals-road intersections-Traffic forecasting-Need-limitation-Types of traffic-Forecasts of traffic. Traffic Compositions-Future traffic estimates-Design Vehicle-Dimensions-Types of Design Vehicles.

UNIT IV**9**

Nature of traffic problems in cities: Growth of towns-Growth of Traffic-Nature of Present Difficulties-Measures to meet problems-Need for Study-Land use and City Planning Controls-Restrain measures-Public transport-Promotion of public transport pedestriauisation-Staggy traffic hours.

Traffic and free environment-Effects of traffic on the environment-Noise-Air-Vibration-Degrading the aesthetic-Land consumption-Evaluation procedures-Environmental areas-computer application in traffic engineering-Public transport systems-Simulation, Traffic Planning and Computer application-situation in India.

Airports-their importance-spacing and position in relation to their zone-details of their location and layout-auxiliary and terminal buildings-their location and layout.

Runway lighting and drainage-Other accessories such as hangers and repair yards-airport zoning.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	C.E.G.Justo and S.K. Khanna	New Chand & Bros.,Roorkee	2000
4	Highway Engineering	Rangwala	Charotar Publications,Pune	2002

REFERENCE BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	L.Kadiyali	Nath Market, Naisarak Delhi-110 006	2002
2	Highway Engineering	Paul K Wright and Karen K. Dixon	Replica Press Limited, Kundli, Seventh Edition	2009
3	Transportation Engineering & Planning,	C.S. Papacostas, P.D.Prevedouros	Prentice Hall of India, Third Edition, New York	2001

WEBSITES:

1. <http://www.icivilengineer.com>
2. <http://www.engineeringcivil.com/>
3. <http://www.aboutcivil.com/>
4. <http://www.engineersdaily.com>
5. <http://www.asce.org/>
6. <http://www.cif.org/>
7. <http://icevirtuallibrary.com/>
8. <http://www.ice.org.uk/>
9. <http://www.engineering-software.com/ce/>

List of Department Elective Subjects

Sixth Semester

15BECE6E01

HIGHWAY ENGINEERING

3 0 0 3 100

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To select pavement materials and design

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. The pavement materials and design

UNIT I

9

Highway Planning And Alignment: Macadam's method of Road Construction, Highway Development in India - Jayakar Committee Recommendations Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmed at National Level- Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment -Engineering Surveys for Alignment - Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards],

UNIT II

9

Geometric Design Of Highways: Design of Horizontal Alignments – Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems]-Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD]-Geometric Design of Hill Roads [IRC Standards Only]

UNIT III

9

Design Of Rigid And Flexible Pavements: Rigid and Flexible Pavements- Components and their Functions-Design Principles of Flexible and Rigid Pavements, Factors affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic-Design Practice for Flexible Pavements [CBR method, IRC Method and Recommendations- Problems]-Design Practice for Rigid Pavements – [IRC Recommendations-Problems] – Joints

UNIT IV

9

Highway Materials And Construction Practice: Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test- Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test-Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests.-Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications]-Highway Drainage [IRC Recommendations]

UNIT V

9

Highway Maintenance: Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs. Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only], Principles of Highway Financing

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2009

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Principles and Practice of Highway Engineering	Kadiyali L R	Khanna Technical Publications, Delhi.	2004

IRC Standards (IRC 37 - 2001 & IRC 58 -1998)

Bureau of Indian Standards (BIS) Publications on Highway Materials
Specifications for Road and Bridges, MORTH (India)

WEBSITES

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>

OBJECTIVE

1. To learn the basics of sewage composition and its characteristics
2. To depict the information about various sewage treatment processes
3. To provide the adequate information on various disposal standards for industrial effluents
4. To study the information about air pollution and its effects
5. To understand the knowledge about solid waste generation and disposal methods.
6. To gain knowledge information about various sewage treatment processes

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Determine the sewage characteristics and design various sewage treatment plants.
2. Analyze the status of surface water and ground water quality and the remediation technologies.
3. understand the information about air pollution and its effects
4. gain knowledge information about various sewage treatment processes
5. Carry out municipal water and wastewater treatment system design and operation.
6. Manage hazardous wastes, risk assessment and treatment technologies apply environmental treatment technologies and design process.

UNIT I INTRODUCTION**9**

Objectives of biological treatment – significance – Principles of aerobic and anaerobic treatment - kinetics of biological growth – Factors affecting growth – attached and suspended growth - Determination of Kinetic coefficients for organics removal – Biodegradability assessment –selection of process- reactors-batch-continuous type.

UNIT II AEROBIC TREATMENT OF WASTEWATER**9**

Design of sewage treatment plant units –Activated Sludge process and variations, Sequencing Batch reactors, Membrane Biological Reactors-Trickling Filters-Bio Tower-RBC-Moving Bed Reactors-fluidized bed reactors, aerated lagoons, waste stabilization ponds – nutrient removal systems – natural treatment systems, constructed wet land – Disinfection – disposal options – reclamation and reuse – Flow charts, layout, PID, hydraulic profile, recent trends.

UNIT III ANAEROBIC TREATMENT OF WASTEWATER**9**

Attached and suspended growth, Design of units – UASB, up flow filters, Fluidized beds MBR, septic tank and disposal – Nutrient removal systems – Flow chart, Layout and Hydraulic profile – Recent trends.

UNIT IV SLUDGE TREATMENT AND DISPOSAL**9**

Design of sludge management facilities, sludge thickening, sludge digestion, biogas generation, sludge dewatering (mechanical and gravity) Layout, PID, hydraulics profile – upgrading existing plants – ultimate residue disposal – recent advances.

UNIT V CONSTRUCTION OPERATIONS AND MAINTENANCE ASPECTS

9

Construction and Operational Maintenance problems – Trouble shooting – Planning, Organizing and Controlling of plant operations – capacity building - Retrofitting Case studies – sewage treatment plants – sludge management facilities.

TOTAL HRS : 45

TEXT BOOKS:

Name of the Book	Author Name	Publisher	Year
Wastewater Treatment for Pollution Control	Arceivala, S.J	TMH, New Delhi, Second Edition	2000
Manual on “Sewerage and Sewage Treatment”	CPHEEO	Ministry of Urban Development, Government of India, New Delhi	2002

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Wastewater Engineering – Treatment and Reuse	Metcalf & Eddy, INC,	Fourth Edition, Tata Mc Graw-Hill Publishing Company Limited, New Delhi	2003
Hand Book of Water and Wastewater Treatment Plant operations	F.R. Spellman	CRC Press, New York	2009
Fundamentals of Water Treatment Process	David Hendricks	CRC Press, New York	2011

WEBSITES:

- www.springer.com
- www.nptel.com
- www.wikipedia.com
- www.civil.ubc.ca
- www.aboutcivil.com

COURSE OBJECTIVES:

- At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures
- To understand the different problematic soils and effect of ground improvement techniques.
- To describe the seepage analysis and suitable dewatering systems for the particular soil conditions.
- To express the concept of compaction efforts on ground improvement and their installation and working principles.
- Describe the load transfer mechanism and effect of geo textiles reinforcements in ground improvement.
- Describe the various stabilization methods for the different types of problematic soils.

COURSE OUTCOMES

1. Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area.
2. Capable of providing alternate methods to improve its character suitable to the project, so that the structures built will be stable and serve.
3. Describe the dewatering systems for different soil conditions and their effect.
4. Express the working principles of different compaction methods on improving weak deposits.
5. Express the design of geo textiles reinforcements for ground improvement.
6. Express the soil stabilization methods for the problematic soils.

UNIT I**9**

Introduction: Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II**9**

Drainage and Dewatering: Drainage techniques - Well points - Vacuum and electro osmotic methods - Seepage analysis for two-dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III**9**

Insitu Treatment of Cohesion less and Cohesive Soils : Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation – Vibro flotation - Sand pile

compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV

9

Earth Reinforcement: Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT V

9

Grout Techniques: Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Improvement Techniques	Purushothama Raj, P	Tata McGraw-Hill Publishing Company, New Delhi	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Ground Improvement	Michael P. Moseley, Klaus Kirsch	Blockie Academic and Professional, Chapman and Hall, Glasgow	2004
2	Design with Geosynthetics, (3rd Edition)	Koerner, R.M.	Prentice Hall, New Jersey	2002
3	Soil Reinforcement with Geotextiles	Khedkar, M. S., and Mandal, J. N.	CIRIA special publication, London	2009
4	Construction and Geotechnical Methods in Foundation Engineering	Koerner R.M	McGraw-Hill, New Delhi	2000

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>

OBJECTIVES:

1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures
3. To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works
4. To understand the analysis of seepage and hydraulic jump
5. To design different types of dams.
6. To understand the different types of cross drainage works

Course outcomes

On completion of the course, the students will be able to:

1. Find the crop water requirement for various crops in the command area.
2. Understand the complete design of Dams and channel systems.
3. Understand the different types of cross drainage works.
4. Design various river training methods.
5. Gained Knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators
6. design different types of dams

UNIT I**9**

Introduction: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – environmental impacts of irrigation-History of irrigation development in India-Classification of irrigation projects Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.

UNIT II**9**

Irrigation Methods: Requirement of an irrigation method- sub surface irrigation-surface irrigation-burried irrigation-seepage line irrigation- Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation – barrow pit method-participatory approach – water user associations- social aspects in water pricing .

UNIT III**9**

Diversion And Impounding Structures: Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

UNIT IV**9**

Canal Irrigation: Design of irrigation channels - Alignment of canals – Classification of canals – Typical capacity – statement of roughness coefficient- Maximum and minimum permissible velocity - Canal drops – side slopes of banks- side slopes of canal- Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.

UNIT V**9**

Irrigation Water Management: Need for optimisation of water use – Minimizing irrigation water losses – On farm development works – Percolation ponds – Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation. Selection of site for hydropower plant- essential data for waterpower studies- requirement of water for hydel power

TOTAL HRS: 45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Engineering	Asawa, G.L	New Age International Publishers, New Delhi	2012
2	Irrigation Engineering	Sharma R.K., and Sharma T.K	S. Chand and company, New Delhi	2011
3	Irrigation Engineering	Gupta, B.L, & Amir Gupta	Satya Praheshan, New Delhi	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Irrigation Water Management (Principles & Practices)	Dilip Kumar Majumdar	Prentice Hall of India (P), Ltd, New york	2004
2	Irrigation Engineering	Basak, N.N	Tata McGraw-Hill Publishing Co, New Delhi	2009
3	Irrigation Engineering	Garg, S.K.,	Tata McGraw-Hill Publishing Co, New Delhi	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To introduce the basics of Earthquake Engineering
2. To introduce the engineering seismology, building geometrics & characteristics, structural irregularities,
3. To introduce tips on earthquake engineering - do's and don'ts
4. To introduce cyclic loading behaviour of RC, steel and pre-stressed concrete elements
5. To discuss code provisions and their application on different types of structures
6. To apply codal provisions on different types of structures

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the basics of Earthquake Engineering
2. Demonstrate the dynamics of structural system under earthquake load
3. Analyze the influence of the structural / geometrical design in building characteristics
4. Demonstrate the cyclic loading behaviour of RC steel and pre-stressed concrete elements
5. Apply codal provisions on different types of structures.
6. Cyclic loading behaviour of RC, steel and pre-stressed concrete elements

UNIT I**9**

Static Loading and Dynamic Loading :Difference between static loading and dynamic loading – Nature of dynamic loads – Wind, Earthquake and Impact Loads – Damping – Viscous and structural damping – single degree of freedom (SDOF) Systems – Formulation of equation of motion – Newton's Law and D'Alembert's principles – Examples of SDOF modeling.

UNIT II**9**

Vibration Response : Free vibration response of SDOF system – Response of undamped and damped SDOF system to harmonic excitation – characteristic of resonance – Response to impulse and an arbitrary forcing function – Duhamel Integral formulation.

UNIT III**9**

MDOF systems: MDOF systems – examples – Lumped parameter model – Formulation of equation of motion – Free vibration of MDOF systems as Eigen value problem – concept of mode shapes and natural frequencies – 2 DOF example – orthogonal properties of normal modes.

UNIT IV**9**

Harmonic Excitation. :Harmonic excitation of 2 DOF system – Principle of mode superposition (principle only) for dynamic analysis – vibration isolation – vibration measuring instruments.

UNIT V**9**

Wind and Earthquake on Structures : Effect of wind and earthquake on structures – Principles of aseismic design – Methods of vibration control – codal provisions for design for wind and earthquake (explanation of provisions only – no design)

TOTAL HRS : 45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Dynamics Theory and Computation	Mario Paz	Van Nostrand Reinhold, New York	2009
2	Dynamics of Structures Theory and Applications to Earthquake Engineering	Anil K.Chopra	Pearson Education, Gurgaon.	2003

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Theory of Vibration and Applications	Thomson W.T	Prentice Hall of India, New York	2011
2	Dynamics of Structures	Clough R.W. and Penzien, J	McGraw-Hill, New Delhi	2009
3	Structural Dynamics – An Introduction to Computer Methods	Craig R.R. Jr	John Wiley and Sons, New York	2008

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>

COURSE OBJECTIVES:

1. To identify and quantify the hydrological data inputs necessary for various design applications in the field of water resources.
2. To introduce to the quantitative relationship that explains the understanding of hydrological processes in answering scientific and water-resources-management questions.
3. To know about urban hydrological cycle
4. To gather knowledge of urban water resources management models
5. To find the different and Effective urban water user organizations
6. To get the knowledge of Operation and maintenance of hydraulic structures.

COURSE OUTCOMES

Students will be able to understand

1. About urban hydrological cycle,
2. urban water resources management models,
3. urban storm water management,
4. Effective urban water user organizations,
5. Operation and maintenance of hydraulic structures.
6. Quantify the hydrological data inputs necessary for various design applications in the field of water resources.

UNIT IURBAN HYDROLOGIC CYCLE**9**

Water in the urban eco-system – Urban Water Resources – Major problems – Urban hydrological cycle – Storm water management objectives and limitations – Storm water policies – Feasibility consideration.

UNIT II URBAN WATER RESOURCES MANAGEMENT MODELS**9**

Types of models – Physically based – conceptual or unit hydrograph based – Urban surface runoff models – Management models for flow rate and volume control rate – Quality models.

UNIT IIIURBAN STORM WATER MANAGEMENT**9**

Storm water management practices (Structural and Non-structural Management measures) – Detention and retention concepts – Modelling concept – Types of storage – Magnitude of storage – Hydraulic analysis and design guidelines – Flow and storage capacity of urban components – Temple tanks.

UNIT IV MASTER PLANS**9**

Planning and organizational aspects – Inter dependency of planning and implementation of goals and measures – Socio – economics financial aspects – Potential costs and benefit measures – Measures of urban drainage and flood control benefits – Effective urban water user organizations.

UNIT V OPERATION AND MAINTENANCE**9**

General approaches to operations and maintenance – Complexity of operations and need for diagnostic analysis – Operation and maintenance in urban water system – Maintenance Management System – Inventories and conditions assessment – Social awareness and involvement.

TOTAL HRS : 45

TEXT BOOKS:

Name of the Book	Author Name	Publisher	Year
Role of Water in Urban Ecology	Hengeveld, H. and C. De Vocht	John Wiley and sons, New York	2000

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Storm Water Management	Martin, P. Wanelista and Yousef, A. Yousef	John Wiley and sons, New York	2000
Urban Water Infrastructure Planning, Management and Operations	Neil S. Grigg	John Wiley and Sons, New York	2002
Storm Water Modelling	Overtens D.E. and Meadows M.E	Academic Press, New York	2001

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

15BECE6E07 REMOTE SENSING TECHNIQUES AND APPLICATIONS 3 0 0 3 100

COURSE OBJECTIVES:

1. To gain a sound fundamental understanding of the GIS and remote sensing technologies
2. To understand the basic principles underlying the GIS/model-based management of water resources and environment.
3. To become familiar with the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
4. Different types of remotely sensed images and data available for water resource applications.
5. To apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
6. To develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.

COURSE OUTCOMES

By the end of this course the students will be able to

1. Develop fundamental understanding of the GIS and remote sensing technologies
2. Understand the basic principles underlying the GIS based management of water resources and environment.
3. Apply the GIS-based analytical and problem-solving techniques for sustainable planning and management of water resources and environmental problems.
4. Understand the types of remotely sensed images and data available for water resource applications.
5. Develop a project report and can develop Water Resource Information Systems (WRIS) for regional and basin scale.
6. Understand the basic principles underlying the GIS/model-based management of water resources and environment.

UNIT I

9

Introduction: Definition – Physics of remote sensing – electromagnetic radiation (EMR) – remote sensing windows – interaction of EMR with atmosphere, earth surface, soil, water and vegetation – platform and sensor – image interpretation.

UNIT II

9

Land Use Studies: Definition of land use – land use / land cover classification – schemes and levels of classification systems with RS data – land use mapping – change detection – urban land use planning, site suitability analysis, transportation planning.

UNIT III

9

Water Resources :Area assessment of surface water bodies – Capacity survey of water bodies – mapping of snow-covered areas – flood risk zone mapping – identification of groundwater potential zones, recharge areas – droughts-definition-drought assessment and management.

UNIT IV

9

Agriculture, Soil And Forestry: Crop inventory mapping – production estimation – command area monitoring – soil mapping – crop stress detection - estimation of soil erosion – forest types and density mapping – forest fire risk zone mapping.

UNIT V

9

Earth Science: Lithology – lithological mapping – structural mapping – Geomorphology – nature and type of landforms – identification – use of remote sensing data for land slides – targeting mineral resources – Engineering geology and Environmental geology.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Remote sensing methods and application	Michael Hord, R	John Wiley and Sons, New York	2004
2	Remote sensing principles and interpretation	Sabins, F.F.Jr	W.H.Freeman &Co.New York	2007

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Remote Sensing and Image interpretation	Lillesand, T.M and Kicter R.W	John Willey and sons, inc. New York	2002
2	Application of Remote sensing in Agriculture	Steven, M.D, and Cllark, J.A	Butterworths, London	1990
3	Manual for Forest mapping and Damage detection using satellite data- Space Applications Centre,1990, Report No.IRS-UP/SAC/FMDD/TN/16/90,1990			
4	Manual of Remote Sensing Vol. II. American Society of Photogrammetry			

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>

COURSE OBJECTIVES:

The students will

1. To develop an understanding of the classification, sources and effects of pollutants
2. To understand the fundamentals of meteorology
3. To study the principles and equipment description of control technologies
4. To review the sources and control of soil pollution.
5. To understand the sources and effects of key types of environmental pollutants
6. To have insight into fundamentals of meteorology

COURSE OUTCOMES

At the end of the course the students will be able to:

1. Understand the sources and effects of key types of environmental pollutants
2. Have insight into fundamentals of meteorology
3. Appreciate different pollution control strategies
4. Understand indoor air pollution and be aware of the control technologies
5. Develop an understanding of the classification, sources and effects of pollutants
6. Understand the fundamentals of meteorology

UNIT I PHYSICS AND CHEMISTRY OF SOIL**9**

Soil formation – composition – soil fabric – mass-volume relationship – Index properties and soil classification – hydraulic and consolidation characteristics – Chemical properties – soil pH – Surface charge and point of zero charge – Anion and Cation exchange capacity of clays– Specific surface area–bonding in clays–soil pollution–factors governing soil–pollutant interaction.

UNIT II INORGANIC AND ORGANIC GEOCHEMISTRY**9**

Inorganic geochemistry – Metal contamination – Distribution of metals in soils – Geochemical processes controlling the distribution of metals in soils – Chemical analysis of metal in soil – Organic geochemistry – Organic contamination – Distribution of NAPLs in soils – Process controlling the distribution of NAPLs in soil – Chemical analysis of NAPLs in soils.

UNIT III CONTAMINANT FATE AND TRANSPORT IN SOIL**9**

Transport processes – advection – diffusion – dispersion – chemical mass transfer processes – sorption and desorption – precipitation and dissolution – oxidation and reduction – acid base reaction – complexation – ion exchange – volatilization – hydrolysis – biological process–microbial transformation of heavy metals.

UNIT IV GROUND IMPROVEMENT TECHNIQUES IN WASTE MANAGEMENT**9**

Role of Ground Improvement-Drainage and Ground Water Lowering-Electro osmotic Methods- Diaphragm walls-Thermal and Freezing methods - Insitu Densification - Deep Compaction -Dynamic Compaction -Blasting Sand piles pre-loading with sand drains-Stone Columns Lime piles- Earth reinforcement -rock bolts Cables and guniting Geotextiles as reinforcement Filtration. Drainage and Erosion control.

UNIT V SOIL REMEDIATION TECHNOLOGIES

9

Contaminated site characterization – Containment – Soil vapour extraction - Soil washing – Solidification and Stabilization – Electro-kinetic remediation – Thermal desorption – Vittrification – In-situ and Ex-situ Bioremediation – Phytoremediation – Soil fracturing – Biostimulation – Bioaugmentation –Chemical oxidation and reduction.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	An Introduction to the Environmental Physics of Soil, Water and Water Sheds	Calvin Rose	Cambridge University Press, London	2004
2	Reclamation of Contaminated Land	Paul Nathanail C. and Paul Bardos R	John Wiley & Sons Limited, New York	2004

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Geo-Environmental Engineering : Site Remediation, Water Contaminant and Emerging Water Management Technologies	Hari D. Sharma and Krishna R. Reddy	John Wiley & Sons Limited, New York	2004
Groundwater Geochemistry : Fundamentals and Applications to Contamination	William J. Deutsch	Lewis Publishers, London.	2002

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

COURSE OBJECTIVES:

1. To expose the students to Railway planning, design, construction and maintenance and planning and design principles of Airports and Harbours.
2. Understand the history and development, role of railways, railway planning and development based on essential criteria's.
3. Learn different types of structural components, engineering properties of the materials, to calculate the material quantities required for construction
4. Understand various aspects of geometric elements, points and crossings, significance of maintenance of tracks.
5. Design and plan airport layout, design facilities required for runway, taxiway and impart knowledge about visual aids
6. Apply design features of tunnels, harbours, dock and necessary navigational aids; also expose them to various methods of tunneling and tunnel accessories.

COURSE OUTCOMES

1. At the end of this course the students should have learnt the Railway planning and design, railway track construction, Maintenance and operation, Airport planning and designing,
2. Airport layout, visual aids and air traffic control, Harbour engineering and other modes of transport.
3. acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.
4. Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.
5. Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.

Apply the knowledge gained to conduct surveying, understand the tunneling activities.

UNIT I**9**

Railway Planning And Design: Role of Indian Railways in National Development - Engineering Surveys for Track Alignment – Obligatory points - Permanent Way, its Components and Functions of each Component: Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks Sleepers-Density- Ballasts - Materials, Ballast less- Tracks -Geometric Design of Railway Tracks – Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves (Derivations of Formulae and Problems)

UNIT II**9**

Railway Track Construction, Maintenance And Operation: Points and Crossings - Design of Turnouts, Working Principle -Signaling, Interlocking and Track Circuiting-Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage-Track Modernization– Automated maintenance and upgrading, Technologies, Re-laying of Track -Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings

UNIT III**9**

Airport Planning And Design: Advantages and Limitations of Air Transport, Components of Airports- Airport Planning – Air traffic potential, Site Selection, Design of Components- Institutional arrangements- Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage-Taxiway Design – Geometric

UNIT IV

9

Airport Layouts, Visual Aids, And Air Traffic Control: Airport Layouts – Apron, Terminal Building, Hangars, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts-Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities -Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings-Air Traffic Control – Basic Actions, Air Traffic Control Network-Helipads, Hangars, Service Equipments.

UNIT V

9

Harbour Engineering & Other Modes Of Transport: Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports-Requirements and Classification of Harbours– Speed of water, Dredging, Range of Tides, Waves and Tidal Currents, Soundings, Anchoring Grounds-Winds & Storms, Position and Size of Shoals-Shore Considerations- Coast Lines- Dry and Wet Docks,, Planning and Layouts- Position of Light Houses, Navigating -Terminal Facilities – Port Buildings, Warehouse, Transit Sheds -Coastal Structures- Piers, Breakwaters Spring Fenders-Coastal Shipping, Inland Water Transport and Container Transportation-Pipe Ways, Rope Ways,

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	A Course in Railway Engineering	Saxena Subhash C and Satyapal Arora	Dhanpat Rai and Sons, Delhi	2000
2	Airport Planning and Design	Khanna S K, Arora M G and Jain S S	Nemchand and Brothers, Roorkee	2002
3	A Course in Docks and Harbour Engineering	S P Bindra, 1993	Dhanpat Rai and Sons, Delhi	2002

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Railway Engineering	Rangwala	Charotar Publishing House, Gujarat	1995
2	Airport Engineering	Rangwala	Charotar Publishing House, Gujarat	1996

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

List of Department Elective Subjects

Seventh Semester

15BECE7E01

BRIDGE STRUCTURES

3 0 0 3 100

COURSE OBJECTIVES:

1. To develop an understanding of basic concepts in bridge engineering like components, classification, importance, investigation of bridges and loading conditions.
2. To study the design of Culvert, Foot Bridge, Slab Bridge, T-beam Bridge and Box Culvert using IRC.
3. To study the design of various sub-structures like piers, abutments, foundations
4. To study the importance of the bearing and joints in construction of the bridge.
5. To select the suitable site and type of the bridge.
6. To prepare a detailed project report for the construction of bridge giving hydraulic particulars of the river and soil details

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Prepare a detailed project report for the construction of bridge giving hydraulic particulars of the river and soil details
2. Select the suitable site and type of the bridge.
3. Design various types of bridges like Culvert, Slab Bridge and T-beam Bridge using provisions of IRC.
4. Design pier, abutment, foundations, bearing and detailing of joints.
5. Design of Culvert, Foot Bridge, Slab Bridge, T-beam Bridge and Box Culvert using IRC.
6. understanding of basic concepts in bridge engineering like components, classification, importance, investigation of bridges and loading conditions

UNIT I

9Introduction: History of Bridges - Components of a Bridge and its definitions- Classification of Road Bridges - Selection of Site and Initial Decision Process - Survey and Alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of Bridge site and planning - Collection of Bridge design data - Hydrological calculation Road Bridges - IRC codes - Standard Loading for Bridge Design - Influence lines for statically determinate structures - I.L. for statically indeterminate structures - Transverse distribution of Live loads among deck longitudinal - Load combinations for different working state and limit state designs Railway Bridges: Loadings for Railway Bridges; Railroad data. Pre-design considerations-Railroad vs. Highway bridges

UNIT II

9Steel Bridges : Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders- Design of deck type plate girder railway bridges for railway loading- Design of main girders

UNIT III

9Reinforced Concrete Slab Bridges : Design of solid slab bridges for IRC loading - Pigeaud's curves- Design of panel and cantilever for IRC loading

UNIT IV

9Reinforced Concrete Girder Bridges : Courbon's theory – Design of Tee beam Girder bridges - Deck slab -Main girder-Cross girder - Design of PSC bridge.

Substructure, bearings and deck joints, parapets and railings

Substructure - Pier; Abutment - Wing walls- Importance of Soil-Structure Interaction - Types of foundations - Open foundation- Pile foundation- Well foundation- Simply supported bridge- Continuous Bridge - Bearings and Deck Joints - Different types of bridge bearings and expansion joints - Parapets and Railings for Highway Bridges

TOTAL HRS : 45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Essentials of Bridge Engineering	Johnson Victor D	Oxford and IBH Publishing Co. New York	2010
2	Design of Bridges	Krishna raj N	Oxford and IBH Publishing Co. New York	2010

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Bridge Engineering	Phatak D.R	Satya Prakashan, New Delhi	2010
2	Bridge Engineering	Ponnuswamy S	Tata McGraw-Hill, New Delhi	2011

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To learnt the general planning consideration of various load factors, vertical structure
2. To plan High rise building structure and their behavior
3. To analysis and design and also other high rise building structure.
4. To design aspects and analysis methodologies of tall buildings will be introduced.
5. To know the stability analysis of tall buildings is another important objective of this course.
6. To gain knowledge of high raised buildings.

COURSE OUTCOMES(COS):

1. Learnt the general planning consideration of various load factors, vertical structure
2. Plan High rise building structure and their behavior
3. Analysis and design and also other high rise building structure.
4. Design aspects and analysis methodologies of tall buildings will be introduced.
5. stability analysis of tall buildings is another important objective of this course.
6. Gain knowledge of high raised buildings.

UNIT I**9**

Introduction: The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II**9**

The Vertical Structure Plane: Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT III**9**

Common High-Rise Building Structures and Their Behavior Under Load: The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV**9**

Approximate Structural Analysis and Design of Buildings: Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate

UNIT V

9

Other High-Rise Building Structure: Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	High - rise building Structures	Wolfgang Schueller	John Wiley and Sons, New York	2001
2	Tall Building Structures , Analysis and Design	Bryan Stafford Smith and Alex Coull	John Wiley and Sons, Inc, New York	2005

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Tall Buildings	Coull, A. and Smith, Stafford, B	Pergamon Press, London,	2006
2	Structural Concepts and Systems for Architects and Engineers	Lin T.Y. and Burry D.Stotes	John Wiley, New York	2008
3	Advances in Tall Buildings	Lynn S.Beedle	CBS Publishers and Distributors, Delhi	2010
4	Structural Analysis and Design of Tall Buildings	Taranath.B.S.,	Mc Graw Hill, New Delhi.	2010

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To impart knowledge to students on modular construction, industrialized construction
2. To design of prefabricated elements and construction methods.
3. To know the different components of Prefabricated structures.
4. To design join flexibility.
5. To understand the assembling and dismantling of prefabricated components
6. To understand the joining techniques in prefabrication

COURSE OUTCOMES

1. The student shall be able to design some of the prefabricated elements
2. The procedure of prefabrication
3. Have the knowledge of the construction methods in using these elements.
4. Design join flexibility.
5. Familiarize with joining techniques used for prefabrication.
6. Abnormal loads which are hazardous to the prefabricated structures.

UNIT I**9**

Introduction: Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection.

UNIT II**9**

Prefabricated Components: Behavior of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

UNIT III**9**

Design Principles: Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV**9**

Joint in Structural Members: Joints for different structural connections – Dimensions and detailing – Design of expansion joints

UNIT V**9**

Design for Abnormal Loads: Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones - Importance of avoidance of progressive collapse.

TOTAL HRS : 45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	CBRI, 1990, Building materials and components, India			
2	Knowledge based process planning for construction and manufacturing	Gerostiza C.Z., Hendrikson C. and Rehat D.R	Academic Press Inc.,	2012

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH	Koncz T	Bauverlag, GMBH	1971
2	Structural design manual, Precast concrete connection details 1978. Society for the studies in the use of precast concrete Netherland Betor Verlag			

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To learn the smart materials and structures
2. To learn about the various strain measuring instruments
3. To learn about the sensors and its physical measurements
4. To learn about the signal processing and control systems
5. To know about the sensor technologies in the field of Civil engineering.
6. To gain knowledge of Data Acquisition and Processing

COURSE OUTCOMES

Upon completing of this course, the students should be able to:

1. Learn the types of smart material and its response, Strain measuring techniques, Sensing technology, Actuator techniques, Signal processing and control systems.
2. Learn about the various strain measuring instruments
3. The sensors and its physical measurements
4. The signal processing and control systems
5. Know about the sensor technologies in the field of Civil engineering.
6. Gain knowledge of Data Acquisition and Processing

UNIT I**9**

Introduction : Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II

9Measuring Techniques : Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheat stone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III**9**

Sensors : Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVDT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT IV**9**

Actuators : Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electro rheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

UNIT V**9**

Signal Processing and Control Systems : Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Smart Structure and Materials	Mel Schwartz	Artech House .Borton. London	2008

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Experimental Stress Analysis	Srinath.L.S	Tata McGraw-Hill, New Delhi	2003
2	Experimental Stress Analysis	J. W. Dally.J.W. & W. F. Riley.	Tata McGraw-Hill ,New Delhi	2003

. WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To apprise the students about the basics of Finite Element theory
2. To know the implementation of computer and its practical applications.
3. To learn basic principles of finite element analysis procedure.
4. To learn the theory and characteristics of finite elements that represent engineering structures.
5. To learn and apply finite element solutions to structural, thermal, dynamic problem.
6. To develop the knowledge and skills needed to effectively evaluate finite element analyses.

COURSE OUTCOMES

1. Students will be in a position to develop computer codes for any physical problems using FE techniques.
2. Understand the concepts behind formulation methods in FEM.
3. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
4. Develop element characteristic equation and generation of global equation.
5. Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow
6. Apply suitable boundary conditions to axis symmetric and dynamic problems and solve them displacements, stress and strains induced.

UNIT I**9**

Variational Formulation: General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT II**9**

Finite Element Analysis of One Dimensional Problems : One dimensional second order equations – discrimination of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT III**9**

Finite Element Analysis of Two Dimensional Problems : Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

UNIT IV**9**

Isoparametric Elements and Formulation: Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoperimetric elements in 1,2 and 3

dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V

9

Applications to Field Problems in Two Dimensionals : Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

TOTAL HRS : 45

TEXT BOOK:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Introduction to Finite Element in Engineering, Third Edition	Chandrupatla, T.R., and Belegundu, A.D	Prentice Hall, India	2010

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	An Introduction to Finite Element Method	Reddy J N	McGraw-Hill, Intl. Student Edition, New Delhi	2009
2	The finite element method, Basic formulation and linear problems, Vol.1	Zienkiewics	McGraw-Hill, Book Co, New Delhi	2000
3	The Finite Element Method in Engineering	Rao. S.S	Pergaman Press.New Delhi.	2010

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To understand the components of solid waste management system
2. To learn about recycling, reuse and reclamation of solid wastes
3. To study the collection, transfer, and transport of municipal solid waste
4. To examine the operation of a resource recovery facility
5. To study the design and operation of a municipal solid waste landfill
6. To study the different disposal methods of MSW

COURSE OUTCOMES

At the end of the course the students will be able to:

1. Review the components of solid waste management system
2. Be aware of the significance of recycling, reuse and reclamation of solid wastes
3. Develop an insight into the collection, transfer, and transport of municipal solid waste
4. Understand the importance and operation of a resource recovery facility
5. Understand the design and operation of a municipal solid waste landfill

UNIT I**9**

Sources and Types of Municipal Solid Wastes: Sources and types of solid waste - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II**9**

On-Site Storage & Processing : On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

UNIT III**9**

Collection and Transfer : Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

UNIT IV**9**

Off-Site Processing : Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V**9**

Disposal: Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills -Landfill liners- Management of leachate and landfill gas- Leachate collection & treatment

TOTAL HRS : 45**TEXT BOOKS**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing

1	Integrated Solid Waste Management	George	McGraw-Hill Publishers, New Delhi	2002
---	-----------------------------------	--------	-----------------------------------	------

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Manual on Municipal Solid Waste Management, 2000, CPHEEO, Ministry of Urban Development, Government of India, New Delhi			
2	Municipal Solid Wastes – problems and Solutions	R.E.Landreth and P.A.Rebers	Lewis Publishers	1997

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To know about the principles of remote sensing and spectral signatures
2. To know about satellites, types of remote sensing and digital image processing
3. To study about the history and components of GIS
4. To study about data types and operations.
5. To know the applications of remote sensing and GIS for various applications on Civil Engineering.
6. To apply the concepts of DBMS in GIS.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Demonstrate the concepts of Electro Magnetic energy, spectrum and spectral signature curves.
2. Apply the concepts of satellite and sensor parameters and characteristics of different platforms.
3. Apply the concepts of DBMS in GIS.
4. Analyze raster and vector data and modeling in GIS.
5. Apply GIS in land use, disaster management, ITS and resource information system.

UNIT I**9**

GIS Technique And Data Input : Development of GIS – Components of GIS – Hardware, software- MAP – Types of Maps.

UNIT II**9**

Data Analysis And Modelling : Simple Analysis – Spatial Analysis – Overlay – Vector Data Analysis – Raster Data Analysis – Data Retrieval – Query –Modelling using GIS – Digital Elevation Model – Cost and path analysis – Expert Systems – Artificial Intelligence – Integration with GIS

UNIT III**9**

Data Output And Error Analysis : Data Output – Types – Devices used – Raster and Vector Display Devices – Printers – Plotters – Photo write Devices – Sources of Errors – Types of Errors – Elimination – Accuracies

UNIT IV**9**

GIS Applications In Resource Management: Fields of Applications – Natural Resources – Agriculture – Soil – Water Resources – Wasteland Management – Social Resources – Cadastral Records – LIS

UNIT V**9**

Advanced Gis Application : AM/FM – Utility Network Management – Integration with Remote Sensing – Knowledge based techniques – Multicriteria Techniques – Introduction to Object Oriented Data base Models.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Principles of GIS for Land Resources Assessment	Burrough P A	Oxford Publication, New York	2000
2	Fundamentals of Geographical Information Systems, Second Edition	Michael N Demers	John Wiley Publications.New York	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Geographical Information Systems Volume I and II, Second Edition	Paul A Longley, Michael F Goodchild	John Wiley Publications,New York	2001

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE7E08 CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT
3 0 0 3 100

COURSE OBJECTIVES:

At the end of this course the students should have learnt construction planning, Scheduling procedures and techniques, cost control monitoring and accounting, Quality control and safety during construction, Organization and use of project information

UNIT I

9

Construction Planning: Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems

UNIT II

9

Scheduling Procedures And Techniques: Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software

UNIT III

9

Cost Control Monitoring And Accounting: The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information

UNIT IV

9

Quality Control And Safety During Construction: Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

UNIT V

9

Organization And Use Of Project Information: Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
-------	---------------	----------------	-----------	--------------------

1	Construction Project Management Planning, Scheduling and Control	Chitkara, K.K	Tata McGraw-Hill Publishing Co., New Delhi	2002
2	Project Management for Construction–Fundamentals Concepts for Owners”	Chris Hendrickson and Tung Au	Prentice Hall, Pittsburgh	2000

REFERENCES

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Scheduling Construction projects	Willis. E.M.,	John Wiley and Sons, New York	2000
2	Financial and cost concepts for construction Management	Halpin, D.W	John Wiley and Sons New York	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

List of Department Elective Subjects
Eighth Semester

15BECE8E01

INDUSTRIAL STRUCTURES

3 0 0 3 100

COURSE OBJECTIVES:

1. This course deals with some of the special aspects with respect to Civil Engineering structures in industries.
2. To Know the different classification of industrial structures.
3. To Know the functional requirement of industrial structures.
4. To design Bunkers and silos.
5. To design the RC structures like Chimneys, bunkers and silos.
6. To know the principles of roof trusses.

COURSE OUTCOMES

1. At the end of this course the student shall be able to design some of the structures used in industries.
2. Special aspects with respect to Civil Engineering structures in industries.
3. The different classification of industrial structures.
4. The functional requirement of industrial structures.
5. Design Bunkers and silos.
6. Design the RC structures like Chimneys, bunkers and silos.

UNIT I

9

Planning : Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II

9

Functional Requirements : Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT III

9

Design of Steel Structures : Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV

9

Design of R.C. Structures : Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V

9

Prefabrication : Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
-------	---------------	----------------	-----------	--------------------

1	Reinforced Concrete Structural elements	Purushothaman .P.	Tata McGraw-Hill Publishing Company Ltd.New Delhi	2000
2	Design of Steel Structure	Pasala Dayaratnam	Oxford and IBH PublishingCo. New York	2002

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Buildings for Industry, vols. I and II	Henn W	London Hill Books	2000
2	Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi			
3	Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre,1982. Madras.			

WEBSITES:

10. <http://www.icivilengineer.com>
11. <http://www.engineeringcivil.com/>
12. <http://www.aboutcivil.com/>
13. <http://www.engineersdaily.com>
14. <http://www.asce.org/>
15. <http://www.cif.org/>
16. <http://icevirtuallibrary.com/>
17. <http://www.ice.org.uk/>
18. <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To introduce the basics of Earthquake Engineering
2. To introduce the engineering seismology, building geometrics & characteristics, structural irregularities,
3. To introduce tips on earthquake engineering - do's and don'ts
4. To introduce cyclic loading behaviour of RC, steel and pre-stressed concrete elements
5. To discuss code provisions and their application on different types of structures
6. To apply codal provisions on different types of structures

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Apply the basics of Earthquake Engineering
2. Demonstrate the dynamics of structural system under earthquake load
3. Analyze the influence of the structural / geometrical design in building characteristics
4. Demonstrate the cyclic loading behaviour of RC steel and pre-stressed concrete elements
5. Apply codal provisions on different types of structures.
6. Cyclic loading behaviour of RC, steel and pre-stressed concrete elements

UNIT I**9**

Single Degree Of Freedom Systems: Formulation of equation of motion, Free and forced vibrations, Damping, Types of Damping – Damped and undamped vibrations, Response to dynamic loading. Introduction of Free and forced vibration of undamped and damped MDOF systems

UNIT II**9**

Engineering Seismology: Elements of Engineering Seismology, Characteristics of Earthquake Engineering, Earthquake History, Indian Seismicity. Performance of structures under past earthquakes, Lessons learnt from past earthquakes.

UNIT III**9**

Seismic Analysis: Seismic Design Concepts- Calculation of base shear as per IS1893- Lateral Load analysis of building frames by Portal method and Cantilever method.

UNIT IV**9**

Earthquake Resistant Design: Concept of Earthquake Resistant Design, Provisions of Seismic Code IS 1893 (Part I), Response Spectrum, Design Spectrum, Design of Buildings.

UNIT V**9**

Ductile Detailing: Ductility- Assessment of Ductility- Member/ Element ductility, Structural Ductility- Factors affecting ductility-Ductile Detailing, Provisions of IS 13920.for beams, columns and footings-Special Confining Requirements.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Earthquake Resistant Design of Structures,	Agarwal and Shrikhande	Prentice Hall of India,	2007

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Structural Dynamics – Theory and Computations, Third Edition	Mario Paz	CBS publishers, New York	2007
2	Design of Earthquake Resistant Buildings	Agarwal Pankaj and Shrikhande Manish	Mc- Graw Hill Book Company, New York	2006
3	Dynamics of Structures	Humar J	Prentice Hall, India	2012
4	Dynamics of structures – Theory and applications to Earthquake Engineering	Anil K Chopra	Prentice Hall Inc, India	2001
5	Earthquake Tips	C V R Moorthy	NICEE, IIT Kanpur	2004
6	Dynamics of Structures, Second Edition	Clough R.W, and Penzien J,	McGraw – Hill International Edition, New Delhi	2003

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>

- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

15BECE8E03INTRODUCTION TO SOIL DYNAMICS AND MACHINE
FOUNDATIONS 3 0 0 3 100

COURSE OBJECTIVES:

At the end of this course the students should have learnt the vibration of elementary system, free and forced vibration, Waves and wave propagation, Dynamic properties of soils, Design procedures for foundation under reciprocating machines, Vibration isolation.

UNIT I

9

Introduction : Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping

UNIT II

9

Waves and Wave Propagation: Wave propagation in an elastic homogeneous isotropic medium-Raleigh, shear and compression waves-waves in elastic half space

UNIT III

9

Dynamic Properties of Soils: Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression - shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil- codal provisions

UNIT IV

9

Design Procedures: Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines

UNIT V

9

Vibration Isolation: Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location-isolation by barriers- active passive isolation tests.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Soil Dynamics and Machine Foundations	Swamisaran	Galgotia Publications Pvt. Ltd.Chennai	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of
-------	---------------	----------------	-----------	---------

				Publishing
1	Vibration Analysis and Foundation Dynamics	Kameswara Rao	Wheeler Publishing, New Delhi	2002
2	IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill,			
3	Foundation for machines	S. Prakash and T. Fennessey	McGraw-Hill, New Delhi.	2003
4	Hand book of Machine Foundations	Srinivasulu, P & Vaidyanathan	McGraw-Hill New Delhi	2007
5	Geotechnical Earthquake Engineering	Kramar S.L	Prentice Hall International series, Pearson Education (Singapore) Pvt. Ltd	2003
6	Dynamics Soil Tests and Applications	Kameswara Rao	Wheeler Publishing, New Delhi,	2000

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To make the students to gain the knowledge on quality of concrete, durability aspects, causes of deterioration.
2. To the assessment of distressed structures, repairing of structures and demolition procedures.
3. To gain the knowledge of available techniques and their application for strengthening or upgrading existing structural system
4. To conduct field monitoring and non-destructive evaluation of concrete structures.
5. To have a brief knowledge on various Nondestructive testing's.
6. To gain some knowledge on the different materials used for maintenance of structures.

COURSE OUTCOMES

1. Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.
2. Assessment of distressed structures, repairing of structures and demolition procedures.
3. Available techniques and their application for strengthening or upgrading existing structural system
4. Conducting field monitoring and non-destructive evaluation of concrete structures.
5. Knowledge on various Nondestructive testing's.

UNIT – I INTRODUCTION 9

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors.

UNIT – II DURABILITY OF STRUCTURES 9

Corrosion mechanism – diagnosis- causes and effects - cover thickness and cracking, measurements for corrosion - methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

UNIT - III MAINTENANCE AND REPAIR STRATEGIES 9

Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

UNIT - IV MATERIALS FOR REPAIR 9

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete.

UNIT - V TECHNIQUES FOR REPAIR AND REPAIR OF STRUCTURES 9

Non-destructive Testing Techniques , Corrosion protection techniques , Guniting and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning. Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure Engineered demolition techniques for Dilapidated structures - case studies

TOTAL HRS : 45

TEXT BOOK

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Repair of Concrete Structures	R.T.Allen and S.C.Edwards	Blakie and Sons, UK,	2011

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Rehabilitation of concrete structures	Dr.B.Vidivelli	Standard publishers, Chennai.	2011

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To be introduced to environmental impact assessment and the current legislation covering it.
2. To understand Prediction and Assessment of Impact.
3. To learn planning for mitigation of adverse impact on environment.
4. To Analyse case studies.
5. Through case studies, learn to present and explain the components and decision-making processes involved in environmental assessment.
6. To present and explain the components and decision-making processes involved in environmental assessment through various case studies.

COURSE OUTCOMES

At the end of the course the students will be able to:

1. Review the key concepts of environmental impact assessment and the current legislation covering it
2. Understand the Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna and Socio Economics
3. Plan options for mitigation of adverse impact on environment
4. Present and explain the components and decision-making processes involved in environmental assessment through various case studies.
5. Learn planning for mitigation of adverse impact on environment.
6. Analyse case studies.

UNIT I ENVIRONMENTAL ISSUES**9**

Water resources development and environmental issues – Environment in water resources project planning – Environmental regulations and requirements – The EIA (Environmental Impact Assessment) notification.

UNIT II EIA FUNDAMENTALS**9**

Environmental Impact Assessment (EIA) – Environmental Impact Statement – EIA in Project Cycle – Legal and Regulatory aspects in India according to Ministry of Environment and Forests – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA –Participation of Public and Non-Governmental Organizations in environmental decision making

UNIT III ENVIRONMENTAL IMPACTS**9**

Hydrological and water quality impacts – Ecological and biological impacts – Social and cultural impacts – Soil and landscape changes – Agro economic issues – Human health impacts – Ecosystem changes.

UNIT IV METHODS OF EIA**9**

EIA team formation – Development of scope, mandate and study design – Base line survey – Check lists – Ad hoc procedures – Network and matrix methods – Semi-quantitative methods – ICID checklist – Economic approaches – Environmental Impact Statement (EIS) preparation.

UNIT V ENVIRONMENTAL MANAGEMENT

9

In-stream ecological water requirements - Public participation in environmental decision making – Sustainable water resources development – Ecorestoration – Hydrology and global climate change – Human ecology – Ecosystem services – Environmental monitoring programs.

TOTAL HRS : 45

TEXT BOOKS

Sl.No	Name of the Book	Author Name	Publisher	Year
1	Environmental Impact Assessment	Canter, L.W	McGraw Hill International Edition, New York	2008
2	Environmental Impact Assessment	Barathwal, R.R	New Age International Publishers, New Delhi	2002

REFERENCES:

Sl.No	Name of the Book	Author Name	Publisher	Year
1	Handbook of Environmental Impact Assessment	Petts, J	Blackwell Science London	1999
2	Environmental Impact Assessment – Practical solutions to recurrent problems	Lawrence, D.P	Wiley-Inter Science, New Jersey	2003
3	Hydrology and global environmental change	Arnel, N	Prentice Hall, Harlow	2002

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

COURSE OBJECTIVES:

1. To impart knowledge on sources and characteristics of various industrial wastes and strategies for its prevention and control.
2. To know the Industrial waste generation patterns, as well as management and disposal techniques
3. To gain knowledge of Central and state pollution control board guidelines on industrial waste management
4. To know the schemes, incentives, policies on industrial waste management
5. To overview of product design for waste minimization
6. Cost benefit analysis of different waste management techniques

COURSE OUTCOMES

The students completing the course will have

1. An insight into the pollution from major industries including the sources and characteristics of pollutants
2. Ability to plan minimization of industrial wastes
3. Ability to design facilities for the processing and reclamation of industrial waste water.
4. Industrial waste generation patterns, as well as management and disposal techniques
5. Knowledge of Central and state pollution control board guidelines on industrial waste management.
6. To know the schemes, incentives, policies on industrial waste management

UNIT I**9**

Introduction: Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II**9**

Cleaner Production: Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III**9**

Pollution from Major Industries: Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV**9**

Treatment Technologies: Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

UNIT V**9**

Hazardous Waste Management : Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Wastewater Treatment	M.N.Rao & A.K.Dutta	Oxford - IBH Publication. New York	2002
2	Industrial Water Pollution Control	W.W. Eckenfelder Jr	McGraw-Hill Book Company, New Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Industrial Wastewater Systems Hand book	Stephenson R L and Blackburn J B., Jr	Lewis Publisher, New York	2000
2	Industrial Pollution Prevention Hand Book	H.M.Freeman	McGraw-Hill Inc., New Delhi	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

The students will

1. Develop an understanding of the classification, sources and effects of pollutants
2. Understand the fundamentals of meteorology
3. Study the principles and equipment description of control technologies
4. Review the sources and control of indoor air pollution.
5. To induce operational considerations under the processing and control monitoring.
6. To apply sampling techniques of gaseous contaminants.

COURSE OUTCOMES

At the end of the course the students will be able to:

1. Understand the sources and effects of key types of environmental pollutants
2. Have insight into fundamentals of meteorology
3. Appreciate different pollution control strategies
4. Understand indoor air pollution and be aware of the control technologies
5. Control noise pollution by specific measurements, standard and preventive measures.
6. Gain the knowledge on the principles and design of control of indoor/ particulate / gaseous air pollutant and its emerging trends

UNIT I**9**

Sources and Effects of Air Pollutants: Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

UNIT II**9**

Dispersion of Pollutants: Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III**9**

Air Pollution Control: Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV**9**

Air Quality Management: Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

UNIT V**9**

Noise Pollution: Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Air Pollution and Control Technologies	Anjaneyulu, D	Allied Publishers, Mumbai	2002
2	Environmental Pollution Control Engineering	Rao, C.S	Wiley Eastern Ltd., New Delhi	2002
3	Air Pollution Control	Rao M.N., and Rao H. V. N	Tata-McGraw-Hill, New Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Industrial Air Pollution Control Systems	W.L.Heumann	McGraw-Hill, New York	2001
2	Pollution Control in Process Industries	Mahajan S.P	Tata McGraw-Hill Publishing Company, New Delhi	2005
3	Environmental Engineering Vol. II	Garg, S.K	Khanna Publishers, New Delhi	2005
4	Pollution Control in Process Industries	Mahajan, S.P.	Tata McGraw-Hill, New Delhi	2004

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

OBJECTIVE

At the end of this course students should have learnt to plan for construction projects, schedule the activities using network diagrams and should have determined the cost of the project, control the cost of the project by creating cash flows.

UNIT I CONSTRUCTION PLANNING**9**

Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems

UNIT II SCHEDULING PROCEDURES AND TECHNIQUES**9**

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedence -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost tradeoffs -Improving the Scheduling process – Introduction to application software

UNIT III COST CONTROL MONITORING AND ACCOUNTING**9**

The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information

UNIT IV QUALITY CONTROL AND SAFETY DURING CONSTRUCTION**9**

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Basic elements of quality – management quality control, factors affecting quality of construction- safety management – common causes of accidents, safety precautions at construction sites.

UNIT V ORGANIZATION AND USE OF PROJECT INFORMATION**9**

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

TOTAL HRS : 45**TEXT BOOKS:**

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Construction Project Management Planning,	Chitkara, K.K	Tata McGraw-Hill Publishing	2008

	Scheduling and Control		Co., New Delhi.	
2	Project Management with CPM, PERT and Precedence Diagramming	Moder.J. C.Phillips and Davis	Third Edition Van No strand Reinhold Co	2005

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Scheduling Construction projects	Willis. E.M.	John Wiley and Sons.New York	2008
2	Financial and cost concepts for construction Management	Halpin, D.W	John Wiley and Sons, New York	2010
3	Project Management for Construction – Fundamentals Concepts for Owners	Chris Hendrickson and Tung Au	Engineers,Architects and Builders, Prentice Hall, Pittsburgh.	2003

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

COURSE OBJECTIVES:

1. To learn the fundamentals of traffic engineering
2. To learn the methods of intersection design
3. To learn the skills of traffic control
4. To be introduced to the different theories of traffic flow
5. To be aware of the importance of traffic safety
6. To be aware of traffic flow theory

COURSE OUTCOMES

Upon completing of this course, the students should be able to:

1. Carry out traffic studies
2. Design intersections
3. Implement traffic system management
4. Be aware of traffic flow theory
5. Enhance safety in all design aspects
6. The skills of traffic control

UNIT I

9

Introduction: Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

UNIT II

9

Traffic Surveys And Analysis : Surveys and Analysis - Volume, Journey time, Capacity, Speed and Delays, Origin and Destination, Parking Survey, Pedestrian Studies, Accident analysis and Safety Level of Services- applications and significance.

UNIT III

9

Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

UNIT IV

9

Geometric Design Of Intersections : Conflicts at Intersections, Classification of Intersections at Grade, - Chanallised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Chanallisation and Rotary design (Problems), Grade Separators

UNIT V

9

Traffic Management: Area traffic Management system- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)-enforcement and education.

TOTAL HRS : 45

TEXT BOOKS:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Highway Engineering,	Khanna K and Justo C E G	Khanna Publishers, Roorkee	2001
2	Traffic Engineering and Transport Planning	Kadiyali L	Khanna Technical Publications, Delhi	2000

REFERENCES:

Sl.No	Title of Book	Author of Book	Publisher	Year of Publishing
1	Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management			
2	Guidelines of Ministry of Road Transport and Highways, Government of India.			
3	A Course in Traffic Planning and Design	Subhash C.Saxena	Dhanpat Rai Publications, New Delhi	2002

WEBSITES:

- <http://www.icivilengineer.com>
- <http://www.engineeringcivil.com/>
- <http://www.aboutcivil.com/>
- <http://www.engineersdaily.com>
- <http://www.asce.org/>
- <http://www.cif.org/>
- <http://icevirtuallibrary.com/>
- <http://www.ice.org.uk/>
- <http://www.engineering-software.com/ce/>

1. To develop analytical skills for solving engineering problems
2. To teach the students the basic concepts of LPP,
3. To learn the techniques to solve transportation and Assignment problems
4. To make the students to study about the Integer Programming and Network Analysis
5. Analyse the results and propose recommendations to the decision-making processes in Management Engineering
6. To acquaint the student to solve problems in different environments and develop critical thinking

COURSE OUTCOMES(COS)::

1. To define and formulate linear programming problems and appreciate their limitations.
2. To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
3. To be able to build and solve Transportation Models, Assignment Models,
4. To construct linear integer programming models and discuss the solution techniques.
5. To formulate and solve problems as networks and graphs.
6. To be able to solve problems in different environments and develop critical thinking

UNI**T I LINEAR PROGRAMMING PROBLEM****(9)**

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method .

UNIT II TRANSPORTATION PROBLEM**(9)**

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM**(9)**

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING**(9)**

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS**(9)**

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

Total : 45**TEXT BOOKS:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013

2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010
---	----------------------------------	------------------------	------------------------------------	------

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES:

1. www.mathworld . Wolfram.com
2. www.mit.edu
3. www.nptel.com

OBJECTIVES:

1. To kindle analytical skills for solving engineering problems
2. To impart the knowledge about inventory models
3. To learn replacement models and simulation models
4. To provide techniques for effective methods to solve nonlinear programming and decision making.
5. To analyse the results and propose recommendations to the decision-making processes in Management Engineering
6. To enhance the students to solve problems using non integer programming.

COURSE OUTCOMES(COS)::

The students will

1. To be able to solve simple models in Inventory problems and Replacement problems.
2. To understand different queuing situations and find the optimal solutions using models for different situations.
3. Simulate different real life probabilistic situations using Monte Carlo simulation technique.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non integer programming.

UNIT – I INVENTORY MODELS**(9)**

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT – II NON LINEAR PROGRAMMING**(9)**

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT – III SIMULATION MODELS**(9)**

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving (M\1): (∞ \FIFO) , (M\M\c): (∞ \FIFO) Models.

UNIT -IV DECISION MODELS**(9)**

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT -V REPLACEMENT MODELS**(9)**

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time- Replacement of items that fail suddenly and completely.

Total : 45

TEXT BOOKS:

S.	AUTHOR(S) NAME	TITLE OF	PUBLISHER	YEAR OF
----	----------------	----------	-----------	---------

NO.		THE BOOK		PUBLICATION
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES:

1. www.mathworld . Wolfram.com
2. www.mit.edu
3. www.nptel.com

OBJECTIVES:

1. To gain knowledge in measures of central tendency.
2. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
3. To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
4. To understand the basic concepts of random processes which are widely used in IT fields.
5. To understand the concept of correlation and spectral densities.
6. To acquire the knowledge on random process in engineering disciplines.

COURSE OUTCOMES(COS):

1. Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
2. The students will have an exposure of various distribution functions, correlation and spectral densities.
3. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
4. To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
5. To apply the concept random processes in engineering disciplines.
6. To understand and apply the concept of correlation and spectral densities.

UNIT- I MEASURES OF CENTRAL TENDENCY AND PROBABILITY**(9)**

Measures of central tendency – Mean, Median, Mode - Standard Deviation

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT- II STANDARD DISTRIBUTIONS**(9)**

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.

UNIT -III TWO DIMENSIONAL RANDOM VARIABLES**(9)**

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT- IV CLASSIFICATION OF RANDOM PROCESS**(9)**

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT -VCORRELATION AND SPECTRAL DENSITIES (9)

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Veerarajan,T.	Probability, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld . Wolfram.com

OBJECTIVES:

1. To gain knowledge in measures of central tendency and probability.
2. To introduce the concept of random variable and functions of random variables.
3. To introduce the basic concepts of two dimensional random variables.
4. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
5. To introduce the basic concepts of classifications of design of experiments.
6. To sampling distributions and statistical techniques used in engineering and management problems.

COURSE OUTCOMES(COS):

1. The student gain the knowledge in measures of central tendency and probability
2. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
3. Understand the basic concepts of two dimensional random variables and apply in engineering applications.
4. Apply the concept of testing of hypothesis for small and large samples in real life problems.
5. Apply the basic concepts of classifications of design of experiments and statistical quality control.
6. Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

UNIT- I MEASURES OF CENTRAL TENDENCY AND PROBABILITY (12)

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration. Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem - Probability mass function - Probability density function.

UNIT- II STANDARD DISTRIBUTIONS (12)

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES (12)

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT- IV TESTING OF HYPOTHESIS (12)

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT- V DESIGN OF EXPERIMENTS (12)

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios Papoulis and S Unnikrishna Pillai	Probability Random variables and Stochastic Processes	McGraw-Hill Publications, New Delhi.	2002

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Walpole, R.E., Myers, R.H., Myers, S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearson Education Inc., Delhi.	2007
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education Inc., Delhi.	2014
4	Johnson, R.A, Irwin Miller	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEBSITES:

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld . Wolfram.com

OBJECTIVES:

1. To understand the fundamental knowledge of probability theory.
2. To introduce the concept of random variable and functions of random variables.
3. To introduce the basic concepts of two dimensional random variables.
4. To introduce the concepts of random processes and Markov chain
5. To understand the different Queuing models and solve problems

COURSE OUTCOMES(COS):

1. The student gain the knowledge in measures of central tendency and probability
2. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
3. Understand the basic concepts of two dimensional random variables and apply in engineering applications.
4. Understand the concepts of random process and markov chains
5. They will be able to solve the Queuing models
6. The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT- I PROBABILITY AND RANDOM VARIABLE (9)

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT- II STANDARD DISTRIBUTIONS (9)

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES (9)

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT -IV RANDOM PROCESS AND MARKOV CHAINS (9)

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains
- Transition probabilities - Limiting distributions.

UNIT-V QUEUEING THEORY (9)

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

Total : 45

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Ross,S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2 nd Edition, New Delhi.	2008
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross, D., Shortle, J. F., Thompson J.M. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons Inc., New Jersey.	2008
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006

WEBSITES:

<ol style="list-style-type: none"> 1. www.mathcentre.ac.uk 2. www.mathworld. Wolfram.com 3. www.mit.edu
--

COURSE OBJECTIVES:

1. Be able to understand basic knowledge of fuzzy sets and fuzzy logic
2. Be able to apply basic knowledge of fuzzy operations.
3. To know the basic definitions of fuzzy relations
4. Be able to apply basic fuzzy inference and approximate reasoning
5. To know the applications of fuzzy Technology.
6. To acquire the knowledge on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology

COURSE OUTCOME:

1. To gain the main subject of fuzzy sets.
2. To understand the concept of fuzziness involved in various systems and fuzzy set theory.
3. To gain the methods of fuzzy logic.
4. To comprehend the concepts of fuzzy relations.
5. To analyze the application of fuzzy logic control to real time systems.
6. The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZY SETS**(9)**

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – F u z z y functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZY SETS**(9)**

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZY RELATIONS**(9)**

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZY MEASURES**(9)**

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZY INFERENCE**(9)**

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

Total : 45**TEXT BOOK:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008
3	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman publishers, USA	1998

WEBSITES:

- | |
|--|
| <ol style="list-style-type: none">1. www.mathcentre.ac.uk2. www.mathworld. Wolfram.com3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm |
|--|

OBJECTIVES:

1. To understand the proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. To Learn about special type of matrices that are relevant in physics and then learn about tensors.
3. To introduce the Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
4. To introduce the concepts of fuzzy relations.
5. To make the students to analyse the application of fuzzy logic control to real time systems.
6. The acquaint the students to have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

COURSE OUTCOME:

1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. Learn about special type of matrices that are relevant in physics and then learn about tensors.
3. Get introduced to Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
4. Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
5. Students will master in calculus of variations and linear integral equations.
6. The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS**(8)**

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS**(8)**

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation - examples

UNIT III SPECIAL FUNCTIONS**(8)**

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre , Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS**(9)**

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS**(12)**

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green’s function – solution of a integral equation – integral equations of the convolution type – Abel’s integral equations – integro–differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

Total : 45**REFERENCES:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2013
2	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010
3	Stephenson, G, Radmore, P.M	Advanced Mathematical Methods for Engineering and Science students	Cambridge University Press India Pvt. Ltd., New Delhi	1990
4	Andrews, Larry C.	Special Functions of Mathematics for Engineers	Oxford Science publishers, New Delhi	1997

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld. Wolfram.com
3. www.nptel.ac.in

OBJECTIVES:

1. To introduce the concepts of special functions.
2. To find the solutions to partial differential equations and their applications
3. To study about mathematical physics and perturbation techniques
4. To learn replacement models and simulation models
5. To provide techniques for effective methods to solve nonlinear programming and decision making
6. To understand how to model and solve problems using non integer programming.

COURSE OUTCOMES(COS):

1. Students know the concepts of improper integrals, Beta and Gamma functions.
2. The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
3. Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS (9)

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS (9)

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT – III PERTURBATION TECHNIQUES (9)

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT -IV SIMULATION MODELS

(9)

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT V DECISION MODELS

(9)

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

Total : 45

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES:

1. www.mathworld.wolfram.com
2. www.efunda.com
3. www.nptel.ac.in

LINEAR ALGEBRA

1. To introduce the basic concepts of vector space
2. To know the fundamentals of linear Algebra
3. To solve system of linear equations
4. To study about the linear transformations
5. To introduce the concepts of inner product spaces
6. To give the knowledge on the importance of Linear Algebra

COURSE COURSE OUTCOMES(COS):

The student will be able to

1. To explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
2. To apply the fundamental concepts in their respective engineering fields
3. To visualize linear transformations as matrix form
4. To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
5. To articulate the importance of Linear Algebra and its applications in branches of Mathematics

UNIT I VECTOR SPACES (9)

General vector spaces, real vector spaces, Euclidean n -space, subspaces, linear independence, basis and dimension, row space, column space and null space,

UNIT II EIGEN VALUES AND EIGEN VECTORS (9)

Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS (9)

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS (9)

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES (9)

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

Total : 45

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES:

<ol style="list-style-type: none"> 1. www.sosmath.com 2. www.nptel.ac.in 3. www.mathworld.wolfram.com

**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(ONLY FOR BE CSE STUDENTS)**

OBJECTIVES:

1. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
2. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
3. To acquaint the student with Fourier transform techniques used in wide variety of situations.
4. To introduce the basic concepts of PDE for solving standard partial differential equations
5. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.
6. To develop the use of effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems

COURSE OUTCOMES(COS):

1. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
2. The learners can equip themselves in the transform techniques and solve partial differential equations
3. Understand how to solve the given standard partial differential equations.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
6. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT- I FOURIER SERIES**(10)**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT -II FOURIER TRANSFORM**(9)**

Fourier integral theorem (without proof) – Fourier transform pair –Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT- III PARTIAL DIFFERENTIAL EQUATIONS**(9)**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT- IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**(9)**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS

(8)

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

Total : 45

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES:

<ol style="list-style-type: none"> 1. www.sosmath.com 2. http://mathworld.wolfram.com/FourierSeries.html 3. www. nptel.ac.in

PURPOSE:

It provides techniques of writing and also trains the students to write without their influence of mother tongue. In addition to honing their skills as professional writers, students will develop technical vocabularies that will aid writing research articles and discussing articles produces by their peers.

OBJECTIVES:

1. To Develop abilities to write technically and expressively,
2. To Recognize writing as a constructive, meaningful process,
3. To Practise using reading strategies for effective writing.
4. To equip them to write for academic as well as work place context.
5. To enable students to be familiar with structure and style of formal written communication
6. To Improve their writing skills and be ready with documents related ideas and notions.

COURSE OUTCOMES(COS):

1. Construct simple sentences, correct common grammatical errors in written English.
2. Build confidence in English language by imbibing lexical and syntax rules.
3. Enrich their reading ability for effective writing.
4. Know the value of LSRW skills in document writing.
5. Understand the structure, content and format of technical documents.
6. Improve their writing skills and be ready with documents related ideas and notions.

UNIT – I BASICS OF WRITING**(7)**

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT – 2 PARAGRAPHS AND ESSAYS**(9)**

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT – 3 LETTERS, MEMOS AND EMAIL**(9)**

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT – 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS (9)

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT – 5 REPORTS AND RESEARCH ARTICLES (11)

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TEXT BOOK:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.N. Arora & Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP, New Delhi.	2014

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	David Morley	The Cambridge Intro. to Creative Writing	CUP, New Delhi.	2010
2	Graham King	Collins Improve Your Writing	Collins; First edition, UK	2009
3	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP, New Delhi.	2003

WEBSITES:

<http://www.stevpavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/> -Unit-I
<http://www.nyu.edu/classes/keefer/brain/net2.html> - Unit-I, II, & III
<https://www.udemy.com/technical-writing-and-editing/> - Unit-IV & V
<http://techwhirl.com/what-is-technical-writing/> - All Units

OBJECTIVES:

1. To inculcate the basics of brief history of Earth sciences
2. To divulge knowledge on the basics of structure of earth and earth's gravitational field.
3. To disseminate the fundamentals of magnetic field and thermal distribution of earth.
4. To introduce the concepts of seismology and seismic waves .
5. To impart the basic knowledge of oceans
6. To Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

OUTCOME:

1. Gain knowledge on the basics of history of Earth sciences.
2. Acquire knowledge on concepts of structure of earth and earth's gravitational field.
3. Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
4. Obtain knowledge on the basics of seismic waves.
5. Understand the basics of oceans and properties of sea water.
6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNIT I ORIGIN OF EARTH**(9)**

A brief history of the development of Earth Sciences . An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition

UNIT II STRUCTURE OF EARTH**(9)**

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy

UNIT III MAGNETIC FIELD AND THERMAL DISTRUBUTION OF EARTH**(9)**

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle

UNIT IV SEISMOLOGY (9)

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's

internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS (9)

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

Total: 45

TEXT BOOK:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A. Jacobs, R.D. Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES:

1. www.ocw.mit.edu 2. www.physicsclassroom.com 3. www.nptel.ac.in 4. www.physics.org
--

COURSE OBJECTIVES:

1. To disseminate the fundamentals of acoustic waves. (K)
2. To inculcate the characteristics of radiation and reception of acoustic waves. (K)
3. To divulge knowledge on the basics of pipe resonators and filters.(S)
4. To introduce the features of architectural acoustics.(S)
5. To impart the basic knowledge of transducers and receivers.(K)

COURSE OUTCOME:

1. Develop the idea of the fundamentals of acoustic waves.
2. Apply the concepts of radiation and reception of acoustic waves.
3. Explain the basic ideas of pipe resonators and filters.
4. Illustrate the basics of architectural acoustics..
5. Illustrate the transducers and receivers and its applications in various electronic devices.
6. Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION (9)

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales.Reflection and Transmission:Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES (9)

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers.Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS (9)

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS (9)

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION (9)

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser – microphone – moving coil electroynamics microphone piezoelectric microphone – calibration of receivers

Total: 45

TEXT BOOK:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lawrence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	John Wiley & Sons	4th edition 2000

REFERENCE:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	<u>E.</u> <u>Alton Everest &</u> <u>Ken Pohlmann</u>	Master Handbook of Acoustics	McGraw Hill Professional	6 th edition 2014

WEBSITES:

1. www.acousticalsociety.org 2. www.acoustics-engineering.com 3. www.nptel.ac.in 4. www.ocw.mit.edu
--

OBJECTIVES:

1. To understand about the fuel
2. To study about the alcohols and its importance in engine
3. To gain knowledge on the fuel gas and oils
4. To get the information on fuel cell
5. To understand electric, hybrid and solar cars
6. To Develop their knowledge in studies of vegetable oils

COURSE OUTCOMES(COS):

1. Students will know about the basic concepts of alternate fuels
 2. Students will know about the basic concepts of alcohols.
 3. Students will understand about fuel gas and oils
 4. Students can enrich their knowledge about the alternate fuels and energy systems
 5. Develop their knowledge in studies of vegetable oils
 6. Students knows about the importance of electric, hybrid and solar cars
-

UNIT I INTRODUCTION (9)

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS (9)

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS (10)

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications

UNIT IV VEGETABLE OILS (8)

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS (9)

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

Total: 45

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Jain, P.C. and Monika Jain	Engineering Chemistry	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
2.	Richard.L.Bechfold	Alternative Fuels	SAE International , USA	2002

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2 nd edition.	Gulf Professional Publisher, USA	2012
2.	Nagpal G.R	Power Plant Engineering	Khanna Publishers, Delhi.	2002

WEBSITES:

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. http://www.exergy.se/goran/hig/ses/06/alternative%20fuels

OBJECTIVES:

1. To make the students conversant with basics of Solid wastes and its classification.
2. To make the student acquire sound knowledge of different treatments of solid wastes.
3. To acquaint the student with concepts of waste disposals.
4. To develop an understanding of the basic concepts of Hazardous waste managements.
5. To acquaint the students with the basics of energy generation from waste materials.
6. To get the information on energy conservation.

COURSE OUTCOMES(COS):

1. Outline the basic principles of Solid waste and separation of wastes (K)
2. Identify the concepts of treatment of solid wastes (S)
3. Identify the methods of wastes disposals. (S)
4. Examine the level of Hazardousness and its management. (S)
5. Examine the possible of the energy production using waste materials. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLID WASTE

(9)

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTE TREATMENT

(9)

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTE DISPOSAL

(9)

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting
Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation,
Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases,
Waste landfill Remediation

UNIT IV HAZARDOUS WASTE MANAGEMENT

(9)

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE

(9)

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dara.S.S,Mishra.D.D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2.	<u>Frank Kreith, George Tchobanoglous</u>	Hand Book of Solid Waste Management- 2 nd edition	McGraw Hill Publishing Ltd., Newyork	2002
3.	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES:

- 1.www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
- 2.<http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
- 3.www.alternative-energy-news.info/technology/garbage-energy/

OBJECTIVES:

1. To make the students conversant about the green chemistry
2. To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
3. To acquaint the student with concepts of green technology.
4. To develop an understanding of the basic concepts of renewable energy resources.
5. To acquaint the students with the basic information on catalysis.
6. To inculcate the chemical principles in the field of engineering and technology

COURSE OUTCOMES(COS):

1. Outline the basic principles of green chemistry (K)
2. Examine the different atom efficient process and synthesis elaborately (S)
3. Apply the concepts combustion of green technology (S)
4. Identify and apply the concepts of renewable energy (S)
5. Apply the concepts of green catalysts in the synthesis (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I INTRODUCTION TO GREEN CHEMICAL PRINCIPLES (9)

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorosolvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES (9)

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III BIOTECHNOLOGY AND GREEN CHEMISTRY (9)

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES (9)

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V CATALYSIS IN GREEN CHEMISTRY (9)

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

Total: 45

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press , London	2010
2.	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry 2 nd edition	Anamaya publishers., New Delhi.	2007

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2.	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1 st edition	Academic Press, Elsevier., New Delhi.	2007
3.	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4.	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES:

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>

OBJECTIVES:

1. To make the students conversant with **the information on electrochemical material**.
2. To make the student acquire sound knowledge of **conducting polymers**.
3. To acquaint the student with concepts of Energy storage devices.
4. To develop energy storage devices.
5. To impart knowledge on basic principals of solar cells and its applications
6. To inculcate the chemical principles in the field of engineering and technology

COURSE OUTCOMES(COS):

1. Outline the basic principles of chemistry in **electrochemical material (K)**
2. Examine the properties of conducting polymers (S)
3. Apply the concepts of electrochemistry in storage devices. (S)
4. Identify the concepts of storage devices and its applications. (S)
5. Apply the suitable materials for the manufacturing of storage devices. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METAL FINISHING**(9)**

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning.

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS**(9)**

lectropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I**(9)**

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II**(9)**

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE**(9)**

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

Total: 45

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elsevier., UK	2007
2.	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M. Barak	Electrochemical Power Sources	IEEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
2.	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3.	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4.	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES:

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

OBJECTIVES:

1. To make the students conversant with **cement and lime** and its uses.
2. To make the student acquire sound knowledge of abrasives and refractories.
3. To acquaint the student with concepts of inorganic chemicals.
4. To develop an understanding of the basic concepts **explosives**.
5. To acquaint the students with the basics of **agriculture chemicals**.
6. To inculcate the chemical principles in the field of engineering and technology

COURSE OUTCOMES(COS):

1. Outline the basic chemistry of **cement and lime (K)**
2. Examine the uses of abrasives and refractories (S)
3. Identify the usage of the inorganic chemicals. (S)
4. Identify the concepts of explosives and smoke screens (S)
5. Identify the usage of the **agriculture** chemicals (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME**(9)**

Manufacture of Portland cement – setting and hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES**(9)**

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS**(9)**

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3 , caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES**(9)**

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS**(9)**

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Harikrishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2.	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCE BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2.	James A. Kent	Hand Book of Industrial Chemistry, 9 th edition	Van Nostrand Reinhold, New York.	1992
3.	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4.	S.D. Shukla and G.N. Pandey	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES:

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>

COURSE OBJECTIVES:

1. To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
2. To study decision structures and loops
3. To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
4. To understand the process and skills necessary to effectively deal with problem solving
5. To discuss in relation to writing programs
6. To study various program object and graphics based on python

COURSE COURSE OUTCOMES(COS):

Upon completion of the course, students will be able to:

1. Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
2. Structure simple Python programs for solving problems
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries
5. Read and write data from/to files in Python Programs
6. Understand various program object and graphics based on python

UNIT I	Fundamentals	9
---------------	---------------------	----------

The Universal Machine-Program power- What is Computer Science?-Hardware Basics- Programming Languages-Python-Inside Python program-Software Development Process- Example program- Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II	Decision Structures and Loops	9
----------------	--------------------------------------	----------

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III	Functions	9
-----------------	------------------	----------

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV	Sequences	9
----------------	------------------	----------

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V	Objects and Graphics	9
---------------	-----------------------------	----------

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

Total Hours: 45

References:

1. John Zelle, “ Python Programming: An Introduction to Computer Science”, 2nd Edition, Franklin & Associates, 2009
2. Mark Lutz, “Learning Python”, OReily, 2013
3. David Beazly & Brian K. Jones, “Python Cookbook”, OReily, 2013

COURSE OBJECTIVES:

1. To study concepts of Internet, IP addresses and protocols
2. To explain the concept of web page development through HTML
3. To introduce the PERL and explore its current strengths and Weaknesses
4. To write working Java code to demonstrate the use of applets for client-side programming
5. To study Internet telephony and various multimedia applications
6. To Elaborate on the principles of web page development

COURSE COURSE OUTCOMES(COS):

Upon completion of this course, the student will be able to:

1. Learn the advanced concepts& techniques of Internet and Java.
2. Analyze the requirements for and create and implement the principles of web page development
3. Understand the concepts of PERL
4. Implement client-side programming using java applets
5. Generate internet telephony based upon advanced concepts
6. Develop applications on internet programming based on java applets and scripts

UNIT I Introduction**9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML**9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, IFrame, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL**9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV Client-Server programming**9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony**9**

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP-

Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

References:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

COURSE OBJECTIVES:

1. To impart the fundamental concepts of Computer Animation and Multimedia
2. To study the graphic techniques and algorithms using flash
3. Explain various concepts available in 3D animation
4. Explain various devices available for animation
5. To study the multimedia concepts and various I/O technologies for concept development
6. To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Develop their creativity using animation and multimedia
2. Understand the concepts of Flash and able to develop animation using it
3. Understand about various latest interactive 3D animation concepts
4. Know the various devices and software available in motion capture
5. Understand the concept development process
6. Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I	Introduction	9
---------------	---------------------	----------

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II **Creating Animation in Flash** 9

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D Animation & its Concepts 9

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption 9

Formats – Methods – Usages – Expression – Motion Capture Software’s – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V	Concept Development	9
---------------	----------------------------	----------

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45

References:

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Computer Graphics, Multimedia and Animation-Malay K. Pakhira, PHI Learning Pvt Ltd, 2010
4. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

COURSE OBJECTIVES:

1. To study the basic parts of computer in detail
2. Introduce various peripheral devices available for computer and its detailed working concepts
3. Overview of various interfaces and other hardware overview
4. Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
5. To study basic concepts and methods in troubleshooting
6. To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

1. Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
2. Identify various peripheral devices available and its working
3. Understand various concepts of hardware and its interface and control
4. Perform basic installation of PC. Importance of maintenance is understood
5. Understand Various faults and failures are identified and troubleshooting in detail
6. Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I Introduction**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification

– Troubleshooting levels – FDD, HDD, CD ROM Problems.

Total Hours: 45

References:

1. B. Govindarajalu, “IBM PC Clones Hardware, Troubleshooting and Maintenance”, 2/E, TMH, 2002.
2. Peter Abel, Niyaz Nizamuddin, “IMB PC Assembly Language and Programming”, Pearson Education, 2007
3. Scott Mueller, “Repairing PC's”, PHI, 1992

COURSE OBJECTIVES:

1. To understand the basic requirements, installation and structure of gaming using Java
2. Discuss various aspects of safe cracker projects
3. Discuss various aspects of match game projects
4. Discuss various aspects of pizza delivery projects
5. Discuss various aspects of moon landing projects
6. Discuss the process of development of gaming using Java

COURSE OUTCOMES(COS):

Upon completion of the course, students will be able to:

1. Interpret various concepts of gaming based on Java
2. Design the frame and code to develop safe cracker project
3. Design the frame and code to develop match game project
4. Design the frame and code to develop pizza delivery project
5. Design the frame and code to develop moon landing project
6. Design and develop various games using Java

UNIT I	Introduction	9
---------------	---------------------	----------

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II	Safecracker Project	9
----------------	----------------------------	----------

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III	Match Game Project	9
-----------------	---------------------------	----------

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV	Pizza Delivery Project	9
----------------	-------------------------------	----------

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V	Moon Landing Project	9
---------------	-----------------------------	----------

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

Total Hours:
45

References:

1. Philip Conrod, Lou Tylee, "Programming Games with Java",2013
2. Timothy M.Right, "Fundamental 2D Game Programming with Java",Cengage Learning PTR,2015
3. Wayne Holder,Doug Bell, "Java Game Programming for Dummies",

Course Objectives

1. To understand the basic concepts of electric hybrid vehicle.
2. To gain the knowledge about electric propulsion unit.
3. To gain the concept of Hybrid Electric Drive-Trains.
4. To gain the different Energy Management Strategies.
5. To study about the efficiency manipulation in drives
6. To understand and gain the knowledge about various energy storage devices

Course COURSE OUTCOMES(COs):

1. Summarize the basic concepts in bioprocess Engineering.
2. Explain the concept of Hybrid Electric Vehicles.
3. Understand the concept of Hybrid Electric Drive-Trains.
4. Identify the different Energy Management Strategies.
5. Understand the concept of different Energy Storage devices.
6. Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2004
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2003

15BEEEOE02 ENERGY MANAGEMENT AND ENERGY AUDITING L T P C 3 0 0 3

Course Objectives:

1. To gain the knowledge about energy management.
2. To understand the basic concepts in economic analysis in energy management.
3. To understand the basic principles of energy audit.
4. To gain the knowledge about the basic concept of types of Energy Audit
5. To gain and Evaluate the different energy efficient motors
6. Understand the concept of Energy conservation.

Course COURSE OUTCOMES(COs):

At the end of this course, students will demonstrate the ability to

1. Understand the concept of Energy Management.
2. Analyze the different methods for economic analysis
3. Knowledge about the basic concept of Energy Audit and types.
4. Evaluate the different energy efficient motors
5. Understand the concept of Energy conservation.
6. Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice-lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

Text Book

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butterworth	<i>Energy Management</i>	<i>Heinemann Publications</i>	2007

Reference Books

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons, 7th Edition	2009
3	Paul o' Callaghan	Energy Management	Mc-Graw Hill Book Company – 1st edition	1998

Course Objectives

1. It deals with various types of Sensors & Transducers and their working principle
2. It deals with resistive transducers
3. It deals with capacitive transducers
4. It deals with inductive transducers
5. It deals with some of the miscellaneous transducers
6. It deals with characteristics of transducers

Course Outcomes (COs)

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
- 3 Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLENEOUS TRANSDUCERS

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2000
2	Patranabis. D	Sensors and Transducers	Prentice Hall of India	1999
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2000
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2001

Course Objectives

1. To understand the basic principles of PLC systems.
2. To gain the knowledge about data handling functions.
3. To gain the knowledge of storage techniques in PLC
4. To acquire the knowledge about how to handle the data and functions
5. To study about flow charts of ladder and spray process system
6. To understand the principles of PID.

Course Outcome

1. At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
2. To acquire the knowledge of storage techniques in PLC
3. Students know how to handle the data and functions
4. Students know about advanced controller in PLC applications
5. Students gather real time industrial application of PLC
6. Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006
---	---	--	---------	------

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2006

WEBSITE

<http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm>, - Introduction to programmable Logic controller

Course Objectives

1. To gain the knowledge about environmental aspects of energy utilization.
2. To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
3. To study about solar energy collectors and its storages
4. To study about the inter connected system in wind power
5. To understand the basic principles fuel cell, Geo thermal power plants.
6. To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Analyze the Energy Scenario in india
2. Understand the concept of Solar Energy
3. Understand the concept of Wind Energy
4. Understand the concept of Hydro Energy
5. Analyze the different energy sources
6. Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers ,Fourth edition	2010
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Fourth edition	2005
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2006
4	Mittal K.M	Non-Conventional Energy Systems	Wheeler Publishing Co. Ltd	1997

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objectives

1. To study the state variable analysis
2. To provide adequate knowledge in the phase plane analysis and also describing function analysis.
3. To study the analysis discrete time systems using conventional techniques.
4. To analyze the stability of the systems using different techniques.
5. To study the design of optimal controller.
6. To study the types of compensators

Course Outcomes

At the end of the course the student will be able to

1. understand the state variable analysis, Z- transform, state equation
2. Construct the frequency response of the system using various plots
3. Correlate the time and frequency domain specifications and effect of compensation
4. Design the different types of compensators using frequency response plots to stabilize the control system
5. Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems

○

UNIT 1 STATE VARIABLE ANALYSIS

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement – State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press	1992
4	George J. Thaler	Automatic Control Systems'	Jaico Publishers	1993

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J. Thaler	Automatic Control Systems	Jaico Publishers	1993
2	M.Gopal	Modern control system theory	New Age International Publishers	2002
3	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
4	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

1. To introduce students to the embedded systems, its hardware and software.
2. To introduce devices and buses used for embedded networking.
3. To study about task management
4. To learn about semaphore management and message passing
5. To study about memory management
6. To imparts knowledge on

Course Outcomes

At the end of the course the students will be able to

1. Understand overview of embedded systems architecture
2. Acquire knowledge on embedded system, its hardware and software.
3. Gain knowledge on overview of Operating system
4. Discuss about task Management
5. Gain knowledge about semaphore management and message passing.
6. Gain knowledge about memory management.

UNIT - I INTRODUCTION TO EMBEDDED SYSTEM

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT - II OPERATING SYSTEM OVERVIEW

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT - III TASK MANAGEMENT

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT - IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message

Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT - V MEMORY MANAGEMENT

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

REFERENCES

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

15BEEC_OE02

CONSUMER ELECTRONICS

3 0 0 3 100

Course Objectives

1. To study about various speakers and microphone
2. To learn the fundamental of television systems and standards
3. To learn the process of audio recording and reproduction
4. To study various telephone networks
5. To discuss about the working of home appliances
6. To familiarize with TV services like ISDN.

Course Outcomes

At the end of the course the students will be able to

1. Understand working of various type of loud speakers
2. Acquire knowledge on various types of picture tubes
3. Demonstrate the working of various optical recording systems
4. Distinguish various standards for color TV system
5. Acquire knowledge on various telecommunication networks
6. Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT – II TELEVISION STANDARDS AND SYSTEMS

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT – III OPTICAL RECORDING AND REPRODUCTION

Audio Disc – Processing of the Audio signal –read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT – IV TELECOMMUNICATION SYSTEMS

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT – V HOME APPLIANCES

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Text Book:

1.S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.

15BEEC_OE03

FUNDAMENTALS OF NANOTECHNOLOGY 3 0 0 3 100

Course Objectives

1. To familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application
2. To have a solid understanding of Nanotechnology concepts.
3. To introduce the basic concepts of Nanotechnology and its applications in various domain
4. To understand the molecular structure of carbon nano tube
5. To educate how to use Nanotechnology to solve real-world problems
6. To familiar with the structure and application of carbon nano tube

Course Outcomes

At the end of the course the students will be able to

1. Understand the basic concepts of Nanotechnology and its applications in various domain
2. Ability to develop how to use Nanotechnology to solve real- world problems
3. Understand solid understanding of Nanotechnology concepts
4. Understand the important concepts applicable to small electronic devices, their fabrication, characterization and application
5. Understand the molecular structure of carbon nano tube
6. Familiar with the structure and application of carbon nano tube

UNIT I-LIMITATIONS OF CMOS

Fundamentals of MOSFET devices-Scaling of CMOS-Limitations- Alternative concepts in materials – Structures of MOS devices: SOI MOSFET, FINFETs, Dual Gate MOSFET, Ferroelectric FETs.

UNIT II-MICRO AND NANOFABRICATION

Optical Lithography-Electron beam Lithography –Atomic Lithography– Molecular beam epitaxy-Nanolithography.

UNIT III-CHARACTERIZATION EQUIPMENTS

Principles of Electron Microscopes-Scanning Electron Microscope- Transmission Electron Microscope-Atomic Force Microscope-Scanning Tunneling Microscope.

UNIT IV-NANODEVICES-I

Resonant tunneling diodes –Single electron devices-Josephson junction- Single Flux Quantum logic-Molecular electronics.

UNIT V-NANODEVICES – II

Quantum computing: principles– Qbits-Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT-Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TEXT BOOK:

S.NO .	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nanoelectronics and information technology	Wiley-VCH. 3 rd Edition	2012

REFERENCES:

S.N O.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley-VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies)	Overseas Press	2002

3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003
---	----------------------------	--	-------------------	------

15BEEC_OE04

IMAGE AND VIDEO PROCESSING

3 0 0 3 100

OBJECTIVES

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study the image compression procedures.
4. To study the image segmentation and representation techniques.
5. To study the video processing fundamentals
6. To know the concepts of motion estimation

COURSE OUTCOMES(COS)::

1. Understand the image fundamentals and mathematical transforms necessary for image processing.
2. Understand the image enhancement techniques
3. Understand the image compression procedures.
4. Understand the image segmentation and representation techniques.
5. Understand the video processing fundamentals
6. Understand motion estimation concepts

UNIT

FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS Basic steps of Image processing systems sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2-D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models: Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding, wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based

motion estimation, multiresolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TEXTBOOKS

1. Gonzalez and Woods, "Digital Image Processing", 3rd edition Pearson
2. Yao Wang, Joern Ostermann and Ya-Qin Zhang, "Video processing and communication", 1st edition PHI

REFERENCE BOOKS

1. M. Tekalp, "Digital video Processing", Prentice Hall International
2. Anerozdemir, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", John Wiley & Sons
3. Chris Solomon, Toby Breckon, "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley & Sons,

Course Objectives

1. To learn the processing steps in fabrication of VLSI devices.
2. To learn the concepts of assembling and packaging for VLSI devices.
3. To impart a good knowledge in reactive plasma etching techniques and equipment.
4. To familiarize the students with the NMOS and CMOS IC technology.
5. To make the student acquire reactive Plasma Etching techniques and Equipment.
6. To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

1. List out various fabrication techniques
2. Understand the etching principle in IC fabrication
3. Gain knowledge on deposition and diffusion methods
4. Understand the process simulation and integration.
5. Assembling and packing techniques
6. various technologies used for fabricating VLSI devices

UNIT 1

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds} - V_{ds} relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II:

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III:

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IV:

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V:

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A.Pucknell, 2005, PHI.

2. Modern VLSI Design - Wayne Wolf, 3rd ed., 1997, Pearson Education.

REFERENCES:

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

Course Objectives

1. To study materials used for MEMS and its working
2. To study the fabrication process used for MEMS
3. To study the packaging process used for MEMS
4. To familiarize the students with various micro actuators and micro sensors.
5. To learn the survey of materials central to micro engineering.
6. To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

1. Appreciate the underlying working principles of MEMS devices.
2. Understand the working of Micro sensors and actuators
3. Explain the IC fabrication processes
4. Gain knowledge on bulk manufacturing
5. Understand the Design of Micro systems.
6. Design and model MEMS devices.

UNIT I-INTRODUCTION TO MEMS AND MICRO FABRICATION

History of MEMS Development, Characteristics of MEMS-Miniaturization-Microelectronics integration-Mass fabrication with precision. Sensors and Actuators-Energy domain. Sensors, actuators Micro fabrication-microelectronics fabrication process-Silicon based MEMS processes-New material and fabrication processing-Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process-structural and sacrificial material.

UNIT II-ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS

Conductivity of semiconductors, crystal plane and orientation, stress and strain-definition-Relationship between tensile stress and strain-mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam-longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III-ELECTROSTATIC AND THERMAL PRINCIPLES SENSING AND ACTUATION

Electrostatic sensing and actuation-Parallel plate capacitor-Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors- Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV-PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLES SENSORS AND ACTUATOR

Piezoresistive sensors- piezoresistive sensor material-stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO-Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation-Micro magnetic actuation principle-Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V - POLYMER AND OPTICAL MEMS

Polymers in MEMS - polyimide-SU-8 Liquid crystal polymer (LCP)-PDMS – PMMA-Parylene-Fluorocarbon, Application - Acceleration, pressure, flow and tactile sensors. Optical MEMS - passive MEMS Optical components - lenses - mirrors - Actuation for active optical MEMS.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K. Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & Sons	2001

Course Objectives

1. To introduce the basic concepts of neural networks and its applications in various domain
2. To educate how to use Soft Computing to solve real-world problems
3. To have a solid understanding of Basic Neural Network.
4. To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
5. To gain exposure in the field of neural networks and relate the human neural system into the digital world
6. To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

1. Understand the basic concepts of neural networks and its applications in various domains
2. Gain knowledge about learning process in Neural Networks
3. Apply perception concept in design
4. Design using ART phenomena
5. Gain knowledge on SOM concepts
6. Ability to develop the use of Soft Computing to solve real-world problems

UNIT I: INTRODUCTION TO NEURAL NETWORKS

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks

UNIT II LEARNING PROCESS

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm

UNIT IV ATTRACTOR NEURAL NETWORK AND ART

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP

UNIT V SELF ORGANIZATION

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements

REFERENCES:

1. Simon Haykin, "Neural Networks and Learning Machines" -3/E - Pearson/ Prentice Hall 2009
2. Satish Kumar- "Neural Networks : A Classroom Approach"-TMH-2008

3. Freeman J.A., Skapura D.M."Neural networks, algorithms, applications, and programming techniques" -Addition Wesley, 2005.
4. Laurene Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications" - Pearson/ Prentice Hall
5. Robert J Schalkoff-"Artificial Neural Networks,McGraw Hill"-1997

Course Objectives

1. To introduce the basic concepts of Fuzzy logic and its applications in various domain
2. To educate how to use Fuzzy computation to solve real-world problems
3. To have a solid understanding of Basic fuzzy models.
4. Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
5. To learn about applications on Fuzzy based systems
6. To familiarize with fuzzy fiction and de fuzzy fiction procedures

Course Outcomes

At the end of the course the students will be able to

1. Understand the basic concepts of Fuzzy logic and its applications in various domain
2. Gain knowledge on theory of Reasoning
3. Develop fuzzy controllers
4. Understand concepts of adaptive fuzzy control
5. Ability to develop how to use Fuzzy computation to solve real- world problems
6. Design fuzzy based model for any application

UNIT - I

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT – II

Theory Of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT - III

Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT - IV

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V**FUZZY BASED SYSTEMS**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TEXT BOOKS:

1. An Introduction to Fuzzy Control- D. Diankar, H. Hellendoom and M. Reinfrank- Narosa Publishers India, 1996.
2. Fuzzy Sets Uncertainty and Information- G. J. Klir and T. A. Folger- PHI IEEE, 1995.

Course Objectives:

1. To impart basic knowledge in bioprocess Engineering
2. To design the bioreactors for various operations.
3. To understand the principle and working of heat transfer equipments.
4. To extend the knowledge in principle of heat transfer inside a bioreactor
5. To construct the equipments used in mass transfer operations.
6. To learn the equipments used in separation process.

Course COURSE OUTCOMES(COs):

1. Summarize the basic concepts in bioprocess Engineering.
2. Design the bioreactors for various operations.
3. Develop the heat transfer equipments for Bioprocess Engineering.
4. Elaborate the principle of heat transfer in bioreactor.
5. Construct the equipments used in mass transfer operations.
6. Categorize the equipments used in separation process.

UNIT I ENGINEERING PROPERTIES AND STORAGE TANK (9)

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II REACTOR DESIGN (9)

Design of Air lift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III HEAT TRANSFER EQUIPMENTS (9)

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV MASS TRANSFER EQUIPMENTS (9)

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V SEPARATION EQUIPMENTS (9)

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotary drum drier and Swenson-walker crystallizer.

TEXTBOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications

1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw- Hill	2007
2	Don W. Green, Robert H. Perry	Chemical Engineer Handbook	The McGraw- Hill Companies,	2008

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline M. Doran	Bioprocess Engineering Principles	Academic Press	2013

Course Objectives

1. To learn the scope and importance of food processing.
2. To impart basic knowledge in different food processing methods carried out in the food tech companies.
3. To extend the brief knowledge in food conservation operations.
4. To study the methods of food preservation by cooling.
5. To familiarize the students on the concepts of preservation methods for fruits.
6. To create deeper understanding on preservation methods for vegetables.

Course Outcomes

1. Describe the scope and importance of food processing.
2. Outline the various processing methods for foods.
3. Extend the knowledge in food conservation operations.
4. Describe the methods of food preservation by cooling.
5. Summarize the preservation methods for fruits.
6. Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING (9)

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS (9)

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- microwave processing and aseptic processing- Infrared radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS (9)

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING (9)

Refrigeration, Freezing- Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of flow temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES (9)

Preprocessing operations-preservation by reduction of water content: drying/dehydration and concentration –chemical preservation –preservation of vegetables by acidification, preservation with sugar-Heat preservation–Food irradiation-Combined preservation techniques.

TEXTBOOKS

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	R.Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Woodhead Publishing Ltd	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin	1995

REFERENCE BOOKS

S.No	Author(s)Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

Course Objectives

- To learn the scope and importance of Molecular modeling.
- To impart basic knowledge in quantum mechanics.
- To familiarize the students on the concepts of molecular mechanics.
- To extend the brief knowledge in molecular dynamics simulation.
- To study the drug design by using modeling tools.
- To understand molecular docking and ligand based drug design methods

Course Outcomes

- Summarize the importance of Molecular modeling.
- Extend the knowledge in quantum mechanics
- Analyze the general features of molecular mechanics.
- Illustrate the molecular dynamics by using simple models.
- Outline the drug design by using modeling tools.
- Describe the molecular docking and ligand based drug design methods

UNIT-I MOLECULARMODELLING**(9)**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima

UNIT-II QUANTUMMECHANICS**(9)**

Introduction to the computational quantum mechanics; one electron atom, poly electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semiempirical methods.

UNIT-III MOLECULARMECHANICS**(9)**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non-bonded interactions; force field parameterization and transferability; energy minimization; derivative and non-derivative methods, applications of energy minimization.

UNIT-IV MOLECULARDYNAMICS**(9)**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamics simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT-V MODELLINGANDDRUGDESIGN**(9)**

Macromolecular modeling, design of ligands for known macromolecular target sites, Drug-receptor interaction, classical SAR/QSAR studies and their implications to the 3D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TEXTBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	Yvonne C. Martin, editor, Peter Willett	Designing bioactive molecules :three- dimension techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; Ha	1998

Course Objectives

1. To impart basic knowledge in Bioremediation.
2. To study the different bio filters and bio film processes.
3. To understand the concept of bioremediation for soil environment.
4. To extend the knowledge in filtration processes of bioremediation.
5. To learn about the bioremediation of metals.
6. To apply the concept of bioremediation to reduce pollution.

Course COURSE OUTCOMES(COs):

- Summarize the basic concepts in Bioremediation.
- Design the bio filters and bio film processes.
- Elaborate the concept of bioremediation for soil environment.
- Construct the filtration processes of bioremediation.
- Describe the bioremediation of metals.
- Outline the concept of bioremediation to reduce pollution.

UNIT-I OVERVIEW OF BIOREMEDIATION (9)

Pollution : Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT-II BIOFILM PROCESSES (9)

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes

UNIT-III BIOREMEDIATION FOR SOIL ENVIRONMENT (9)

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & In-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination

UNIT-IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMENT (9)

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream- Biofiltration, Bio-trickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters

UNIT-V BIOREMEDIATION OF METALS**(9)**

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Bioremediation, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann, B.E., and McCarty, P.L.,	Environmental Biotechnology : Principles and Applications.	McGraw Hill,	2001
2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill Education	1995

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Prescott, L.M., Harley, and Klein, D.A	Microbiology	McGraw- Hill Higher Education	2008

Course Objectives

- To learn the molecular structure of biological systems.
- To impart basic knowledge in conformation of nucleic acids.
- To familiarize the students on the concepts of conformation of proteins.
- To extend the brief knowledge in kinetics of ligand interactions.
- To understand the techniques for the study of biological structure & function.
- To study the transport and dynamics properties of biological systems.

Course Outcomes

- Summarize the importance of molecular structure of biological systems.
- Extend the knowledge in conformation of nucleic acids.
- Analyze the concepts of conformation of proteins.
- Illustrate the kinetics of ligand interactions.
- Outline the techniques for the study of biological structure & function.
- Describe the transport and dynamics properties of biological systems.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS (9)

Intramolecular bonds—covalent—ionic and hydrogen bonds—biological structures—general features — water structure— hydration — interfacial phenomena and membranes — self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS (9)

Primary structure—the bases—sugars and the phosphodiester bonds—double helical structure—A, B and Z forms—properties of circular DNA—topology—polymorphism and flexibility of DNA—structure of ribonucleic acids—hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS (9)

Conformation of the peptide bond—secondary structures—Ramachandran plots—use of potential functions—tertiary structure—folding—hydration of proteins—hydropathy index.

UNIT IV Energetics & Dynamics of Biological Systems (9)

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bimolecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES (9)

Techniques for the study of biological structure & function: Size and shape of macromolecules—methods of direct visualization—macromolecules as hydrodynamic particles—macromolecules diffusion—ultra centrifugation—viscometry—X-ray crystallography—determination of molecular structures, X-ray fibre diffraction—electron microscopy—neutron scattering—light scattering.

TEXTBOOKS:

S.No	Author(s)Name	Titleofthebook	Publisher	Year of Publications
1	RolandGlaser	Biophysics	Springer Science &Business Media	2001
2	MichelDaune	Molecular Biophysics: StructuresinMotion	Oxford University Press	1999
3	CharlesR.Cantor	BiophysicalChemistry, Part2:Techniques of theStudy ofBiologic StructureandFunction	W. H. Freeman and Company	1980

Course Objectives

- To understand the available tools and databases for performing research in bioinformatics.
- To expose students to sequence alignment tool in bioinformatics.
- To construct the phylogenetic trees for evolution.
- To get familiar with the 3D structure of protein and classification.
- To acquire basic knowledge in protein secondary structure prediction.
- To extend the brief knowledge in Micro array data analysis.

Course Outcomes

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.

UNIT I OVERVIEW OF BIOINFORMATICS**(9)**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases—contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**(9)**

Data retrieval with Entrez & DBGET/LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families; multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**(9)**

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**(9)**

Conceptual model of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by

comparativemodeling;secondary
predictionstrategies.

structureprediction;advancedproteinstructureprediction&

UNITV MICROARRAYDATAANALYSIS

(9)

Microarray

data,analysismethods;microarraydata,tools&resources;sequencesampling&SAGE.Bioinformatics
inpharmaceuticalindustry:informatics&drugdiscovery; pharmainformatics
resources.Basicprinciplesofcomputinginbioinformatics:runningcomputer
software;computeroperatingsystems;softwaredownloading &installation;database management.

TEXTBOOK

S.No.	Author (s) Name	Titleof thebook	Publisher	Year of Publication
1	Dan E. Krane, Micha L. Rayme	Fundamental Concepts of Bioinformatics	Pearsoneducation	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical GuidetotheAnalysisofGenes andProteins	Wiley-Interscience	2004
3	David W. Mount	SequenceandGenomeAnalysis	ColdSpringHarbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCEBOOKS

S.No.	Author (s) Name	Titleof thebook	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: MethodsandApplications	Springer Science & BusinessMedia	2007

Course Objectives

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nano devices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

Course Outcomes

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nano devices.
6. Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION**(9)**

Introduction, Scope and Overview, Length scales, Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANOPARTICLES**(9)**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications-MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/Dip-pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nanowires and Nanotubes.

UNIT III APPLICATIONS**(9)**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodesigns and Systems. Fabrication of Novel Biomaterials through molecular self assembly-Small scale systems for in vivo drug delivery-Future nanomachine.

UNIT IV NANOBIO TECHNOLOGY**(9)**

Clinical applications of nano devices. Artificial neurons. Real-time nanosensors-Applications in cancer biology. Nanomedicine. Synthetic retinal chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial
 Referenceto Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues
 Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues,
 Nanotechnology and Future Socio-economic challenges.

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	Freitas Jr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

Course Objective

1. To explain to the students about MEMS Technology, Present, Future and Challenges.
2. To gain a knowledge of basic approaches for microsystem design.
3. To gain a knowledge of state-of-the-art lithography techniques for microsystems.
4. To learn new materials, science and technology for microsystem applications.
5. To understand materials science for microsystem applications.
6. To understand state-of-the-art micromachining and packaging technologies.

Course Outcome

1. Students will explain MEMS Technology, Present, Future and Challenges.
2. Gain a knowledge of basic approaches for microsystem design
3. Gain a knowledge of state-of-the-art lithography techniques for microsystems
4. Learn new materials, science and technology for microsystem applications
5. Understand materials science for microsystem applications
6. Understand state-of-the-art micromachining and packaging technologies

UNIT I INTRODUCTION

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TEXT BOOKS

1. Chang Liu, "Foundations of MEMS", Pearson Education Inc., 2006.
2. Stephen D Senturia, "Microsystem Design", Springer Publication, 2000.
3. Tai Ran Hsu, "MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002.

REFERENCES

1. Nadim Maluf, "An Introduction to Micro Electro Mechanical System Design", Artech House, 2000.
2. Mohamed Gad-el-Hak, editor, "The MEMS Handbook", CRC press Baco Raton, 2000

3. Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, "Micro Sensors MEMS and Smart Devices", John Wiley & Son LTD, 2002
4. James J. Allen, "Micro Electro Mechanical System Design", CRC Press Publisher, 2010
5. Thomas M. Adams and Richard A. Layton, "Introduction MEMS, Fabrication and Application," Springer 2012.

Course Objective

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

Course Outcome

1. Develop the student's knowledge in various robot structures and their workspace.
2. Develop student's skills in performing spatial transformations associated with rigid body motions.
3. Develop student's skills in perform kinematics analysis of robot systems.
4. Provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. Provide the student with some knowledge and analysis skills associated with trajectory planning.
6. Provide the student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS

RGV, AGV; Implementation of Robots in Industries-Variou Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TEXT BOOKS

1. Klafter R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach", Prentice Hall, 2003.
2. Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2001.

REFERENCES

1. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.
2. Deb S.R., "Robotics Technology and Flexible Automation" Tata McGraw Hill Book Co., 1994.
3. Koren Y., "Robotics for Engineers", Mc Graw Hill Book Co., 1992.

4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.
5. Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.
6. Rajput R.K., “Robotics and Industrial Automation”, S.Chand and Company, 2008.
7. Surender Kumar, “Industrial Robots and Computer Integrated Manufacturing”, Oxford and IBH Publishing Co. Pvt. Ltd., 1991.

Course Objective

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES

Structuring the SC, SC and new products, functional roles in SC - SC design framework - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TEXT BOOKS

1. Shari.P.B and Lassen.T.S, "Managing the global supply chain", Viva books, New Delhi, 2000.
2. Ayers.J.B, "Hand book of supply chain management", The St. Lencie press, 2000.

REFERENCES

1. Nicolas.J.N, "Competitive manufacturing management - continuous improvement", Lean production, customer focused quality, McGrawHill, New York, 1998.
2. Steudel.H.J and Desruelle.P, "Manufacturing in the nineteen - How to become a mean, lean and world class competitor", Van No strand Reinhold, New York, 1992.

Course Objective

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

Course Outcome

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS

General overview of transport phenomena including various applications, Transport of momentum, heat and mass, Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion-Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. <https://laulima.hawaii.edu/portal>

Course Objective

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

Course Outcome

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

REFERENCES

1. Duane Knudson, "Fundamentals of Biomechanics", Springer Science+ Business Media, LLC, 2007
2. C. Ross Ethier Craig A. Simmons, "Introductory Biomechanics", Cambridge University Press, 2007

Course Objectives:

1. To impart knowledge on the constructional details and principle of operation of various automobile components.
2. To learn the function and working of various components in transmission and drive lines.
3. To study the concept and working of steering and suspension systems in an automobile.
4. To give knowledge on the wheels, tyres and brakes of automobiles.
5. To provide information on the current and future trends in automobiles.
6. Identify and explain the types of steering system.

Course COURSE OUTCOMES(COs):**Upon successful completion of the course, the students should be able to:**

1. Demonstrate the operating principles and constructional details of various automobile components.
2. Explain the function and working of components in transmission and drive lines.
3. Identify and explain the types of steering system.
4. Identify and explain the types of suspension system.
5. Classify and describe the types of wheels, tyres and brakes of automobiles.
6. Discuss the current and future trends in the automobiles.

UNIT-I ENGINE AND FUEL FEED SYSTEMS

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT –II TRANSMISSION SYSTEMS

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT -III SUSPENSION SYSTEM

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT-IV BRAKES

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan. V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment”, 3 rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

Course Objectives

1. The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
2. Construct the frames of two and three wheelers of different layouts.
3. Demonstrate the constructional details and principle of operation of various engine components.
4. Identify and explain the types of transmission systems.
5. Identify and explain the types of steering and suspension systems.
6. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

Upon successful completion of the course, the students should be able to:

1. Construct the frames of two and three wheelers of different layouts.
2. Demonstrate the constructional details and principle of operation of various engine components.
3. Identify and explain the types of transmission systems.
4. Identify and explain the types of steering and suspension systems.
5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
6. Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS

2 stroke and 4 stroke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

Course Objectives

1. The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.
2. Describe and differentiate the types of maintenance.
3. List the procedure for dismantling, servicing and assembling of engine components.
4. Demonstrate the servicing of transmission and driveline components.
5. Discuss the procedure for steering and suspension
6. Discuss the procedure for wheel and brake maintenance.

Course Outcomes

Upon successful completion of the course, the students should be able to:

1. Describe and differentiate the types of maintenance.
2. List the procedure for dismantling, servicing and assembling of engine components.
3. Demonstrate the servicing of transmission and driveline components.
4. Discuss the procedure for steering and suspension
5. Discuss the procedure for wheel and brake maintenance.
6. Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

Course Objectives:

1. To impart knowledge on trends in the vehicle power plants.
2. To learn the various advanced driver assistance systems.
3. To study the working of advanced suspension and braking systems in an automobile.
4. To give information about motor vehicle emission and noise pollution control.
5. To provide knowledge of the vehicle telematics.
6. To give information about the noise control techniques

Course COURSE OUTCOMES(COs):**Upon successful completion of the course, the students should be able to:**

1. Distinguish and describe the various modern vehicle power plant systems.
2. List and explain the various driver assistant mechanisms.
3. Identify and describe the working of advanced suspension and braking systems.
4. Apply the knowledge of motor vehicle emission and noise pollution control.
5. Describe the noise control techniques
6. Describe the vehicle telematics and its applications.

UNIT I TRENDS IN POWER PLANTS

Hybrid vehicles - Stratified charged / learn burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT VTELEMATICS

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION

1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems –Progress in Technology	Automotive Electronics Series,SAE, USA.	1998

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William B Riddens	“Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3.	Robert Bosch,	“Automotive HandBook”, 5 th Edition	SAE	2000

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING**9**

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES**9**

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS**9**

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL HRS : 45

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 2002.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 2001.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES**9**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS**9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN**9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS**9**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors –

Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION

9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL HRS : 45

TEXT BOOKS

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 2002.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2005.

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London, 2005.
3. National Building Code.

OBJECTIVES:

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

COURSE OUTCOMES(COS):

- Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
- The Coastal zone regulations, coastal processes and wave dynamics.
- Forecast waves and tides and plan coastal structures including harbours.
- To explain which scientific background values that are necessary for a successful planning,
- To apply knowledge about ecosystem values and management in the planning process,
- To plan and carry out a simplified consultation process for activities in the coastal zone

UNIT I. COASTAL ZONE 9

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II. WAVE DYNAMICS 9

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III. WAVE FORECASTING AND TIDES 9

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV. COASTAL PROCESSES 9

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V. HARBOURS 9

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL HRS : 45

TEXT BOOKS

1. Richard Sylvester, “Coastal Engineering, Volume I and II”, Elseiner Scientific Publishing Co., 2006
2. Quinn, A.D., “Design & Construction of Ports and Marine Structures”, McGraw-Hill Book Co., 2007

REFERENCES

1. Ed. A.T. Ippen, “Coastline Hydrodynamics”, McGraw-Hill Inc., New York, 2002
2. Dwivedi, S.N., Natarajan, R and Ramachandran, S., “Coastal Zone Management in Tamilnadu”

COURSE OBJECTIVES:

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

COURSE OUTCOMES(COS):

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS 9

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING 9

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES 9

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES 9

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE 9

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TEXT BOOKS

1. Dally J W and Riley W.F, Experimental stress Analysis, McGraw-Hill, Inc. New York, 2005.
2. Srinath L S et al, Experimental Stress Analysis, Tata McGraw-Hill Publishing co., Ltd., New Delhi, 2006.

REFERENCE BOOKS

1. Rangan C S et al., Instrumentation – Devices and Systems, Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 2002.
2. Sadhu Singh, Experimental Stress Analysis, Khanna Publishers, New Delhi, 2006.

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I. IRRIGATION SYSTEM REQUIREMENTS**9**

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II. IRRIGATION SCHEDULING**9**

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III. MANAGEMENT**9**

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV. OPERATION**9**

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL HRS : 45

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 2000

COURSE OBJECTIVES

1. Develop Parametric design and the conventions of formal engineering drawing
2. Produce and interpret 2D & 3D drawings
3. Communicate a design idea/concept graphically/visually
4. Examine a design critically and with understanding of CAD - The student learn to interpret drawings
5. to produce designs using a combination of 2D and 3D software.
6. Get a Detailed study of an engineering artifact

COURSE OUTCOME

The students will be able to

- a. Develop Parametric design and the conventions of formal engineering drawing
- b. Produce and interpret 2D & 3D drawings
- c. Communicate a design idea/concept graphically/visually
- d. Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
- e. Get a Detailed study of an engineering artifact
- f. Planning and designing of structures

UNIT I	INTRODUCTION	9
---------------	---------------------	----------

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II	COMPUTER GRAPHICS	9
----------------	--------------------------	----------

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

UNIT III	STRUCTURAL ANALYSIS	9
-----------------	----------------------------	----------

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV	DESIGN AND OPTIMISATION	9
----------------	--------------------------------	----------

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V	EXPERT SYSTEMS	9
---------------	-----------------------	----------

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables – Inference mechanisms - Simple applications.

TOTAL HRS : 45

TEXT BOOKS

1. Groover M.P. and Zimmers E.W. Jr., "CAD/CAM, Computer Aided Design and Manufacturing", Prentice Hall of India Ltd, New Delhi, 2005.
2. Krishnamoorthy C.S.Rajeev S., "Computer Aided Design", Narosa Publishing House, New Delhi, 2000

REFERENCES

1. Harrison H.B., "Structural Analysis and Design", Part I and II Pergamon Press, Oxford, 2002.
2. Rao S.S., "Optimisation Theory and Applications", Wiley Eastern Limited, New Delhi, 2002.
3. Richard Forsyth (Ed), "Expert System Principles and Case Studies", Chapman and Hall, London, 2000.

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I. TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM**9**

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and deflections in pavements under repeated loading

UNIT II. DESIGN OF FLEXIBLE PAVEMENTS**9**

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III. DESIGN OF RIGID PAVEMENTS**9**

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV. PERFORMANCE EVALUATION AND MAINTENANCE**9**

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By

Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V. STABILISATION OF PAVEMENTS

9

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL HRS : 45

TEXT BOOKS

1. Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna tech. Publications, New Delhi, 2007.
2. Croney, D., Design and Performance of Road Pavements, HMO Stationary Office, 2005.
3. Wright, P.H., “Highway Engineers”, John Wiley & Sons, Inc., New York, 2001
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 2003.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2001, The Indian Roads Congress, New Delhi.

Article I.

OBJECTIVES:

- To understand the role of geology in the design and construction process of underground openings in rock.
- To apply geologic concepts and approaches on rock engineering projects
- To identify and classify rock using basic geologic classification systems.
- To use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
- To sequential design process used in geotechnical engineering practice.
- To Require civil engineering students to read and summarize geologic literature for site specific projects.

COURSE OUTCOMES(COS):

- Understand the role of geology in the design and construction process of underground openings in rock.
- Geologic concepts and approaches on rock engineering projects
- Identify and classify rock using basic geologic classification systems.
- Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
- Sequential design process used in geotechnical engineering practice.
- Require civil engineering students to read and summarize geologic literature for site specific projects.

UNIT I. CLASSIFICATION AND INDEX PROPERTIES OF ROCKS**9**

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II. ROCK STRENGTH AND FAILURE CRITERIA**9**

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III. INITIAL STRESSES AND THEIR MEASUREMENTS**9**

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV. APPLICATION OF ROCK MECHANICS IN ENGINEERING**9**

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V. ROCK BOLTING**9**

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL HRS : 45**TEXT BOOKS**

1. Goodman P.E., "Introduction to Rock Mechanics", John Wiley and Sons, 2005.
2. Stillborg B., "Professional User Handbook for rock Bolting", Tran Tech Publications, 2006.

REFERENCES

1. Brow E.T., "Rock Characterisation Testing and Monitoring", Pergaman Press, 2002.
2. Arogyaswamy R.N.P., "Geotechnical Application in Civil Engineering", Oxford and IBH, 2000.
3. Hock E. and Bray J., "Rock Slope Engineering, Institute of Mining and Metallurgy", 1991.

COURSE OBJECTIVES:

1. To learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and prestressed concrete water tanks
2. To design the storage structures.
3. To gain knowledge of steel water tanks and their design.
4. To get a brief idea about concrete water tanks.
5. To design steel bunkers and silos
6. To design prestressed concrete water tanks

COURSE OUTCOMES(COS):

1. The design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and prestressed concrete water tanks
2. Design the storage structures.
3. Gain knowledge of steel water tanks and their design.
4. Get a brief idea about concrete water tanks.
5. Design steel bunkers and silos
6. Design prestressed concrete water tanks

UNIT I. STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation

UNIT II. CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III. STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV. CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V. PRESTRESSED CONCRETE WATER TANKS

9

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL HRS : 45

TEXT BOOKS

1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 2002.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 2000

REFERENCES

1. R.G.Hopkinson and J.D.Kay, “The Lighting of buildings”, Faber and Faber, London, 2000
2. William H.Seaverns and Julian R.Fellows, “Air-conditioning and Refrigeration”, John Wiley and Sons, London, 2000.

OBJECTIVES:

1. To understand the need of energy conversion and the various methods of energy storage
2. To explain the field applications of solar energy
3. To identify Winds energy as alternate form of energy and to know how it can be tapped
4. To explain bio gas generation and its impact on environment
5. To understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. To illustrate the concepts of Direct Energy Conversion systems & their applications.

COURSE OUTCOMES(COS):

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. Illustrate the concepts of Direct Energy Conversion systems & their applications.

UNIT I. INTRODUCTION**9**

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II. EFFECT OF WIND ON STRUCTURES**9**

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III. EFFECT ON TYPICAL STRUCTURES**9**

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV. APPLICATION TO DESIGN**9**

Design forces on multistorey building, towers and roof trusses.

UNIT V. INTRODUCTION TO WIND TUNNEL**9**

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL HRS : 45**TEXT BOOKS**

1. Peter Sachs, “Wind Forces in Engineering, Pergamon Press, New York, 2002.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 2005

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottawa, 2003

2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 2002.

COURSE OBJECTIVES:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

COURSE OUTCOMES(COS):

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT - I MODERN CONSTRUCTION METHODS**9**

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES**9**

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT - III MODERN CONSTRUCTION EQUIPEMENTS -I**9**

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting

UNIT - IV MODERN CONSTRUCTION EQUIPEMENTS -II**9**

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT - V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES**9**

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL HRS : 45**TEXT BOOKS**

1. Peurifoy, R. L., , Ledbette, W.B., Construction Planning , Equipment and Methods,
Mc Graw Hill Co., 2000.

2. Antill J.M., PWD, Civil Engineering Construction, Mc Graw Hill Book Co., 2005

REFERENCE

1. Varma, M Construction Equipment and its Planning & Applications, Metropolitan
Book Co., 2000

2. Nunnally, S.W., Construction Methods and Management , Prentice – Hall, 2000

3. Ataev, S.S., Construction Technology, MIR , Pub. 2000

B.E. COMPUTER SCIENCE AND ENGINEERING

SYLLABUS

2015 (REGULAR PROGRAMME)

Department of Computer Science and Engineering
FACULTY OF ENGINEERING



KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed University Established Under Section 3 of UGC Act 1956)
Pollachi Main Road, Eachanari post, Coimbatore - 641 021. INDIA Phone :
0422-6471113-5, 6453777 Fax No : 0422-2980022-3
Email : info@ karpagam.com Web : www.kahedu.edu.in

COURSE OBJECTIVES

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication
- To enable students to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence.

COURSE OUTCOMES

Upon completion of this course, the students will be able to:

- Effectively use English language for communication: verbal & non –verbal.
- Express comprehension and acquisition of speaking & writing ability.
- Improve the student confidence in using English language in real life situations.
- Develop word power: lexical, grammatical and communication competence.
- Prepare the students to write business letters and other forms of technical writing.
- Demonstrate the students to prepare for oral communication in formal contexts.

Unit I

(9)

Listening– Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II

(10)

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar**– Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary**– Compound Nouns/Adjectives – Irregular verbs.

Unit III

(10)

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV

(8)

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk.

Reading-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs.

Vocabulary – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES:

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

COURSE OBJECTIVES:

- To develop analytical skills for solving different engineering problems.
- To understand the concepts of Matrices, sequences and series.
- To solve problems by applying Differential Calculus and Differentialequations.
- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To acquaint the student with mathematical tools needed in evaluating integrals and their usage.
- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- understand matrices and its various functions
- Apply advanced matrix knowledge to Engineering problems.
- improve their ability in solving geometrical applications of differential calculus problems
- solve engineering problems involving hyperbolic functions, Beta and Gamma functions
- expose the concept of sequences and series
- apply differential and integral calculus to evaluate real world problems.

UNIT I MATRICES**(12)**

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS**(12)**

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III SEQUENCES AND SERIES**(13)**

Sequences: Definition and examples – **Series:** Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS**(12)**

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS**(11)**

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014

2	Sundaram, V. Lakhminarayan, K.A. & Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006
---	--	---	-----------------------------------	------

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES :

1. www.efunda.com 2. www.mathcentre.ac.uk 3. www.intmath.com/matrices-determinants 4. www. Intmath.com/calculus/calculus-intro.php

COURSE OBJECTIVES:

- To understand the properties of matter and thermodynamics
- To understand the fundamentals of quantum physics and their applications.
- To inculcate the characteristics of electronic materials through basics.
- To divulge knowledge on the basics of semiconducting materials for diode applications.
- To introduce the features of light interaction with semiconductor for optoelectronic applications.
- To impart the basic knowledge of new semiconducting materials for engineering applications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

- Develop the idea of quantum mechanics through applications.
- Apply the concepts of quantum theory for various methodologies.
- Explain the basic ideas of classical electron theory and energy band structures.
- Illustrate the basics of semiconductor physics and its applications in various electronic devices.
- Identify the basic properties and functioning of optical materials for optoelectronics.
- Summarize the features of low dimensional materials for engineering applications.

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS (9)

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending. Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS (9)

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER -CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III QUANTUM PHYSICS (9)

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS (9)

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS (9)

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications - Sonogram

Introduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	8 th Edition 2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	9 th Edition 2011

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

COURSE OBJECTIVES:

- To gain knowledge on adsorption phenomena.
- To make the students conversant with basics of water technology.
- To make the student acquire sound knowledge of electrochemistry and storage devices.
- To acquaint the student with concepts of fuels and rocket propellants.
- To develop an understanding of the basic concepts of corrosion science.
- To acquaint the students with the basics of surface chemistry.

COURSE OUTCOMES:

- Outline the basic principles of chemistry for water treatment (K)
- Examine the electrochemical properties to design non – conventional energy storage devices (S)
- Apply the concepts combustion of different fuels (S)
- Identify the concepts of corrosion and its protection in the engineering field (S)
- Apply the concepts of surface chemistry in the field of engineering (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY**(9)**

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES**(9)**

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode – Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries- **Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.**

UNIT III FUELS AND ROCKET PROPELLANTS**(9)**

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, **An introduction to Fuel Cell, $\text{H}_2\text{-O}_2$ Fuel Cell** - Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE**(9)**

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY**(9)**

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water- Applications of adsorption.

Total: 45

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Raman Sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., 3 rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:

- <http://www.studynotes.ie/leaving-cert/chemistry/>
- <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>
- <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>
- <http://ocw.mit.edu/courses/#chemistry>
- <http://www.chem.qmul.ac.uk/surfaces/sec>

COURSE OBJECTIVES:

- Identify and understand the working of key components of a computer system.
- Identify and understand the various kinds of input-output devices and different types of storage media commonly associated with a computer
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language
- Write small programs related to simple/ moderate mathematical and logical problems in 'C'.
- Study, analyze and understand simple data structures and how to use it in C language

COURSE OUTCOMES:

- Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer
- Write, compile and debug programs in C language and use different data types for writing the programs.
- Design programs connecting decision structures, loops and functions.
- Explain the difference between call by value and call by address.
- Understand the dynamic behavior of memory by the use of pointers.
- Use different data structures and create / manipulate basic data files and developing applications for real world problems.

UNIT I OVERVIEW OF COMPUTER (8)

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types-Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II OVERVIEW OF 'C' (8)

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program- Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III SELECTION AND ITERATION (9)

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop-break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV FUNCTIONS (10)

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V ARRAYS, STRINGS AND POINTERS (10)

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters, Introduction to pointers- declaration and Initialization of pointers-basic pointer examples.

REFERENCES:

1. E. Balagurusamy, “ Computing Fundamentals and C Programming”, TMH Education, 5th Edition, 2014
2. Yashavant Kanetkar, “ Let us C”, BPB Publications, 13th Edition, 2013
3. H. M. Deitel and D. J. Deitel, ‘C: How to Program’, Prentice Hall, 7th Edition, 2012
4. E. Balagurusamy, “ Programming in ANSI C”, TMH Education, 6th edition, 2012

***This course is offered in the first semester to the branches CSE, EEE, ECE and in the second semester to the branches CIVIL, MECH and AUTO.**

ENGINEERING PHYSICS

COURSE OBJECTIVES:

- To develop basic laboratory skills
- To demonstrate the application of physical principles.
- To learn the basic concepts in physics relevant to different branches of Engineering and Technology.
- To study the concept of semiconductor and conductivity.
- Explain the basic concepts of velocity of sound and compressibility of liquid
- To learn the properties of materials.

COURSE OUTCOME:

Upon completion of this course the students will be able to:

- Familiarize the properties of material and basic concepts in physics.
- Familiarize with the basic concepts of thermal conductivity, thermocouple, optical fibre and ultrasonic.
- Familiarize with the basic concepts of velocity of sound and compressibility of liquid
- Familiarize with the basic concepts of various Laser parameters
- Familiarize with the basic concepts of Torsional pendulum
- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY

COURSE OBJECTIVE

- To provide students with practical knowledge of quantitative analysis of materials
- Provide details of analysis done by classical and instrumental methods
- Study concepts of developing experimental skills in building technical competence.
- Study various conductometric and potentiometric titrations on various chemicals
- Determination of molecular weight and degree of polymerization
- Determination of corrosion rate by weight loss method.

COURSE OUTCOMES

Upon completion of this course, the students will be able to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity
- Determine conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt
- Understand all the concepts of developing experimental skills in building technical competence.
- Understand various conductometric and potentiometric titrations on various chemicals

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

COURSE OBJECTIVES:

- Study various tools like Text editor, Spread sheet and Power point presentation
- Determine methods to draw flowcharts and write Algorithms
- Provide methods to design and develop C problem solving skills
- Determine methods to trace and debug a program
- Determine methods to write C programs using functions and arrays
- Determine to use concepts of pointers,structures and files to write C programs

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

- Ability to use Text editor, Spread sheet and Power point presentation
- Ability to draw flowcharts and write Algorithms
- Ability to design and develop C problem solving skills
- Ability to trace and debug a program
- Ability to write C programs using functions and arrays
- Ability to use concepts of pointers,structures and files to write C programs

LIST OF EXPERIMENTS

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function

Total Hours: 45

COURSE OBJECTIVES:

- To understand the importance graphics in engineering
- To learn basic engineering drawing formats
- To develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
- To learn to take data and transform it into graphic drawings.
- To prepare the students to communicate effectively
- To explain students to use the techniques, skills, and modern engineering tools necessary for engineering practice

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- Know and understand the conventions and the method of engineering drawing.
- Interpret engineering drawings using fundamental technical mathematics.
- Construct basic and intermediate geometry.
- Improve their visualization skills so that they can apply these skill in developing new products.
- Improve their technical communication skill in the form of communicative drawings.
- Comprehend the theory of projection.

UNIT I INTRODUCTION**(3 + 10)**

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES**(3 + 10)**

SCALES:Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING**(3 + 12)**

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES**(3 + 12)**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS**(3 + 12)**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

INTRODUCTION TO DRAFTING SOFTWARE/PACKAGE (NOT FOR EXAM)**(4)**

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL: 75**TEXT BOOKS**

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEBSITES:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

COURSE OBJECTIVES:

- To motivate learners to acquire listening & speaking skills in both formal and informal context.
- To focus on various question forms
- To make them understand the importance of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading.
- To equip them to write for academic as well as work place context.
- To enable students to face interviews.

COURSE OUTCOMES:

Students undergoing this course will be able to:

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance their reading texts critically and analytically.
- Develop writing effectively and persuasively
- Producing different types of writing such as narrating, description, exposition and argument
- To produce creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.

UNIT-1**(10)**

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II**(8)****Listening**

– Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III**(9)**

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing - Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV**(8)**

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job

application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V

(10)

Listening – Types of listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	<u>Sangeeta Sharma ,</u> <u>Meenakshi Raman</u>	<u>Technical</u> <u>Communication:</u> <u>Principles</u> And <u>Practice</u> 2 nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES :

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

COURSE OBJECTIVES:

- To understand the concepts and applications of partial differential equations
- To have knowledge in integral calculus and Vector calculus
- To expose to the concept of Analytical function and Complex integration.
- To introduce sequence and series and Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To understand the concept of functions of several variables and vector identities.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage

COURSE OUTCOMES:

The student will be able to

- Solve problems in Fluid Dynamics, Theory of Elasticity, heat and mass transfer etc.
- Find the areas and volumes using multiple integrals
- Improve their ability in Vector calculus
- Expose to the concept of Analytical function.
- Apply Complex integration in their Engineering problems
- To understand the ideas of limits and continuity and an ability to calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.

UNIT- I PARTIAL DIFFERENTIAL EQUATIONS (11)

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II MULTIPLE INTEGRALS (11)

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS (13)

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelepipeds.

UNIT-IV ANALYTIC FUNCTIONS (12)

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION (13)

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES:

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolfram.com

COURSE OBJECTIVES:

- To understand the fundamentals of material science and their applications.
- To inculcate the characteristics of conducting materials
- To divulge knowledge on the basics of semiconducting materials for diode applications.
- To understand about dielectric materials
- To introduce the features of magnetic and superconducting materials.
- To impart the basic knowledge of new semiconducting materials for engineering applications.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

- Develop the idea of quantum mechanics through applications.
- Apply the concepts of quantum theory for various methodologies.
- Explain the basic ideas of classical electron theory and energy band structures.
- Illustrate the basics of semiconductor physics and its applications in various electronic devices.
- Identify the basic properties and functioning of dielectric materials and advances materials.
- Summarize the features new semiconducting materials for engineering applications.

UNIT I CONDUCTING MATERIALS (9)

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS (9)

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIAL (9)

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS (9)

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS (9)

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications.

Composite materials, Aircraft materials and non-metallic materials.

Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

Total: 45

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley & Sons Inc., New York.	9 th Edition 2013
2	James F Shackelford	Introduction to Materials Science for Engineers	Macmillan Publication Company, New York	8 th Edition 2014
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	8 th Edition 2005

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

COURSE OBJECTIVES

- To give a comprehensive insight into natural resources
- Understand ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures.
- Understand various Social issues and its effect on environment

COURSE OUTCOMES

Upon completion of this course the student will be able to:

- Prepare them to go eco-friendly and help preserving the nature and environment.
- Educate the means in preserving the environment.
- Understand the various types of pollution and environmental status.
- Enhance the fundamental knowledge on human welfare measures
- Sustainable and unsustainable development.
- Get an insight on various Social issues and how it effects the environment

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

(9)

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM

(9)

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY

(9)

Introduction to biodiversity, Definition- Genetic diversity, Species diversity, Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION

(9)

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT**(9)**

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health- Population growth, Variation of population among nations- Population explosion.

Total: 45**TEXT BOOKS:**

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	William P. Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Ltd., New Delhi.	2005
3.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

1. <http://people.eku.edu/ritchisong/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=120>
3. www.newagepublishers.com/samplechapter/001281.
4. www.unesco.org/ext/field/beijing/scienceb.htm, www.infinitepower.org/education.htm
5. <http://www.sciencedaily.com/news/top/environment/>

COURSE OBJECTIVES:

- To Identify and understand the working of key components of a computer program.
- To Identify and understand the various kinds of keywords
- To explain about different data types of C programming
- To Understand, analyze and implement software development tools like algorithm,
- To develop pseudo codes and programming structures.
- To Study, analyze and understand logical structure of a computer program, and different constructs to develop a program in “C” language.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

- Formulate simple algorithms for arithmetic and logical problems
- Translate the algorithms to programs (in C language)
- Test and execute the programs and correct syntax and logical errors
- Implement conditional branching, iteration and recursion
- Decompose a problem into functions and synthesize a complete program using divide and conquer approach
- Understand concept of computer graphics in C

UNIT-I POINTERS AND BUILT-IN-FUNCTIONS**(10)**

Introduction and features of pointers- Declaration of pointers- Void pointer- Array of pointers- Pointers to Pointers- Built-in-functions- String functions- Math functions- Character functions- Memory Management Functions- static and dynamic memory

UNIT-II STRUCTURES AND UNIONS**(8)**

Introduction and features of Structures- Declaration and initialization- Array of Structures- Pointers to structures- Passing structures as arguments to functions- Enumerated data type- typedef- Union

UNIT-III FILES**(7)**

Introduction- File operations- Open, read and close- Text modes- Binary modes- File functions- fprintf, fscanf, getc, putc, fgetc, fputc, fseek, feof- Command line arguments

UNIT-IV PREPROCESSOR DIRECTIVES**(10)**

The #define Statement- Program Extendability- Program Portability- The # Operator- The ## Operator- The #include Statement- System Include Files- conditional compilation- The #if, #endif, #else, #elif, #ifndef Statements- #error, #line and #undef Statement

UNIT-V GRAPHICS IN C**(10)**

Graphics and Text mode- Video Adapter- Initialize Graphics Mode and resolution, graphics.h header file-Functions for drawing a Point on Screen, drawing lines, rectangle, circles, arcs, polygon- Functions to fill colors- Display Text in Graphics mode, outtext(), outtextxy(), justifying text.

Total: 45+15=60

REFERENCES:

1. Yashavant Kanetkar, “Let us C”, BPB Publications, 13th Edition, 2013
2. H.M. Deitel and D.J. Deitel, ‘C:How to Program’, Prentice Hall, 7th Edition, 2012
3. A.P. Godse and D.A.Godse, “Advanced C Programming”, Technical Publications, 1st Edition, 2008
4. How to solve it by Computer by R.J. Dromey, Prentice-Hall India EEE Series, 2012

COURSE OBJECTIVES:

- To understand the operational characteristics of a Semiconductor in Equilibrium and Non-Equilibrium conditions.
- To understand the working of PN junction diodes and special purpose diodes.
- To understand the basic working physics of BJT and FET both in ideal and non-ideal conditions.
- To understand the working of Rectifiers and Voltage regulators.
- To understand the fabrication process of Monolithic ICs.
- To explain various applications of semiconductors in real time applications

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

- Understand the characteristics and operations of semiconductors
- Design and implement Combinational and Sequential diodes .
- Understand the process of transistors
- Understand the functions of field effect transistors
- Implement Thyristors and IC fabrication
- Implement various applications of semiconductors in real time applications

UNIT I SEMICONDUCTORS

(9)

Motion of Charged particle in electric, magnetic and combined fields- Semiconductor fundamentals - Fermi Level - Energy Band diagram - Intrinsic and Extrinsic Semiconductors- Carrier Concentration -Drift and Diffusion currents - Space charge effect.

UNIT II CHARACTERISTICS OF DIODES

(9)

Working and description of a PN diode- Diode Equation - Minority carrier Concentration - Varactor Diode - Avalanche and Zener Breakdown - Zener diode - Tunnel Diode -PIN diode - Photo diode - Photo voltaic cell - Light emitting diode - Liquid crystal display - Light dependant resistor- Thermistors.

UNIT III TRANSISTORS

(9)

Principle of transistor action - Current Components - Cut off, Active and saturation regions of a transistor - CE,CB,CC Configurations - Ebers Moll model of a BJT - Evaluation of H- parameters - Hybrid pi model - Charge control approach of Hybrid pi model - Transistor as a switch - Use of a heat sink.

UNIT IV FIELD EFFECT TRANSISTORS

(9)

Constructional features of a field effect transistor - theory of operation and current equations - VVR operation of a FET - MOSFET -Working and V-I Characteristics - Depletion and enhancement types -Threshold Voltage - Gate capacitance - MOS as a charge transferring Device - CCD, BBD -Power MOSFET-characteristics of UJT.

UNIT V THYRISTORS AND IC FABRICATION

(9)

Working and V-I characteristics features of Silicon Controlled Rectifier, DIAC, TRIAC, GTO - Device Technology - Planar process -Diffusion - Ion Implantation - Vapour Deposition - NMOS, PMOS Fabrication - Twin Tub Process of CMOS - Thick film and thin film Technology.

TEXT BOOKS :

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Millman and	Electronic devices	Tata McGraw	1994

	Halkias	and Circuits	Hill International	
2	G.K.Mithal	Electronic Devices and Circuits	Khanna Publishers	1999

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Street Man	Solid State Electronic Devices'	Prentice Hall Of India	1995
2	David A.Bell	Electron Devices and Circuits	Prentice Hall Of India	1995
3	Mathur Kulshrestha and Chadha	Electron devices and Applications and Integrated circuits'	Umesh Publications	1986
4	Thomas L. Floyd	Electron Devices	Charles and Messil Publications	1989
5	S.Salivahanan N.Sureshkumar A.Vallavaraj	Electronic devices and Circuits	Tata Mcgraw Hill	2010

COURSE OBJECTIVES:

- To identify and use of tools, types of joints in carpentry, fitting, tin smithy and plumbing operations.
- To demonstrate on Smithy operations, Foundry operations, Plumbing and Carpentry Works
- To understand of electrical wiring and components.
- To Observe the function of lathe, shaper,
- To practice drilling, boring, milling, grinding machines.
- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

COURSE OUTCOMES:

Upon completion of this course the students will be able to:

- To identify different Tools required for Wood working.
- Familiarize the students to different cutting fluids.
- Use the Cutting tools required for Metal working in the Fitting work.
- Identify the need for heating of the Mild Steel and to understand the Hot Working of the metals in Black Smithy
- Demonstrate Manufacturing practices on CNC Machine tools.
- Expose different types of solid state welding and other welding practices viz Arc welding, Gas welding, Brazing, Soldering etc.

PART – A (CIVIL & MECHANICAL)

- i. WELDING (6)**
 - i. Preparation of arc welding of butt joints, lap joints and tee joints.
- ii. BASIC MACHINING (6)**
 - i. Simple Turning and Taper turning
 - ii. Drilling and Tapping
- iii. SHEET METAL WORK (6)**
 - i. Model making – Trays, funnels, etc.
- iv. DEMONSTRATION ON (4)**
 - i. Smithy operations
 - ii. Foundry operations
 - iii. Plumbing Works
 - iv. Carpentry Works

PART –B (ELECTRICAL & ELECTRONICS)

- v. ELECTRICAL ENGINEERING (10)**
 - i. Study of electrical symbols and electrical equipments.
 - ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
 - iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
 - iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
 - v. Measurement of energy using single phase energy meter.
- vi. ELECTRONICS ENGINEERING (13)**
 - i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
 - ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
 - iii. Study of logic gates AND, OR, NOT, NOR and NAND.
 - iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapooovan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, Vikas Puplishing House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

COURSE OBJECTIVE:

- To Understand the basic concept of C programming
- To discuss different modules that includes Arrays, Strings, Functions, Pointers, Structures and File programming
- To understand the concept of Array and pointers dealing with memory management.
- To understand the concept of structures and unions through which derived data types can be Formed
- To understand and apply the in-built functions and customized functions for solving the problems.
- To learn graphics functions in C.

COURSE OUTCOME:

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, linking
- Able to execute a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Able to explain and apply the in-built functions and customized functions for solving the problems.
- Apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.

LIST OF EXPERIMENTS

1. Implementing simple C program for practicing pointers
2. Implementation of Structures
3. Implementation of array of structures
4. Implementation of pointers to structures
5. Implementation of recursion in C
6. Implementing programs for Passing arrays and structures to functions
7. Implementation of memory management functions in C
8. Working with math and character built-in functions
9. Implementation of file functions
10. Working with preprocessor directives
11. Implementation of C program to practice graphics functions

COURSE OBJECTIVES:

- To acquire the knowledge needed to test the logic of a program.
- To gain knowledge in the applications of expert system, in data base.
- To gain understanding on set theory and functions
- To provide understanding on various mathematical logics
- To provide adequate knowledge in class of functions, lattices and Boolean algebra
- To explain about Number theory and graph theory.

COURSE OUTCOMES:

- The student will gain the fundamentals about the logic of a programme.
- Be able to construct simple mathematical proofs
- Enrichment of the knowledge in applications of expert system, in data base.
- Gaining the adequate concepts in class of functions, lattices and Number theory
- Incrementally build sophisticated programs by a systematic design process based on discretemathematics.
- Permutations and combinations and Graph Theory.

UNIT- I Set Theory and Functions**9**

Basic concepts – Notation – Subset – The power set – Ordered pairs and Cartesian product – Relations on sets – Types of relations and their properties – Relation matrix and the graph of a relation – Equivalence relations – Composition of binary relations - Functions – Injective, Surjective, Bijective, Composition, Identity, Inverse and Characteristic function of a set – Permutation functions.

UNIT -II Mathematical Logic**9**

Basic connectives and truth tables – Tautologies – Logical equivalence and Implications – Propositional logic and First order Logic – Laws of logic – Rules of inference – The Predicate calculus – The Statement Function, Variables and Quantifiers – Predicate Formulas – Free and Bound Variables – The Universe of discourse.

UNIT- III Lattices and Boolean Algebra**9**

Lattices as Partially ordered sets – Hasse diagram – Some Properties of Lattices – Sublattices, Direct product and Homomorphism – Some Special Lattices - Boolean algebra – Definition and Examples.

UNIT -IV Number Theory**9**

Theory of Numbers – Prime – Composite – Perfect amicable numbers – The Sieve of Eratosthenes – Number of primes is infinite – Resolution of composite numbers in to prime factors – Divisor of a given number – Euler's function $\phi(N)$ – Highest power of prime p contained in $n!$ – Congruence – Fermat's theorem – Generalization of Fermat's theorem – Wilson's theorem – Lagrange's theorem. (Statements and simple problems only)

UNIT – VGraph Theory9

Graphs and graph models – Graph terminology and special types of graphs – Representation graphs and graph-isomorphism – connectivity – Matrix Representation of Graphs – Trees.

Total Hours: 45+15=60

Text Books:

1. Kenneth H Rosen, Discrete Mathematics and its Applications with Combinations and Graph theory, Tata McGraw - Hill Pub. Co. Ltd, New Delhi, Sixth Edition,2008

References:

1. Bernard Kolman, Robert, C., Busby and Sharan Cutler Ross, Discrete Mathematical Structures, Pearson Education Pvt. Ltd, New Delhi, Fifth Edition.2006
2. Tremblay, J. P. and Manohar, R , Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw–Hill Pub. Co. Ltd, New Delhi.2008
3. Ralph P Grimaldi, Discrete and Combinatorial Mathematics – An Applied Introduction Addison, Wesley Publishing Company, USA, Fifth Edition 2006
4. Thomas Koshy, Discrete Mathematics with Applications , Elsevier Academic Press, New Delhi. 2012
5. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PHI Learning Pvt. Ltd.,2004
6. V. K. Krishnan, Elementary Number Theory: A Collection of Problems With Solutions , Universities Press,2012

Websites:

1. www.mhhe.com/rosen
2. www.siam.org/books/series/dt.php
3. www.dmtcs.org/dmtcs-ojs/index.php/dmtcs

COURSE OBJECTIVES:

- Understand the properties of various data structures
- Identify the strengths and weaknesses of different data structures
- Design and employ appropriate data structures for solving computing problems
- Possess the knowledge of various existing algorithms
- Analyze and compare the efficiency of algorithms
- Possess the ability to design efficient algorithms for solving computing problems

COURSE OUTCOMES:

- Able to understand the basic properties of data structures
- Able to identify the strength and weakness of data structures
- Able to implement Linear data structures for singly linked list, stack and Queue
- Design and implement the basic search and sorting algorithms
- Able to implement non linear data structures for Binary Trees
- Design and employ non linear data structure for solving graph application

UNIT-1 Introduction to Data Structures and Algorithms 7

Arrays, Structures, Pointers to structures and Strings- Algorithm Development- Complexity Analysis- Recursion

UNIT-II Linear Data Structures 9

Abstract Data Type(ADT)-Definition- List ADT – Linked List- Operations-Creation-Insertion-Deletion- Doubly Linked List- Stack ADT-Definition-Implementation - Operations and Applications-Queue ADT- Definition-Implementation, Operations and Applications

UNIT-III Sorting and Searching 10

Bubble sort-Selection Sort-Insertion Sort-Merge Sort-Quick Sort- Running Time analysis of each sort – Linear Search-Binary Search-Hash Search Table

UNIT-IV Non Linear Data Structures-I 10

Trees-terminologies- binary Tree-Applications-Tree Traversals-Search Trees- Binary Search Tree- AVL Trees- Operations and Applications- B-Trees

UNIT-V Non Linear Data Structures-II 9

Graph-Definition-Terminologies- Graph Representations- Graph Traversals- Basic Algorithms- Shortest Path Algorithm- Minimum Spanning Tree Construction Algorithms-Prim's and Kruskal's- Bi-connectivity- Graph Applications

Total Hours: 45+15=60

Text Books:

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Pearson Education, 2nd Edition, 2011

References:

1. Richard.F., Gilberg A, Behrouz A., Forouzan, “Data Structures- A Pseudocode Approach with C”, Thomson Brooks, 2nd Edition, 2008
2. Aho Hopcroft and Ullman, “Data Structures and Algorithms, Pearson Education, 4th Edition, 2009

Websites:

1. <http://www.cs.auckland.ac.nz/software/AlgAnim/trees.html>
2. <http://www.itl.nist.gov/div897/sqg/dads/HTML/graph.html><http://www.cmpe.boun.edu.tr/~akin/cmpe223/chap2.htm>

COURSE OBJECTIVES:

- To learn the basics of binary number systems, Boolean functions and their simplification using K-map.
- To study, analyse and design combinational logic circuits
- To explain synthesis of the combinational circuits using HDL.
- The design issues of MSI devices are taught in detail
- To explain their synthesis using HDL are learnt.
- To study, analyze and design sequential circuits.

COURSE OUTCOMES:

- At the end of this course, the student will be able to:
- Perform arithmetic operations in any number system.
- Simplify the Boolean expression using K-Map and Tabulation techniques.
- Use Boolean simplification techniques to design a combinational hardware circuit.
- Design and analysis of a given digital circuit – combinational and sequential and a circuit using PLD
- Possess the ability to design an efficient digital circuit for simple real time applications

UNIT-I Number Systems**9**

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT-II Logic Gates And Combinational Circuits Logic Gates**9**

AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations –Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics –Tristate gates.

COMBINATIONAL CIRCUITS: Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA.

UNIT-III Sequential Circuit**9**

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State

assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers-Universal shift register – Shift counters – Ring counters.

UNIT-IV Asynchronous Sequential Circuits

9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT-V Memory Devices

9

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Field Programmable Gate Arrays (FPGA).

Total Hours: 45

Text Books:

1. Morris Mano.M Digital Design Prentice Hall of India Pvt. Ltd., New Delhi, 5th edition, 2013
2. Jain.R.P Modern Digital Electronics Tata McGraw–Hill publishing company limited, New Delhi, 4th edition, 2010

References:

1. John M .Yarbrough Digital Logic Applications and Design Thomson- Vikas publishing house, New Delhi 2003
2. Salivahanan.S and Arivazhagan.S Digital Circuits and Design Vikas Publishing House Pvt. Ltd, New Delhi, 3rd edition, 2009
3. Charles H.Roth Fundamentals of Logic Design Thomson Publication Company, New Delhi. 2013
4. Donald P.Leach and Albert Paul Malvino Digital Principles and Applications Tata McGraw Hill Publishing Company Limited, New Delhi, 7th edition, 2011
5. Thomas L. Floyd Digital Fundamentals Pearson Education, New Delhi, 8th edition, 2009

Websites:

1. http://www.allaboutcircuits.com/vol_2/chpt_9/2.html
2. <http://www.educyclopedia.be/electronics/digital.htm>

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven, and concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- Analyze and compare the efficiency of algorithms
- Possess the ability to design efficient algorithms for solving computing problems
- Explain simple Java programming environment, compile programs and interpret compiler errors.
- Explain syntax and use of the fundamental data types.

COURSE OUTCOMES:

- Able to use a simple Java programming environment, compile programs and interpret compiler errors.
- Able to understand and use the fundamental data types.
- Able to develop a program from a given design.
- Able to understand and implement the branching and looping statements
- Able to identify the objects and classes and apply in the suitable context.
- Able to develop a program from a given design

UNIT I Fundamentals of Object-Oriented Programming**9**

Object oriented programming concepts – Benefits of OOP-Applications of OOP- How Java Differs from C and C++- Java and Internet-Java and World Wide Web-Web Browsers-Hardware and Software Requirements-Java Support Systems-Java Environment

UNIT II Overview of Java Language**10**

Simple Java Program-An Application with Two Classes-Java Program Structure-Java Tokens-Java Statements-Installing and Configuring Java-Implementing a Java Program-Java Virtual Machine-Command Line Arguments-Programming Style

UNIT III Constants, Variables, and Data Types**10**

Constants-Variables-Data Types-Arithmetic Operators-Relational Operators-Logical Operators-Assignment Operators-Increment and Decrement Operators-Conditional Operator-Bitwise Operators-Special Operators-Arithmetic Expressions-Evaluation of Expressions-Mathematical Functions

UNIT IV Branching and Looping**8**

Decision Making with if Statement-Simple if Statement-The if...Else Statement-Nesting of if...Else Statements-The Else if Ladder-The Switch Statement-The ? : Operator-The While Statement-The Do Statement-The For Statement-Jumps in Loops-Labelled Loops

UNIT V Classes, Objects and Methods**8**

Text Books:

1. E. Balagurusamy, “Programming with Java”, 4th Edition, Tata Mc Graw Hill, 2010
2. C. Thomas Wu, “An Introduction to Object-Oriented programming with Java”, 5th Edition Tata McGraw-Hill Publishing company Ltd 2010
3. Yashawant Kanetkar, “Let Us Java”, 1st Edition, PBP Publications, 2012

References:

1. Cay S. Horstmann and Gary Cornel, “Core Java: Volume I – Fundamentals”, 8th Edition, Sun Microsystems Press, 2011
2. Timothy Budd “Understanding Object-oriented programming with Java” Pearson Education, 2nd edition, 2006
3. Herbert Schildt, “Java The Complete Reference”, Oracle Press, 8th edition, 2011

Websites:

1. <http://www.intap.net/~drw/cpp/>
2. <http://www.cplusplus.com/doc/tutorial/>
3. www.learncpp.com/

COURSE OBJECTIVES:

- An understanding of basic EE abstractions on which analysis and design of electrical and electronic circuits
- Explain systems including lumped circuit, digital and operational amplifier abstractions.
- The capability to use abstractions to analyze and design simple electronic circuits.
- The ability to formulate and solve the differential equations describing time behavior of circuits containing energy storage elements.
- An understanding of how complex devices such as semiconductor diodes and field-effect transistors are modeled and how the models are used in the design and analysis of useful circuits.
- The capability to design and construct circuits, take measurements of circuit behavior and performance, compare with predicted circuit models and explain discrepancies.

COURSE OUTCOMES:

- Understand the fundamentals of e.m.f, potential difference, current, resistance and energy conversions from one form to another. They should be able to calculate cost of energy consumption.
- Understand the basics of magnetic circuits and Identify the relationship between current and magnetic fields with application to determination of inductance.
- Apply the concept of electromagnetism to understand transformer operation and interpret the relationship between charge and electric fields with its application.
- Understand basic knowledge of sinusoidal quantities and phasors with their behavior and apply it to purely resistive, inductive and capacitive circuits.
- Analyze A. C. circuits, interpret relationship between voltage, current and power, examine concept of resonance, and analyze balanced three phase circuits.
- Analyze and solve D. C. networks by applying various laws and theorems.

UNIT I Electric Circuits & Measurements 9

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II Electrical Machines 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III Measuring Instruments 9

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV Semiconductor Devices And Applications 9

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics

UNIT V Digital Electronics

9

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

Total Hours: 45

Text Books:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, 2010.
2. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series, McGraw Hill, 6th edition 2013.

References:

1. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press, 2nd edition, 2011.
2. Mehta V K, “Principles of Electronics”, S.Chand & Company Ltd, 11th edition, 2008.
3. Mittle N., “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 2009.
4. Sedha R.S., “Applied Electronics”, S. Chand & Co., 2013.

COURSE OBJECTIVES:

- A competence to design, write, compile, test and execute straightforward programs using a high level language;
- An appreciation of the principles of object oriented programming;
- An awareness of the need for a professional approach to design
- Explain the importance of good documentation to the finished programs.
- Be able to implement, compile, test and run Java programs comprising more than one class, to address a particular software problem.
- Demonstrate the ability to use simple data structures like arrays in a Java program.

COURSE OUTCOMES:

- Understand the principles of OOP;
- Be able to demonstrate good object-oriented programming skills in Java;
- Be able to describe, recognise, apply and implement selected design patterns in Java;
- Be familiar with common errors in Java and its associated libraries.
- Able to develop a program from a given design
- Understand the capabilities and limitations of Java;

List of Experiments

1. Create Java package with simple stack and queue class
2. Write a Java program to perform Complex number manipulation
3. Write a Java program for Date class similar to java.util package
4. Write a Java program for implementing dynamic polymorphism in java
5. Write a Java program for ADT stack using Java interface
6. Write a Java program for DNA file creation
7. Develop a simple paint like program using applet
8. Develop a scientific calculator using java
9. Developing a template for linked list
10. Develop a multi threaded producer consumer Application
11. Write a Java program for generating prime numbers and Fibonacci series
12. Write a Java program for Multithreaded GUI application

Total Hours: 45

COURSE OBJECTIVES:

- To learn and understand basic digital design techniques.
- To learn and understand design and construction of combinational and sequential circuits.
- To understand the digital logic and create various systems by using these logics.
- Explain analysis and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- Explain how to analyze sequential digital circuits like flip-flops, registers, counters.
- Understand the importance and need for verification, testing of digital logic and design for testability

COURSE OUTCOMES

- Learn the basics of gates.
- Construct basic combinational circuits and verify their functionalities
- Apply the design procedures to design basic sequential circuits
- Able to analyze and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
- Able to analyze sequential digital circuits like flip-flops, registers, counters.
- Understand the importance and need for verification, testing of digital logic and design for testability.

List of Experiments

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices
4. Design and implementation of parity generator / checker using basic gates and MSI devices
5. Design and implementation of magnitude comparator
6. Design and implementation of application using multiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Coding combinational circuits using Hardware Description Language (HDL software required)
10. Coding sequential circuits using HDL (HDL software required)

Total Hours: 45

COURSE OBJECTIVES:

- Analyze performance of algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Determine which algorithm or data structure to use in different scenarios.
- Demonstrate understanding of the abstract properties of various data structures such as stacks, queues, lists, trees and graphs
- Use various data structures effectively in application programs.
- Demonstrate understanding of various sorting algorithms, including bubble sort, insertion sort, selection sort, heap sort and quick sort.

COURSE OUTCOMES:

- Able to understand the importance of structure and abstract data type, and their basic usability in different applications through different programming languages.
- Able to analyze and differentiate different algorithms based on their time complexity.
- Able to understand the linked implementation, and its uses both in linear and non-linear data structure.
- Able to understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Able to implement a given problem by applying the linear and non linear data structure
- Able to identify the strength and weakness of data structures.

List of Experiments

1. Implementation of List using Arrays
2. Implementation of Singly Linked List
3. Implementation of Linked Stack
4. Implementation of Linked Queue
5. Implementation of any two stack applications
6. Implementation of Insertion Sort
7. Implementation of Merge Sort
8. Implementation of Quick Sort
9. Implementation of Insertion operation in Binary Search Tree
10. Implementation of Tree Traversals
11. Implementation of Hashing with any one collision resolution method
12. Implementation of Dijkstra's Shortest Path Algorithm

Total Hours: 45

COURSE OBJECTIVES:

- Understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- Learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- Be able to explain a database and report on the process.
- Be able to teach how to write query in databases
- Know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- Possess the knowledge about the emerging trends in the area of distributed DB- OO DB- Data mining and Data Warehousing and XML.

COURSE OUTCOMES:

On successful completion of this module, the student should:

- Have gained knowledge and understanding of what is involved in the design of a database.
- Have gained knowledge and understanding of the models used for structuring data in database systems.
- Be able to implement a database and report on the process.
- Be able to query a database.
- Apply the database knowledge to avoid the concurrency and deadlock problems
- Able to apply the database knowledge in the up coming current trends.

UNIT-I	Introduction and Conceptual Modeling	9
---------------	---	----------

Introduction to File and Database systems- Database system structure –Introduction and concept Modeling-Database user Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT-II	Relational Model	9
----------------	-------------------------	----------

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design-Relational Models-Design issues – Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT- III	Data Storage and Query Processing	9
------------------	--	----------

Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree

– Query Processing. Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT- IV Transaction Management

9

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT- V Current Trends

9

Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

Total Hours: 45 +15 =60

Text Books:

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan” Database System Concepts”, McGraw-Hill, 6th edition,2011.
2. Raghuramakrishnan and Johannes Gehrke, “Database Management Systems”, 3rd Edition, McGraw Hill, 2002
3. Ramesh Elmasri, Shamkant B.Navathe, “Fundamentals of Database Systems”, 5th Edition, Pearson Education, 2008

References:

1. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom” Database System Implementation” Pearson Education, 2nd Edition,2013
2. Peter Rob and Corlos Coronel “Database System, Design Implementation and Management”, Thompson Learning Course Technology, 11th Edition,2014.

Websites:

1. <http://www.tutorialized.com/tutorial/DB2-Tutorial/>
2. <http://www.techtutorials.info/datadb2.html>

3. <http://www.firstsql.com/tutor.htm>
4. <http://sqlzoo.net/>

COURSE OBJECTIVES:

- To discuss the basic structure of a digital computer
- To study in detail the organization of the Control unit, the Arithmetic and Logical unit, the Memory unit and the I/O unit.
- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms
- To implement fixed-point and floating-point addition, subtraction, multiplication & division.
- To study in detail the different types of control and the concept of pipelining.

COURSE OUTCOMES:

The main goal of the course is for students to:

- Be able to understand simple circuits from logic formula.
- Understand the basics of assembly language.
- Understand the main concepts of computer architecture.
- Be able to explain how the various parts of a modern computer function and cooperate.
- Be able to exploit the advantages of an advanced computer memory having virtual memory and cache
- Implement assembly programs that accomplish basic computational and I/O operations.

UNIT- I Basic structure of computers**9**

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues.

UNIT- II Arithmetic unit**9**

Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.

UNIT- III Basic processing unit**9**

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Microprogrammed control - Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT- IV Memory system and i/o organization**9**

Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits-Serial Communication

Forms of Parallel Processing: Array Processors-Multiprocessors-Interconnection Networks :Single Bus-Crossbar NetworksMultistage Networks-Hypercube NetworksMesh Networks-Tree Networks Ring Networks-Memory Organization in Multiprocessors- Program Parallelism and Shared Variables-Performance Consideration: Amdahl's Law –Performance Indicators-Intel connection structure, intel connection arbitration

Total Hours: 45

Text Books:

1. Computer Organization and Architecture Designing for Performance, William Stallings, Pearson Education, New Delhi. 2013
2. Computer System Architecture , M. Morris Mano (3rd Edition), Prentice Hall, 2013

References:

1. Computer Organization, Carl Hamacher, Zvonko Vranesic and Safwat Zaky, McGraw-Hill,2012
2. Computer Organization and Design: The hardware / software interface, David A.Patterson and John L.Hennessy, Morgan Kaufmann, Pune.2011
3. Computer Architecture and Organization, John P.Hayes, McGraw Hill ,New Delhi , 2012

Websites:

1. www.eastaughts.fsnet.co.uk/cpu/structure-alu.htm
2. <http://e-articles.info/e/a/title/Types-of-Memory/www.comptechdoc.org/hardware/pc/begin/hwmemory.html>

COURSE OBJECTIVES:

- To have an understanding of foundations of design of assemblers, loaders, linkers, and macro processors
- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro processors.
- To understand the functions of Operating Systems and usage of system software tools

COURSE OUTCOMES:

- To have an understanding of foundations of design of assemblers, loaders, linkers, and macro processors
- To understand the relationship between system software and machine architecture.
- To know the design and implementation of assemblers
- To know the design and implementation of linkers and loaders.
- To have an understanding of macro processors.
- Explain the functions of Operating Systems and usage of system software tools

UNIT- I Introduction**9**

System software and machine architecture – The Simplified Instructional Computer (SIC) - XE - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

UNIT- II Assemblers**9**

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT- III Loaders and Linkers**9**

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT-IV Macro Processors**9**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT- V Operating system and system software tools

9

Basic Operating System Functions-Machine Dependent Operating System Features:Interrupt Processing-Process Scheduling-I/O Supervision- Machine Independent Operating System Features: File Processing, Operating System Design Options: Multiprocessor Operating Systems-Distributed Operating Systems-Object Oriented Operating Systems. Text editors - Editor Structure. - Interactive debugging systems

Total Hours: 45

Text Books:

1. Leland L. Beck, “System Software – An Introduction to Systems Programming “, Pearson Education Asia.3rd edition,2011

References:

1. Dhamdhare.D.M, “Systems Programming and Operating Systems “, Tata McGraw-Hill, New Delhi, 2009
2. John J. Donovan, “Systems Programming “, Tata McGraw-Hill , New Delhi, 2002

Websites:

1. http://www.omninerd.com/articles/PC_Bootstrap_Loader_Programming_Tutorial_in_ASM
2. www.tenouk.com/ModuleW.html

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven,
- To explain concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- To explain concurrent object-oriented programming in Java
- To describe event-driven programming
- To explain in detail event handling in the context of Java GUI programming

COURSE OUTCOMES:

To be able to describe & discuss advanced features of Java programming including:

- Able to understand and implement the concepts of interfaces and packages
- Able to implement a multithreaded program
- Able to manage exceptions for real time applications
- Able to design an event driven program using applet
- Able to use streams, buffers for handling I/O operations
- Able to design a complete Java program using the given design

UNIT I Interfaces and Packages**9**

Defining Interfaces-Extending Interfaces-Implementing Interfaces-Accessing Interface Variables-Java API Packages-Using System Packages-Naming Conventions-Creating Packages-Accessing a Package-Using a Package-Adding a Class to a Package-Hiding Classes-Static Import

UNIT II Multithreaded Programming**9**

Creating Threads-Extending the Thread Class-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Exceptions-Thread Priority-Synchronization

UNIT III Managing Errors and Exceptions**9**

Implementing the 'Runnable' Interface-Inter thread Communication-Types of Errors-Exceptions-Syntax of Exception Handling Code-Multiple Catch Statements-Using Finally Statement-Throwing Our Own Exceptions-Using Exceptions for Debugging

UNIT IV Applet and Graphics**9**

How Applets Differ from Applications-Preparing to Write Applets-Building Applet Code-Applet Life Cycle-Creating an Executable Applet-Designing a Web Page-Applet Tag-Adding Applet to HTML File-Running the Applet-Getting Input from the User-Event Handling-The Graphics Class-Introduction to AWT Package-Introduction to Swings

Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes-Using Streams-Other Useful I/O Classes-Using the File Class-Input/Output Exceptions-Creation of Files-Reading/Writing Characters-Reading/Writing Bytes-Handling Primitive Data Types-Concatenating and Buffering Files-Random Access Files-Interactive Input and Output-Other Streamclasses

Total Hours: 45+15=60

Text Books:

1. E. Balagurusamy, “Programming with Java”, 4th Edition, Tata Mc Graw Hill, 2010
2. C. Thomas Wu, “An Introduction to Object-Oriented programming with Java”, 5th Edition Tata McGraw-Hill Publishing company Ltd 2010
3. Yashawant Kanetkar, “Let Us Java”, 1st Edition, PBP Publications, 2012

References:

1. Cay S. Horstmann and Gary Cornell, “Core Java: Volume I – Fundamentals”, 8th Edition, Sun Microsystems Press, 2011
2. Timothy Budd “Understanding Object-oriented programming with Java” Pearson Education, 2nd edition, 2006
3. Herbert Schildt, “Java The Complete Reference”, Oracle Press, 8th edition, 2011

Websites:

1. <http://java.sun.com>.

COURSE OBJECTIVES:

- To create analytical skills, to enable the students to design algorithms for various applications, and to analyze the algorithms
- To introduce basic concepts of algorithms
- To introduce mathematical aspects and analysis of algorithms
- To introduce sorting and searching algorithms
- To explain applications of the algorithms and design techniques to solve problems
- To describe the complexities of various problems in different domains.

COURSE OUTCOMES:

The main goal of the course is for students to:

- Able to understand and implement the concepts of interfaces and packages
- Able to implement a multithreaded program
- Able to manage exceptions for real time applications
- Able to design an event driven program using applet
- Able to use streams, buffers for handling I/O operations
- Able to design a complete Java program using the given design

UNIT- I Basic Concepts of Algorithms 9

Introduction – Notion of Algorithm – Fundamentals of Algorithmic Solving – Important Problem types – Fundamentals of the Analysis Framework – Asymptotic Notations and Basic Efficiency Classes.

UNIT- II Mathematical Aspects and Analysis of Algorithms 9

Mathematical Analysis of Non-recursive Algorithm – Mathematical Analysis of Recursive Algorithm – Example: Fibonacci Numbers – Empirical Analysis of Algorithms – Algorithm Visualization.

UNIT -III Analysis of Sorting and Searching Algorithms 9

Brute Force – Selection Sort and Bubble Sort – Sequential Search and Brute-force string matching – Divide and conquer – Merge sort – Quick Sort – Binary Search – Binary tree- Traversal and Related Properties – Decrease and Conquer – Insertion Sort – Depth first Search and Breadth First Search.

UNIT- IV Algorithmic Techniques 9

Transform and conquer – Presorting – Balanced Search trees – AVL Trees – Heaps and Heap sort – Dynamic Programming – Warshall's and Floyd's Algorithm – Optimal Binary Search trees – Greedy Techniques – Prim's Algorithm – Kruskal's Algorithm – Dijkstra's Algorithm – Huffman trees.

UNIT- V Algorithm Design Methods 9

Backtracking – n-Queen’s Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem- P, NP and NP-Complete Problems

Total Hours: 45

Text Books:

1. Introduction to the Design and Analysis of Algorithm, Anany Levitin, Pearson Education, Asia, 3rd edition, 2014
2. The Design and Analysis Of Computer Algorithms, Aho A.V, J.E.Hopcroft and J.D.Ullman, Pearson Education Asia, New Delhi, 2013

References:

1. Introduction to Algorithms , Cormen.T.H, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd, New Delhi, 3rd edition, 2009
2. Computer Algorithms - Introduction to Design and Analysis, Sara Baase and Allen Van Gelder, Pearson Education, Asia, New Delhi, 2003
3. Fundamentals of Algorithmics, Bratley Paul, Brassard Gilles, Phi Learning, 1st Edition, 2009

Websites:

1. <http://www.ics.uci.edu/~eppstein/161/960312.html>
2. <http://cpp.datastructures.net/presentations/Analysis.pdf>
3. www.tsp.gatech.edu

COURSE OBJECTIVES:

- Understand the concepts of object-oriented, event driven, and concurrent programming paradigms
- Develop skills in using these paradigms using Java.
- To understand and implement the concepts of interfaces and packages
- To implement a multithreaded program
- Explain how to manage exceptions for real time applications
- Explain how to design an event driven program using applet

COURSE OUTCOMES:

- After completion of this course, the students would be able to
- Understand programming language concepts, particularly Java and object-oriented concepts.
- Write, debug, and document well-structured Java applications.
- Implement Java classes from specifications.
- Effectively create and use objects from predefined class libraries.
- Understand the behavior of primitive data types, object references, and arrays.
- Apply decision and iteration control structures to implement algorithms.

List of Experiments

1. Write a Java program for generating prime numbers and Fibonacci series
2. Write a Java program for finding greatest number among 3 numbers in java
3. Write a Java program for Overloading in Java
4. Write a Java program for Overriding in Java
5. Write a Java program for Exception Handling
6. Write a Java program for Multithreading
7. Write a Java program to show the connectivity with JDBC
8. Write a Java program for Overloading in eclipse
9. Write a Java program to implement Jtable
10. Write a program of an applet that receives two numerical values as the input from user and displays the sum of these two numbers.

Total Hours: 45

COURSE**OBJECTIVES:**

- To introduce the scientific computing
- Discuss various concepts covering some important aspects of solving equations, IVP, BVP.
- To implement the methods using the spread sheet in Excel
- To explain various numeric methods and find their solutions
- Explain how to work numerically on the ordinary differential equations
- Work numerically on the partial differential equations using different methods

COURSE OUTCOMES:

After completion of this course, the students would be able to

- To do the scientific computing to solving algebraic equations, IVP, BVP and also implement the methods using the spread sheet in Excel .
- Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
- Apply various interpolation methods and finite difference concepts.
- Work out numerical differentiation and integration whenever and wherever routine methods are not applicable
- Work numerically on the ordinary differential equations using different methods through the theory of finite differences.
- Work numerically on the partial differential equations using different methods through the theory of finite differences.

List of Experiments

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
 - i) Runge - Kutta 4th order method
 - ii) Modified Euler's method
 - iii) Milne's method
 - iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
 - i) Laplace Equation
 - ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
 - iii) One dimensional wave equation

Reference Books:

1. Curtis F. Gerald and Patrick O. Wheatley, Applied Numerical Analysis, Pearson Education, South Asia, 2009.
2. Steven C. Chapra, Raymond P. Canale, Numerical Methods for Engineers, McGraw - Hill Pub. Co. Ltd, 2014.

COURSE OBJECTIVES:

- Master the basic concepts and appreciate the applications of database systems.
- Master the basics of SQL and construct queries using SQL.
- Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
- Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
- Master sound design principles for logical design of databases, including the E-R method and normalization approach.
- Master the basics of query evaluation techniques and query optimization.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database, Populate and query a database using SQL DML/DDDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application.

List of Experiments

1. Data Definition Language (DDL) commands in RDBMS.
2. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
3. High-level language extension with Cursors.
4. High level language extension with Triggers
5. Procedures and Functions.
6. Embedded SQL.
7. Database design using E-R model and Normalization.
8. Design and implementation of Payroll Processing System.
9. Design and implementation of Banking System.
10. Design and implementation of Library Information System.
11. Database connectivity using JDBC
12. Database connectivity using ODBC

Total Hours: 45

COURSE OBJECTIVES:

- To have a thorough knowledge of processes, scheduling concepts, memory management, I/O and file systems in an operating system
- To have an overview of different types of operating systems
- To know the components of an operating system.
- To have a thorough knowledge of process management
- To have a thorough knowledge of storage management
- To know the concepts of I/O and file systems.

COURSE OUTCOMES:

- Understand device and I/O management functions in operating systems as part of a uniform device abstraction.
- Have an understanding of disk organization and file system structure.
- Be able to give the rationale for virtual memory abstractions in operating systems.
- Understand the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling.
- Understand the main mechanisms used for inter-process communication.
- Understand the main problems related to concurrency and the different synchronization mechanisms available.

UNIT- I Introduction**9**

Introduction – OS Concepts- OS Structures- kernel, shell-Evolution of OS- Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems - Hardware Protection - System Components – Operating System Services – System Calls – System Programs - Process Concept – Process Scheduling – Operations on Processes – Cooperating Processes – Inter-process Communication.

UNIT –II Scheduling**9**

Threads – Overview – Threading issues - CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling - The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors.

UNIT- IIIDeadlocks**9**

System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlocks - Storage Management – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging.

UNIT- IVVirtual Memory**9**

Virtual Memory – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing - File Concept – Access Methods – Directory Structure – File Sharing – Protection

UNIT- V File Systems**9**

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Kernel I/O Subsystems - Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management. Case Study: The Linux System, Windows 2000 –Introduction -UNIX

Total Hours: 45

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne“ Operating Systems
2. Andrew S. Tanenbaum, Albert S Woodhull, “The MINIX Book- Operating Systems Design and Implementation,” 3rd Edition, Pearson Education Pvt Ltd., 2006.

References:

1. Harvey M. Deitel, “Operating Systems” Pearson Education Pvt. Ltd, 2009.
2. Andrew S. Tanenbaum.” Modern Operating Systems”, Prentice Hall of India Pvt. Ltd, NewDelhi, 4th edition, 2014.
3. William Stallings, “Operating System”, Prentice Hall of India, 8th edition, 2014.

Websites:

1. <http://courses.cs.vt.edu/~csonline/OS/Lessons/index.html>
2. www.ee.surrey.ac.uk/Teaching/Unix/

COURSE OBJECTIVES:

- To introduce the architecture and programming of 8085 microprocessor.
- To introduce the interfacing of peripheral devices with 8085 microprocessor.
- To introduce the architecture and programming of 8086 microprocessor.
- To introduce the architecture, programming and interfacing of 8051 micro controller.
- Explain various analysis using assembly language programs
- Describe various assembly language programs

COURSE OUTCOMES:

- Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance.
- Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.
- Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
- Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
- Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
- Evaluate assembly language programs and download the machine code that will provide solutions real-world control problems

UNIT I Microprocessor- 8086**9**

Register Organization -Architecture-Signals-Memory Organization-Bus
Minimum Mode-Maximum Mode-Timing Diagram-Interrupts - Service
Interfacing concepts.

Operation-I/O Addressing-
Routines – I/O and Memory

UNIT II Programming of 8086**9**

Addressing Modes-Instruction format-Instruction set-Assembly language programs in 8086. RISC architecture – introduction to ARM Programming-register configuration and instruction set – sample program.

UNIT III Interfacing Devices

9

Programmable Peripheral Interface (8255) - Programmable Interval Timer (8254) - Programmable Interrupt Controller (8259A) - Programmable DMA Controller (8257) - Programmable Communication Interface (8251A) –Programmable Keyboard and Display Controller (8279).

UNIT IV Microcontroller-8051

9

Register Set-Architecture of 8051 microcontroller- I/O and memory addressing-Interrupts-Instruction set-Addressing modes. .

UNIT V Programming And Interfacing Of 8051

9

Timer-Serial Communication-Interrupts Programming-Interfacing to External Memory-Interfacing to ADC, LCD, DAC, Keyboard and stepper motor.

**Total Hours:
45**

Text Books:

1. K. Ray and K. M. Bhurchandi, Advanced Microprocessors and Peripherals. Tata McGraw Hill, New Delhi, 3rd edition, 2013.
2. Douglas V. Hall, Microprocessor and Interfacing: Programming and Hardware. Tata McGraw Hill, New Delhi 2007

References:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay The 8051 Microcontroller and Embedded Systems Pearson Education, New Jersey, 2nd edition, 2009
2. Krishna Kant, Microprocessor and Microcontroller Architecture, programming and system design using 8085, 8086, 8051 and 8096, PHI, New Delhi, 2008
3. Kenneth J. Ayala, The 8051 Microcontroller, Thompson Delmar Learning, New Delhi, 2007
4. Barry B. Brey, The Intel Microprocessors Architecture, Programming and Interfacing,
5. Pearson Education, New Delhi, 2007

Websites:

1. <http://www.8052.com/tut8051><http://www.eastaughs.fsnet.co.uk/cpu/index.htm>
2. <http://www.webphysics.davidson.edu/faculty/dmb/py310/8085.pdf>
3. http://www.aust.edu/cse/moinul/8086_lectures.pdf
4. <http://www.cache.com.hk/datasheetC8255ovview.html>

COURSE OBJECTIVES:

- Understand the division of network functionalities into layers.
- Be familiar with the components required to build different types of networks
- Be exposed to the required functionality at each layer
- Learn the flow control and congestion control algorithms
- To introduce the concepts, terminologies and technologies used in modern days data communication and computer networking.
- To understand the concepts of data communications.

COURSE OUTCOMES:

- To understand the division of network functionalities into layers
- To understand the concepts of data communications
- To understand the working of router
- Able to identify the ports used for transferring and receiving data
- Able to identify the flow control mechanism to be adopted in transport layer
- Able to understand the functions of application layer

UNIT- I Fundamentals & Link layer**9**

Building a network - ISO / OSI model - Requirements - Layering and protocols - Internet Architecture - Network software - Performance ; Link layer Services - Framing - Error Detection - Flow control

UNIT –II Media access & Internetworking**9**

Media access control - Ethernet (802.3) - Wireless LANs - 802.11 - Bluetooth - Switching and bridging - Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)

UNIT –III Routing**9**

Routing (RIP, OSPF, metrics) - Switch basics - Global Internet (Areas, BGP, IPv6), Multicast - addresses - multicast routing (DVMRP, PIM)

UNIT- IV Transport layer**9**

Overview of Transport layer - UDP - Reliable byte stream (TCP) - Connection management - Flow control - Retransmission - TCP Congestion control - Congestion avoidance (DECbit, RED) - QoS - Application requirements

UNIT –V Application layer**9**

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) - HTTP - Web Services - DNS – SNMP

Total Hours: 45+15=60**Text Books:**

1. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.
2. Andrew S. Tanenbaum, “Computer Networks”, Fifth Edition, 2011
3. William Stallings, “Data and Computer Communication”, Tenth Edition, Pearson Education, 2013

References:

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.

2. James F. Kurose, Keith W. Ross, "Computer Networking - A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher, 2011.

Websites:

1. <http://www.freeprogrammingresources.com/tcp.html>
2. <http://www.mcmse.com/cisco/guides/osi.shtml>
3. http://compnetworking.about.com/od/vpn/a/vpn_tunneling.htm

COURSE OBJECTIVES:

- To understand a finite automata for a given language.
- Discuss about a Turing machine
- To understand the relation between grammar and language
- To understand the basic principles of working of a compiler
- To study about the type checking procedure during the compilation
- To understand the storage structure of the running program

COURSE OUTCOMES:

Upon completion of the course, the students should be able to :

- Design a finite automaton for a specific language.
- Design a Turing machine.
- Select appropriate grammar for the implementation of compiler phases
- Design a lexical analyser, Design a simple parser
- Design and implement techniques used for optimization by a compiler.
- Write a very simple code generator

UNIT- I Introduction To Automata 9

Basics of String and Alphabets - Finite Automata (FA) – Deterministic Finite Automata (DFA)– Non-deterministic Finite Automata (NFA) – Conversion of NFA to DFA- Finite Automata with Epsilon transition-Equivalence and Minimization of Automata

UNIT- II Regular Expressions And Languages 9

Regular Expression – FA and Regular Expressions – Proving languages not to be regular –Pumping lemma for regular sets - Closure properties of regular languages- Decision Properties of Regular Languages

UNIT- IIIContext-Free Grammar And Languages 9

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata- Pumping Lemma for CFL - Closure Properties of CFL- Context Sensitive Grammar (CSG) & Languages

UNIT IV Properties Of Context Free Grammar 9

Normal forms for Context Free Grammar- Chomsky Normal Form- The Pumping lemma for Context free Languages- Closure properties of Context Free Languages-Inverse Homomorphism-Decision Properties of CFL

UNIT- V Turing Machine 9

Turing Machines – Introduction- Definition – Turing machine construction- Storage in Finite control-Multiple tracks- Subroutines-Checking of Symbols – Two way infinite tape-Undecidability .

Total Hours: 45+15=60

Text Books:

1. Hopcroft J.E, R.Motwani and J.D.Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, 2011.

References:

1. Lewis H.R and C.H.Papadimitriou, Elements of The theory of Computation, Pearson Education, PHI, 2009.
2. Martin J, Introduction to Languages and the Theory of Computation, TMH, 2010
3. Micheal Sipser, Introduction of the Theory and Computation, Edition,Thomson Brokecole,2012.
4. An Introduction to Formal Languages and Automata, 5th Edition, Peter Linz, 2011

Websites:

1. <http://www.regular-expressions.info/tutorial.html>
2. <http://www.cs.duke.edu/csed/jflap/tutorial/fa/nfa2dfa/index.html>
3. <http://web.cecs.pdx.edu/~harry/compilers/slides/LexicalPart3.pdf>

COURSE OBJECTIVES:

- Understand fundamental underlying principles of computer networking
- Understand details and functionality of layered network architecture
- Apply mathematical foundations to solve computational problems in computer networking
- Utilizing Network tools and simulator
- Explain computer networking concepts and vocabulary
- Explain the concept of protocols

COURSE OUTCOMES:

- Understand fundamental underlying principles of computer networking
- Understand details and functionality of layered network architecture
- Apply mathematical foundations to solve computational problems in computer networking
- Understands computer networking concepts and vocabulary
- Understands the concept of protocols
- Utilizing Network tools and simulator

List of Experiments

1. Implementation of Sliding Window Protocol.
2. Study of Socket Programming and Client - Server model
3. Write a code simulating ARP /RARP protocols.
4. Write a code simulating PING and TRACEROUTE commands
5. Create a socket for HTTP for web page upload and download.
6. Write a program to implement RPC (Remote Procedure Call)
7. Implementation of Subnetting .
8. Applications using TCP Sockets like Echo client and echo server
9. Applications using TCP and UDP Sockets like File Transfer
10. Study of Network simulator (NS3), Wireshark

Total Hours: 45

COURSE OBJECTIVES:

The student should be made to:

- Introduce ALP concepts and features
- Explain to write a program for 8085 Microprocessor
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Illustrate program for 8051 Microcontroller
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors

COURSE OUTCOMES

- Ability to write a program for 8085 Microprocessor
- Ability to write a program for 8086 Microprocessor
- Ability to determine the program for Interfacing
- Ability to write a program for 8051 Microcontroller
- Design and implement 8051 microcontroller based systems
- To Understand the concepts related to I/O and memory interfacing

List of Experiments

Minimum 12 Experiments to be conducted

1. Programs for 8/16 bit Arithmetic operations (Using 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Programs on Subroutines (Using 8086)
6. Interfacing ADC and DAC(Using 8085).
7. 8255 PPI.
8. Transfer data serially between two kits (8253/8251).
9. 8279 Keyboard & display
10. Temperature control.
11. Traffic Control.
12. 8259 Programmable Interrupt Controller.
13. Interfacing and Programming of DC Motor Speed control (8085/8051)
14. Interfacing and Programming of Stepper Motor and (8085/8051).
15. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.

Total Hours: 45

COURSE OBJECTIVE:

- Grasp a fundamental understanding of computer and operating systems
- Explain various Identify the services provided by operating system
- Learn basic shell programming
- Understand memory management
- Understand process concurrency and synchronization
- Learn the scheduling policies of operating systems

COURSE OUTCOMES:

- Identify the services provided by operating system
- Able to write programs on Shell Script
- Understand the internal structure of an operating system and be able to write programs
- Understand and solve problems involving key concepts and theories in operating systems
- Able to implement scheduling algorithms
- Able to understand the memory management concepts

List of Experiments

(Implement the following on LINUX platform. Use C for high level language implementation)

1. Shell programming
 - command syntax
 - write simple functions
 - basic tests
2. Shell programming
 - loops
 - patterns
 - expansions
 - substitutions
3. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir
4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
5. Write C programs to simulate UNIX commands like ls, grep, etc.
6. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
7. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time
8. Implement the Producer – Consumer problem using semaphores.
9. Implement some memory management schemes – I
10. Implement some memory management schemes – II
11. Case study: “awk” Scripting Language

COURSE OBJECTIVES:

- To know the fundamentals of cost analysis and economics.
- To learn about the basics of economics
- To understand cost analysis related to engineering so as to take economically sound decisions.
- To make the students to understand capital market, breakeven point analysis and depreciation
- Explain various financial statements and cost information
- Describe the concepts of the time value of money

COURSE OUTCOMES:

- Understand financial statements and cost information
- Understand the concept of the time value of money
- Understand money and its management
- Apply present worth analysis in evaluating alternatives apply annual worth analysis in evaluating alternatives
- Apply rate of return analysis in evaluating alternatives
- Apply the knowledge in cost analysis and changing economics situations

UNIT- I Fundamentals of Engineering Economics 9

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics- Demand and supply analysis-Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT- II Financial Management 9

Objectives and functions of financial management – financial statements, working capital management– factors influencing working capital requirements – estimation of working capital. Capital budgeting - Need for Capital Budgeting – Project Appraisal Methods - Payback Period – ARR – Time Value of Money.

UNIT- IIICapital Market 9

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions –Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT- IVNew Economic Environment 9

National Income – concepts – methods of calculating national income - Economic systems, economic Liberalization –Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT- V Cost Analysis And Break Even Analysis 9

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight

Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

Total Hours: 45

Text Books:

1. Ramachandra Aryasri .A, and V. V.Ramana Murthy,” Engineering Economics &Financial Accounting”, Tata McGraw Hill,—,New Delhi,2007
2. Varshney R. L., and K.L Maheshwari,” Managerial Economics”, Sultan Chand & Sons, New Delhi,1st edition,2008

References:

1. Samuelson and Nordhaus,” Economics”, Tata McGraw Hill, New Delhi,2009
2. Prasanna Chandra,” Fundamentals of Financial Management”, Tata McGraw Hill, New Delhi,8th edition,2011

Websites:

1. <http://www.handbook.unsw.edu.au/postgraduate/courses/.../CVEN9701.ht...>
2. <http://www.rejinpaul.com/2011/11/eefa-engineering-economics-and.html>
3. <http://www.eogogics.com> › Descriptions of Publications

COURSE OBJECTIVES

- To introduce the methodologies involved in the development
- To explain maintenance of software over its entire life cycle.
- To explain the various effective software engineering processes
- To explain design, cost and principles in a software engineering
- To describe different projects of software testing
- To be aware of Different life cycle models and requirement dictation process

COURSE OUTCOMES:

- Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
- Employ group working skills including general organization, planning and time management and inter-group negotiation.
- Translate a requirements specification into an implementable design, following a structured and organised process.
- Formulate a testing strategy for a software system, employing techniques such as unit testing, test driven development and functional testing.
- Evaluate the quality of the requirements, analysis and design work done during the module.
- Able to back track effectively to improve the current functionalities using appropriate software measures

UNIT -I Software Process

9

Introduction –S/W Engineering Paradigm – life cycle models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object oriented) - system engineering – computer based system – verification – validation – life cycle process – development process –system engineering hierarchy.

UNIT- II Software Requirements

9

Functional and non-functional - user – system –requirement engineering process – feasibility studies – requirements – elicitation – validation and management – software prototyping – prototyping in the software process – rapid prototyping techniques – user interface prototyping -S/W document. Analysis and modelling – data, functional and behavioural models – structured analysis and data dictionary.

UNIT- IIIDesign Concepts and Principles

9

Design process and concepts – modular design – design heuristic – design model and document. Architectural design – software architecture – data design – architectural design – transform and transaction mapping – user interface design – user interface design principles. Real time systems - Real time software design – system design – real time executives – data acquisition system - monitoring and control system.

UNIT- IVTesting

9

Taxonomy of software testing – levels – test activities – types of s/w test – black box testing – testing boundary conditions – structural testing – test coverage criteria based on data flow mechanisms – regression testing – testing in the large. S/W testing strategies – strategic approach and issues - unit testing – integration testing – validation testing – system testing and debugging.

UNIT- V Software Project Management

9

Measures and measurements – S/W complexity and science measure – size measure – data and logic structure measure – information flow measure. Software cost estimation – function point models – COCOMO model- Delphi method. - Defining Task Network – Scheduling – Earned Value Analysis – Error Tracking - Software changes- program evolution dynamics- software maintenance – Risk management -Architectural evolution.

Total Hours: 45+15=60

Text Books:

1. Roger S.Pressmen, “Software Engineering : A Practitioner’s Approach”, McGraw-Hill International Edition,4th edition,2014
2. Ian Sommerville, “Software engineering”, Pearson education Asia,9th edition,2011

References:

1. Fundamentals of software engineering, Rajib Mall Phi learning pvt. Ltd,4th edition,2014
2. Pankaj Jalote,” An Integrated Approach to Software Engineering”, Springer Verlag,3rd edition,2010
3. James F Peters and Witold Pedryez,” Software Engineering – An Engineering Approach”, John Wiley and Sons, New Delhi,2007

Websites:

1. http://www.testingbrain.com/WHITEBOX/WHITE_BOX_Testing.html
2. <http://www.cs.drexel.edu/~spiros/teaching/CS576/slides/control-testing.pdf>

COURSE OBJECTIVES:

- At the end of the course the student will be able to design and implement a simple compiler.
- To understand, design and implement a lexical analyzer.
- Explain how to build lexical analyzers and use them in the construction of parsers;
- To understand, design and implement a parser.
- To understand various grammars of a programming language
- To understand, design code generation schemes

COURSE OUTCOMES:

On completion of the course, the students will be able to:

- build lexical analyzers and use them in the construction of parsers;
- express the grammar of a programming language;
- build syntax analyzers and use them in the construction of parsers;
- perform the operations of semantic analysis;
- discuss the merits of different optimization schemes.
- Able to design and Implement a simple compiler

UNIT- I Introduction to compiling
9

Compilers – Analysis of the source program – Phases of a compiler – Cousins of the Compiler – Grouping of Phases – Compiler construction tools – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens.

UNIT- II Syntax Analysis
9

Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

UNIT –IIIIntermediate code generation
9

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

UNIT- IVCode generation
9

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.

UNIT- V Code optimization and run time environments
9

Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

Text Books:

1. Compilers Principles, Techniques and Tools, Alfred Aho, Ravi Sethi, Jeffrey D Ullman, Pearson Education Asia, 2nd edition, 2013
2. Compiler Design in C, Allen I. Holub, Prentice Hall of India, 2006.

References:

1. Engineering a Compiler, Keith Cooper and Linda Torczon, 2nd Edition, 2011.
2. Introduction to Compiler Techniques, Bennet.J.P, Tata McGraw-Hill, 2007
3. Lex & Yacc , John R. Levine, Tony Mason, Doug Brown, 2nd edition (October 1992) O'Reilly & Associates.
4. Compiler Construction: Principles and Practice, Kenneth C. Loudon, Thompson Learning. 2006

Websites:

1. <http://www.tenouk.com/ModuleW.html>
2. <http://www.mactech.com/articles/mactech/Vol.06/06.04/LexicalAnalysis/index.html>

COURSE**OBJECTIVES:**

- To study the graphics techniques and algorithms.
- To study the multimedia concepts and various I/O technologies.
- To enable the students to develop their creativity
- To explain the standards for representing audio files.
- To discuss the aspects of multimedia design.
- To impart the fundamental concepts of Computer Graphics and Multimedia.

COURSE OUTCOMES:

- Students will demonstrate an understanding of contemporary graphics hardware.
- Appreciation of the standards for representing audio files.
- Appreciation of the standards and issues concerned in representing static/dynamic visual input/output.
- An understanding of aspects of multimedia design.
- An understanding of the tools available for multimedia production and image/audio processing
- Apply the logic to develop animation and gaming programs

UNIT- I Output Primitives**10**

Overviews of graphics system-Video display devices, Raster scan system-Random scan systems. Line, Circle Drawing Algorithms – Attributes – Two-Dimensional Geometric Transformations – Two-Dimensional Clipping and Viewing.

UNIT- II Three-Dimensional concepts**9**

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation.

UNIT- IIIMultimedia systems design**9**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Databases.

UNIT- IVMultimedia storage technologies**8**

Compression & Decompression–Types of Compression-Data and file format standards-Multimedia I/O technologies -Storage and retrieval Technologies.

UNIT- V Hypermedia**9**

Digital voice and audio – Video image and animation – Full motion video – Hypermedia messaging - Mobile Messaging – Hypermedia message component – Creating Hypermedia message – Integrated multimedia message standards-Distributed Multimedia Systems.

Text Books:

1. Judith Jeffcoate, Multimedia in practice technology and Applications, PHI,2007
2. Foley, Vandam, Feiner, Huges, Computer Graphics: Principles & Practice, Pearson Education,2005

References:

1. Udit Agarwal, Computer Graphics & Multimedia, S.K. Kataria & Sons;
2. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Pearson Education,2013
3. Prabat K Andleigh and Kiran Thakrar, Multimedia Systems and Design,PHI,2011

Websites:

1. <http://www.tenouk.com/ModuleW.html>
2. <http://www.mactech.com/articles/mactech/Vol.06/06.04/LexicalAnalysis/index.html>

COURSE OBJECTIVES:

The objectives of the course are to:

- Understand the need of developing graphics applications.
- Learn the hardware involved in building graphics applications.
- Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
- To explain program functions to implement graphics primitives.
- To explain how to write programs that demonstrate geometrical transformations.
- Learn the representation and transformation of graphical images and pictures.

COURSE OUTCOMES:

- Students will create interactive graphics applications using one or more graphics application programming interfaces.
- Students will write program functions to implement graphics primitives.
- Students will write programs that demonstrate geometrical transformations.
- Students will write program functions to implement visibility detection.
- Students will write programs that demonstrate computer graphics animation.
- Students will apply the logic to develop animation and gaming programs

List of Experiments

1. To implement Bresenham's algorithms for line, circle and ellipse drawing
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and shearing.
3. To implement Cohen-Sutherland 2D clipping and window-viewport mapping
4. To perform 3D Transformations such as translation, rotation and scaling.
5. To visualize projections of 3D images.
6. To convert between color models.
7. To implement text and image compression algorithm.
8. To perform animation using any Animation software.
9. To perform basic operations on image using any image editing software .
10. Web document creation using Dream weaver.
11. Raster scan lines and circular drawing.

Total Hours: 45

COURSE OBJECTIVES:

- Practicing the different types of case tools such as Rational Rose / other Open Source
- Illustrate used for all the phases of Software development life cycle.
- Learn the basics of OO analysis and design skills.
- Be exposed to the UML design diagrams.
- Learn to map design to code.
- Be familiar with the various testing techniques

COURSE OUTCOMES:

- The students understands the process to be followed in the software development life
- Cycle
- find practical solutions to the problems
- solve specific problems alone or in teams
- manage a project from beginning to end
- work independently as well as in teams
- define, formulate and analyze a problem

List of Experiments

1. Implementation of Student Marks Analyzing System
2. Implementation of Quiz System
3. Implementation of Online Ticket Reservation System
4. Implementation of Payroll System
5. Implementation of Course Registration System
6. Implementation of Expert Systems
7. Implementation of ATM Systems
8. Implementation of Stock Maintenance

Total Hours: 45

COURSE OBJECTIVES:

- To develop managerial and entrepreneurial skills our Culture and Ethics
- Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations.
- After studying this course, students will be able to have a clear understanding of the managerial functions
- Illustrate various activities like planning, organizing, staffing, leading and controlling.
- Student should understand concepts of directing and controlling
- To create an awareness and practice through Engineering Ethics and Human Values.

COURSE OUTCOMES:

- Advanced philosophical knowledge of the profession of recreation and leisure
- Synthesis of trends and issues as related to current professional practice
- Evaluation of organizational theories and human resource management principles
- Information Competency
- Ethical practices and Ethical Management
- To mould an individual in becoming a successful entrepreneur

UNIT I Management, Planning, Organizing 9

Definition of Management – Management and Administration – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Forecasting – Decision-making – Formal and informal organization – Organization Chart .

UNIT II Directing and Controlling 9

Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control .

UNIT III Engineering Ethics 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT IV Factors of Changes 9

Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT V Entrepreneurship and Motivation 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth- Major Motives Influencing an Entrepreneur – Achievement

Motivation Training, self rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

Total Hours: 45

Text Books:

1. Mike Martin and Roland Schinzinger,” Ethics in Engineering”, McGraw-Hill, New York, 2005
2. Govindarajan M, Natarajan S, Senthil Kumar V. S,” Engineering Ethics”, Prentice Hall of India, New Delhi, 2011

References:

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education/ Prentice Hall, New Jersey, 2012
2. Charles E Harris, Michael S. Protchard and Michael J Rabins,” Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Learning, United States, 2009
3. John R Boatright,” Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2010
4. Edmund G Seebauer and Robert L Barry,” Fundamentals of Ethics for Scientists and Engineers” Oxford University Press, Oxford, 2008

Websites:

1. <http://www.ubter.in/Curriculum/Mechanical/Document/sem6.pdf>
2. http://www.foothill.edu/programs/programs.php?rec_id=769

COURSE OBJECTIVES:

- To learn the basic web concepts and Internet protocols.
- To understand CGI Concepts & CGI Programming.
- To familiarize with Scripting Languages.
- To study DHTML, XML, SERVELETS AND JSP.
- To explain how to create, install and update sophisticated web sites.
- Explain application of the computer systems and computer based data.

COURSE OUTCOMES:

- Demonstrate an understanding of the components of a computer information networked system, including application and software, communication protocols, and networking hardware and software.
- To understand CGI concepts and CGI programming
- Create, install and update sophisticated web sites.
- Install and manage server software and other server side tools.
- Demonstrate critical thinking in the understanding, evaluation and application of technology solutions to a variety of real-life situations.
- Articulate ethical and professional standards as they apply to the use of the computer systems and computer based data.

UNIT I Introduction**9**

Internet Principles – Basic Web Concepts – Client/Server model – retrieving data from Internet – HTML and Scripting Languages – Standard Generalized Mark –up languages – Next Generation – Internet – Protocols and Applications.

UNIT-II Common gateway interface programming**9**

CGI Concepts – HTML tags Emulation – Server – Browser Communication – E-mail generation – CGI client Side applets – CGI server applets – authorization and security.

UNIT III Scripting languages**9**

HTML – forms – frames – tables – web page design- XML - JavaScript introduction – control structures – functions – arrays – objects – simple web applications

UNIT IV Dynamic HTML**9**

Dynamic HTML – introduction – cascading style sheets – object model and collections – event model – filters and transition – data binding – data control – ActiveX control – handling of multimedia data

UNIT V Servlets and JSP**9**

JSP Technology Introduction-JSP and Servelets- Running JSP Applications Basic JSP- JavaBeans Classes and JSP-Tag Libraries and Files- Support for the Model-View- Controller Paradigm- Case Study- Related Technologies.

Text Books:

1. Deitel H.M. and Deitel P.J., “Internet and World Wide Web How to program”, Pearson International, 2012, 4th Edition. (Ch-1,4,5,6,12,14,26,27)
2. Uttam K.Roy, “Web Technologies”, Oxford University Press, 2011.

References:

1. Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2011.(Ch- 1 to 11)
2. Paul Dietel and Harvey Deitel,”Java How to Program”, Prentice Hall of India, 8th Edition.(Ch-29),2012
3. Mahesh P. Matha, “Core Java A Comprehensive study”, Prentice Hall of India, 2011.
4. Thomno A. Powell,” The Complete Reference HTML and XHTML”, Tata McGraw Hill, 2008.

Websites:

1. www.wileyindia.com/web-technologies-html-javascript-php-java-jsp-xml
2. www.comptechdoc.org/independent/web/

L	T	P	C
3	1	0	4

COURSE OBJECTIVES:

- To understand concepts, strategies, and methodologies related to open source software development.
- To understand the business, economy, societal and intellectual property issues of open source software.
- To familiarize with open source software products
- To discuss the development tools currently available on the market.
- To explain coding in PHP and MySQL
- Be able to utilize open source software for developing a variety of software applications, particularly Web applications.

COURSE OUTCOMES:

- Understanding of the issues and currents in open source and open source development
- Having the ability to choose between the various open source licenses understanding the implications for users, developers, and the software community in general
- Able to develop projects in python
- Have a basic understanding of HTML5 and how to develop modern web enabled applications
- Able to develop projects in PHP and MySQL
- Write software that integrates and interacts with existing open source systems (e.g., Firefox). For example: add-ons; bug fixes; new features; etc.

UNIT I Introduction to OSS and Unix OS 9

Overview of Free/Open Source Software-- Definition of FOSS & GNU, Advantages of Free Software and GNU /Linux, FOSS usage , trends and potential - global and Indian. GNU/Linux OS installation-- detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions.

UNIT II Python Overview 9

History-Features-Setting up path-Working with Python- Basic Syntax- Variable and Data Types- Operator - Conditional Statements – Looping - Control Statements - String Manipulation – Lists – Tuple – Dictionaries – Functions – Modules - Input-Output - Exception Handling

UNIT III Python 9

Database – Introduction- Connections - Executing queries - Transactions - Handling error – Networking - Socket - Socket Module - Methods - Client and server -Internet modules – Multithreading- Thread - Starting a thread -Threading module -Synchronizing threads -Multithreaded Priority Queue

UNIT IV PHP 9

Introduction to PHP- Evaluation of Php -Basic Syntax -Defining variable and constant -Php Data type - Operator and Expression - Handling Html Form With Php - Decisions and loop –Function- Generating Images with PHP - Database Connectivity with MySql

MySQL Database definition- Theory, Terminology and Concepts -Data Definition using MySQL - Basic Data Manipulation using MySQL - Advanced Data Manipulation using MySQL – Transactions - Import/Export

Total Hours: 45

Text Books:

1. Steve Suchring, “MySQL Bible”, John Wiley, 2002
2. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
3. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001

References:

1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
2. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw- Hill Publishing Company Limited, Indian Reprint 2009.

Websites:

1. php.net/manual/en/refs.webservice.php
2. php.net/docs.php
3. <https://cloud.google.com/appengine/docs/python/>
4. <https://www.python.org/doc/>
5. <https://docs.python.org/3/library/>
6. <https://www.mysql.com/...mysql/.../mysql-reference-architectures-for-sca>
7. dev.mysql.com/doc/en/
8. <https://www.mysql.com/...mysql/.../mysql-web-reference-architectures-fo...>

COURSE**OBJECTIVES:**

- To understand concepts, strategies, and methodologies related to open source software development.
- To familiar with open source software products
- Explain various concepts of python
- Discuss programming in Php and mysql
- To discuss about the development tools currently available on the market.
- Be able to utilize open source software for developing a variety of software applications, particularly Web applications.

COURSE OUTCOMES:

- Having the ability to choose between the various open source licenses understanding the implications for users, developers, and the software community in general
- Able to develop projects in python
- Have a basic understanding of HTML5 and how to develop modern web enabled applications
- Able to develop projects in PHP and MySQL
- Write software that integrates and interacts with existing open source systems (e.g., Firefox). For example: add-ons; bug fixes; new features; etc.
- Able to utilize open source software for developing a variety of software application, particularly web applications

List of Experiments

1. Linux operating system installation
2. Working basic commands in Unix.
3. Simple programs to practice condition and input and output statements using Python.
4. Working with Strings in Python
5. Programming in python- program to perform functions in List & Tuple
6. Programming in python- working with Loops
7. Installation of Mysql and working with MySQL queries
8. Database connectivity with PhP and Mysql

Total Hours: 45

COURSE OBJECTIVES:

- To learn the basic web concepts and Internet protocols.
- To develop web page using HTML
- To familiarize with Scripting Languages.
- To study DHTML, XML, SERVELETS AND JSP.
- Create, install and update sophisticated web sites.
- Install and manage server software and other server side tools.

COURSE OUTCOMES:

- The students will be able to design Web pages using HTML/XML and style sheets
- Able to use XML to store and forwarding data.
- Students will find the ease of implementation of a website and the role of servlets in creating the dynamic websites
- The students will be able to write Client Server applications
- The students will be able to create dynamic web pages using server side scripting.
- Able to create a complete Web Application with all the required modules.

List of Experiments

1. Develop a web page using HTML with containing map with hot spots that hyperlinks to related information.
2. Develop a web page and use various CSS formatting options on the text.
3. Develop a web page and use external CSS formatting with different formatting options than the ones' used in the previous experiment.
4. Develop a XSL parser for an XML document for data display.
5. Using CSS to format an XML Document
6. Develop a mechanism to validate user input at the client side using JavaScript.
7. Program to set a cookie using JavaScript
8. Develop a computer program that utilizes Java Applet technology to demonstrate some functions.
9. Developing a Java Applet that utilizes the Sound function and is included in the HTML document
10. Develop a mini web application of your choosing.

Total Hours: 45

COURSE OBJECTIVES:

- Describe those aspects of mobile programming that make it unique from programming for other platforms,
- Explain installation and working of Android
- Critique mobile applications on their design pros and cons,
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
- Program mobile applications for the Android operating system that use basic and advanced phone features, and
- Deploy applications to the Android marketplace for distribution.

COURSE OUTCOMES:

- Ability to install Android in Eclipse
- Understanding of the Android environment to develop projects
- Ability to develop simple Android projects
- Understanding of the android widgets and inclusion of it in projects
- Ability to create android application for playing audio and video files
- Ability to deploy application to the android market place for distribution

List of Experiments

1. Installation of Android in eclipse and study of Android Development Tools, Components and Architecture.
2. Creating and Running Android Virtual Device (AVD)
3. Running Hello World Android Project
4. Working with different Android User Interface
5. A simple android application to study various android widgets like text box, buttons, toggle Buttons and Images
6. Working with Android Activity life cycle
7. Working with intents
8. Working with fragments
9. Working with TTS engine in Android
10. A simple android application for playing audio and video files

Total Hours: 45

**COMPUTER SCIENCE AND ENGINEERING
DEPARTMENT ELECTIVE**

COURSE OBJECTIVES:

- To arm the students with the basic programming concepts.
- To Introduce different techniques pertaining problem solving skills
- To arm the students with the necessary constructs of C++ programming.
- Explain various OOPs concepts
- Discuss various basic data structure concepts
- To emphasis on guided practical sessions

COURSE OUTCOMES:

- Articulate the principles of object-oriented problem solving and programming.
- Outline the essential features and elements of the C++ programming language.
- Explain programming fundamentals, including statement and control flow and recursion.
- Apply the concepts of class, method, constructor, instance
- Apply various oops concepts like data abstraction, Function abstraction, inheritance, overriding, overloading and polymorphism in programs
- Program with basic data structures using array, list, and linked structures.

UNIT I Introduction to C++**9**

Object Oriented Programming Paradigms - Comparison of Programming Paradigms – Object Oriented Languages - Benefits of Object Oriented Programming - Comparison with C - Overview of C++ - Pointers-References and Structures - Functions - Scope and Namespaces - Source Files and Programs.

UNIT II Classes and Objects**9**

Working with classes – Classes and objects – Class specification-Class objects-Accessing class members-Defining class members-Inline functions-Accessing member functions within class-Data hiding-Class member accessibility-Empty classes, constructors-Parameterized constructors-Constructor overloading-Copy constructors-new, delete operators-”this” pointer-friend classes and friend functions-Function overloading-Operator overloading.

UNIT III Derived Classes**9**

Base class and derived class relationship-Derived class declaration-Forms of inheritance-Inheritance and member accessibility- Constructors in derived class-Destructors in derived class-Multiple inheritance-Multi level inheritance-Hybrid inheritance-Virtual base classes-Member function overriding-Virtual functions.

UNIT IV I/O and Library Organization**9**

I/O Stream - File I/O - Exception Handling - Templates - STL – Library Organization and Containers – Standard Containers - Overview of Standard Algorithms-Iterators and Allocators.

Development Process – Management - Object Identification – Components - Object Oriented Design Fundamentals – Case Studies.

Total Hours: 45

Text Books:

1. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 4th Edition, 2010
2. Venu Gopal.K.R, Ravishankar.T, and Raj kumar, "Mastering C++", Tata McGraw Hill, 2011.

References:

1. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, 4th Edition, 2013.
2. John R Hubbard, "Programming with C++", Schaums Outline Series, McGraw Hill, 2nd edition, 2000.
3. James Martin & James J. Odell, "Object Oriented methods-A foundation", Prentice Hall, 1997.
4. Grady Booch, "Object Oriented Analysis and Design with application", Addison Wesley, 3rd Edition, 2007

COURSE OBJECTIVES:

- Understand and describe current and emerging database models and technologies.
- Design and implement relational database solutions for general applications
- Develop database scripts for data manipulation and database administration.
- Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security.
- Explain various data mining, uncertainty data management, XML data.
- Understand the concepts and practices of data warehouse and OLAP

COURSE OUTCOMES:

- Able to understand the background and knowledge of some advanced topics in database that have become key techniques in modern database theory and practices;
- typical topics are distributed concurrency control, database recovery, query optimization, spatial databases.
- Able to understand the background and knowledge of some contemporary topics in database research;
- Implement applications on data mining, uncertainty data management, XML data.
- Able to understand the background and knowledge of some contemporary topics in information management,
- Able to understand typical topics like cloud computing, web information management, social network technology.

UNIT I Relational Model Issues 9

ER Model – Normalization – Query processing – Query optimization – Transaction processing – Concurrency control – Recovery – Database tuning.

UNIT II Distributed Databases 9

Parallel databases – Inter and intra query parallelism – Distributed database features – Distributed database architecture – Fragmentation – Distributed query processing – Distributed transactions processing – Concurrency control – Recovery – Commit protocols

UNIT III Object Oriented Databases 9

Introduction to object oriented databases – Approaches – Modeling and design – Persistence – Query languages – Transaction – Concurrency – Multi version locks – Recovery – POSTGRES – JASMINE – GEMSTONE – ODMG model.

UNIT IV **Emerging Systems** **9**

Enhanced data models – Client/Server model – Data warehousing and data mining – Web databases – Mobile databases – XML and web databases.

UNIT V Current Issues 9

Rules – Knowledge bases – Active and deductive databases – Multimedia databases – Multimedia data structures – Multimedia query languages – Spatial databases.

Total Hours: 45

Text Books:

1. Thomas Connolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Pearson Education 2009.

References:

1. R. Elmasri, S.B.Navathe, “Fundamentals of Database Systems”, 6th Edition, Pearson Education, 2011.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, 6th Edition, Tata McGraw Hill, 2010.
3. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, 8th Edition, Pearson Education, 2006.

COURSE**OBJECTIVES:**

- To extend the students' knowledge of algorithms and data structures
- To enhance their expertise in algorithmic analysis and algorithm design techniques.
- To explain in detail various non linear data structures like graphs and trees
- Expected to learn a variety of useful algorithms and techniques
- Able to apply those algorithms and techniques to solve problems
- To explain various concepts of time and space complexity of advanced data structures

COURSE OUTCOMES:

- Solve problems using the procedural, functional, and object-oriented programming paradigms.
- Relates all binary heap trees to form a large binomial queue for large data structures creation.
- Analyze how to balance a binary search tree using rotation methods and color changing methods
- Solve problems using graph algorithms, including single-source and all-pairs shortest paths, and minimum spanning tree algorithms.
- Analyze the time and space complexity of advanced data structures and their supported operations
- Compare the time and space tradeoff of different advanced data structures and their common operations

UNIT I Fundamentals 9

Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – Introduction to NP-Completeness/NP-Hard – Recurrence Equations – Solving Recurrence Equations

UNIT II**Heap Structures**

9

Priority Queues-Min/Max heaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – lazy Binomial Heaps.

UNIT III Trees

9

Counting Binary Trees-Huffman coding – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.

UNIT IV Set & Graph Algorithms

9

Set ADT- Union & Find data structure and Applications- Graph traversals-DFS, BFS, Bi connected components, Cut vertices, Graph Matching, Network flow Problems

UNIT V Geometric Algorithms

9

Segment Trees – 1-Dimensional Range Searching - k-d Trees – Line Segment Intersection – Convex Hulls - Computing the Overlay of Two Subdivisions - Range Trees – Voronoi Diagram.

Total Hours: 45

Text Books:

1. T. Cormen, C. Leiserson, R. Rivest, C. Stein, Introduction to Algorithms, Prentice-Hall India, 2009.
2. Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Fundamentals of Data Structures in C, Second Edition, University Press, 2008

References:

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Data Structures using C and C++, Second Edition, PHI Learning Private Limited, 2010
2. Anany Levitin, Introduction to The Design & Analysis of Algorithms, Pearson Education, 3rd Edition, New Delhi, 2014.
3. Aho Hopcroft and Ullman, “Data Structures and Algorithms, Pearson Education, 4th Edition, 2009.

COURSE OBJECTIVES:

- To do an advanced study of the Instruction Set Architecture, Instruction Level Parallelism with hardware and software approaches, Memory and I/O systems and different multiprocessor architectures with an analysis of their performance
- To study the ISA design, instruction pipelining and performance related issues.
- To do a detailed study of ILP with dynamic approaches.
- To do a detailed study of ILP with software approaches.
- To study the different multiprocessor architectures and related issues.
- To study the Memory and I/O systems and their performance issues.

COURSE OUTCOMES:

Upon the completion of the course the student is able to:

- Design the application of computer architecture
- Construct application specific solutions in the field of Pipelining and ILP
- Appreciate that the solution to any problem in computer architecture
- Able to quickly invalidated by time
- Strive for solutions that minimize the effects of this reality
- Develop confidence in specifying computational requirements and formulating original solutions in a timely manner.

UNIT I Pipelining and ILP**9**

Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and Its Exploitation - Concepts and Challenges - Overcoming Data Hazards with Dynamic Scheduling – Dynamic Branch Prediction - Speculation - Multiple Issue Processors – Case Studies.

UNIT II Advanced Techniques for Exploiting ILP**9**

Compiler Techniques for Exposing ILP - Limitations on ILP for Realizable Processors - Hardware versus Software Speculation - Multithreading: Using ILP Support to Exploit Thread-level Parallelism - Performance and Efficiency in Advanced Multiple Issue Processors - Case Studies.

UNIT III Multiprocessors**9**

Symmetric and distributed shared memory architectures – Cache coherence issues - Performance Issues – Synchronization issues – Models of Memory Consistency - Interconnection networks – Buses, crossbar and multi-stage switches.

UNIT IV Multi-Core Architectures**9**

Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture – IBM cell architecture.- hp architecture.

Introduction - Optimizations of Cache Performance - Memory Technology and Optimizations -
Protection: Virtual Memory and Virtual Machines - Design of Memory Hierarchies - Case Studies.

Total Hours: 45

Text books:

1. John L. Hennessey and David A. Patterson, Computer Architecture A Quantitative Approach, Morgan Kaufmann, New York 2006

References:

1. Sima D, Fountain.T, and Kacsuk.P, Advanced Computer Architectures A Design Space Approach, Addison Wesley, New York. 2005
2. Kai Hwang, Advanced computer architecture Parallelism Scalability Programmability, Tata McGraw Hill, New Delhi 2004
3. Vincent P.Heuring, Harry F.Jordan, Computer System Design and Architecture, Addison Wesley, New York. 2008
4. William Stallings, Computer Organization and Architecture – Designing for Performance, Pearson Education, Seventh Edition 2006

COURSE OBJECTIVES:

- Discuss about Encryption techniques and key generation techniques
- Study about Public key encryption
- Describe various authentication and security measures
- Describe various security practices
- Discuss various concepts of system security
- Detailed description to be given on intrusion and filtering analysis□

COURSE OUTCOMES:

The main goal of the course is for students to:

- Identify some of the factors driving the need for network security.
- Identify and classify particular examples of attacks.
- Identify physical points of vulnerability in simple networks.
- Describe methods of providing assurances about data integrity.
- Describe and distinguish between different mechanisms to assure the freshness of a message.
- Discuss the effectiveness of passwords in access control and the influence of human behavior.

UNIT I Conventional and Modern Encryption 9

Model of network security – Security attacks, services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles- DES – Strength of DES - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC5 - Differential and linear crypto analysis – Placement of encryption function – traffic confidentiality

UNIT II Public Key Encryption 9

Number Theory – Prime number – Modular arithmetic – Euclid's algorithm – Fermat's and Euler's theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography

UNIT III Authentication 9

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – MD5 – SHA - HMAC – Digital signature and authentication protocols – DSS

UNIT IV Security Practice 9

Authentication applications – Kerberos – X.509 Authentication services - E-mail security – IP security - Web security

UNIT V System Security 9

Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security

Text Books:

1. William Stallings, “Cryptography & Network Security”, Pearson Education, 4th Edition 2010.

References:

1. Charlie Kaufman, Radia Perlman, Mike Speciner, “ Network Security, Private communication in public world” PHI 2nd edition 2002
2. Bruce Schneier, Neils Ferguson, “Practical Cryptography”, Wiley Dreamtech India Pvt Ltd, 2003
3. Douglas R Simson “Cryptography – Theory and practice”, CRC Press 1995

COURSE OBJECTIVES:

- To understand the basic concepts in distributing computing in operating systems
- To discuss various issues related to designing distributed system
- To study concepts of remote procedure calls
- To learn basic architecture and other details of distributed shared memory
- To enable the students to understand synchronization and management of distributed systems
- To make the students to get idea of files systems in distributed computing

COURSE OUTCOMES:

The main goal of the course is for students to:

- Identify the differences among: concurrent, networked, distributed, and mobile computing
- Able to understand all concepts on remote procedure calls
- Understand Resource allocation and deadlock detection and avoidance techniques.
- Analyze distributed shared memory
- Understand IPC mechanisms in distributed systems.
- Design and build newer distributed file systems for any OS.

UNIT I Fundamentals**9**

What is distributed computing systems – Evolution of distributed computing systems – Distributed computing system models – What is distributed operating system – Issues in designing distributed operating systems. Message passing – Features of a good message-passing system – Issues in IPC by message passing – Synchronization – Buffering – Multidatagram messages – Encoding and decoding of message data – Failure handling – Group communication.

UNIT II Remote Procedure Calls**9**

RPC Models – Transparency of RPC – Implementing RPC mechanism – Stub generation – RPC messages – Marshaling arguments & results – Server Management – Parameter-passing semantics – Call semantics – Communication protocols for RPCs – Complicated RPCs – Client server binding – Security – Special types of RPCs – Light weight RPC.

UNIT III Distributed Shared Memory**9**

General architecture of DSM systems – Design & implementation issues of DSM – Granularity – Structure of shared memory space – Consistency models – Replacement strategy – Thrashing – Heterogeneous DSM – Advantages of DSM.

UNIT IV Synchronization and Management**9**

Synchronization – Clock synchronization – Mutual exclusion – Election algorithms – Deadlocks.- Resource Management – Task assignment approach – Load balancing approach – Load sharing approach - Process Management – Process migration – Threads.

UNIT V Distributed File Systems**9**

Desirable features of a good distributed file system – File models – File accessing models – File sharing semantics – File caching schemes – File replications – Fault tolerance – Atomic transaction.

Total Hours: 45

Text Books:

1. Andrew S.Tanenbaum, and Steen, Maarten van, “Distributed Systems”, 2nd Edition, Prentice Hall of India, 2007

References:

1. Pradeep K Sinha, ”Distributed Operating Systems, Concepts & Design”, Prentice Hall of India, 2009.
2. Andrew S.Tanenbaum, ”Distributed Operating Systems”, Prentice Hall of India, 2005.

COURSE OBJECTIVES:

- To explain the fundamental concepts of the C# language and the .NET framework.
- To discuss the various types of Assemblies present
- To learn about server object types
- Learn about interfaces and collections in C# and .NET
- Learn basic concepts about IO Namespace and ADO .NET
- Learn about ASP.net and various web services which can be developed using it

COURSE OUTCOMES:

The main goal of the course is for students able to:

- Write clear and effective C# code and .Net. □
- Gained knowledge about various types of Assemblies present and server objects
- Understood concepts of interface and collections in C# and .NET
- Develop web applications using ASP.NET Web Forms.
- Develop and use various ASP.NET Web Services. □
- The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the framework.

UNIT I Introduction**9**

Overview of .NET – Advantages of .NET over the other languages – Overview of .NET binaries – Intermediate Language – Metadata – .NET Namespaces – Common language runtime – Common type system – Common language specification – C# fundamentals – C# class – object – string formatting – Types – scope – Constants – C# iteration – Control flow – Operators – Array – String – Enumerations – Structures – Custom namespaces – Object oriented programming concepts –Class – Encapsulation – Inheritance – Polymorphic – Casting.

UNIT II Assemblies**9**

Assemblies – Versioning – Attributes – Reflection – Viewing metadata – Type discovery – Reflecting on a type –Marshaling – Remoting – Understanding server object types – Specifying a server with an interface – Building a server – Building the client – Exception handling – Garbage collector.

UNIT III Interfaces and Collections**9**

Interfaces and collections – Enumerator – Cloneable objects – Comparable objects – Collections – Indexes – Delegates – Events – Multithreaded programming. Programming with windows form controls – Windows form control Hierarchy – Adding controls – TextBox – CheckBoxes – RadioButtons – GroupBoxes – ListBoxes – ComboBoxes – TrackBar – Calender – Spin Control – Panel – ToolTips –ErrorProvider – Dialog Boxes.

UNIT IV IO Namespace and ADO .NET**9**

Input and output – Introduction to System. IO .namespace – File and folder operations – Stream class – Introduction to ADO .NET – Building data table – Data view – Data set – Data relations – ADO.NET managed providers – OleDb managed provider – SQL.

Web development and ASP.NET – Web applications and web servers – HTML form development – Client side scripting – GET and POST – ASP.NET application – ASP.NET namespaces – creating sample C# web Applications. Understanding Web Security – Windows authentication – Forms authentication – Web services – Web services – Web service clients – The City View application.

Total Hours: 45

Text Books:

1. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 6th edition, 2012.

References:

1. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw-Hill, 3rd edition, 2008.

COURSE OBJECTIVES:

- Apply analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.
- Use data and pulse communication techniques.
- Utilize multi-user radio communication.

COURSE OUTCOMES:

- Demonstrate about various blocks in communication system.
- Student is able to differentiate between analog and digital communication concepts
- Analyze the types of modulations.
- Analyze and design the analog modulator and demodulator circuits.
- Learnt details related to source and error coding
- Analyze All Modulation techniques in time and frequency domains.

UNIT I Analog Communication**9**

Source of Noise - External Noise - Internal Noise- Noise Calculation. Introduction to Communication Systems: Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

UNIT II Digital Communication**9**

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) – Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT III Data and Pulse Communication**9**

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces. Pulse Communication: Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM)

UNIT IV Source and Error Control Coding**9**

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm

UNIT V Multi-User Radio Communication**9**

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Hand off - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

Total Hours: 45

Text Books:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2013.
2. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2010.

References:

1. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2010.
2. H.Taub, D L Schilling and G Saha,"Principles of Communication", 3 rd Edition, Pearson Education, 2007.
3. B.P.Lathi, "Modern Analog and Digital Communication Systems", 3 rd Edition, Oxford University Press, 4th edition, 2010.
4. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.

COURSE OBJECTIVES:

- To learn the basic concepts of Network Routing Algorithms
- To create in-depth awareness of packet routing in computer communication networks
- To provide comprehensive details of routing algorithms and protocols
- To describe the architectures of routers followed by the concepts of MPLS towards the next generation routing
- To study various mobile IP networks concept
- To study concept of mobile Ad-Hoc networks

COURSE OUTCOMES:

- To be able to explain basic network routing concepts and algorithms
- To be able to explain how the Internet protocol suite operates
- To be able to classify the functions of various RWA algorithms
- To be able to understand concepts of Mobile IP networks
- To be able to classify the Mobile Ad –Hoc Networks
- To be able to explain the concept and usage of node addressing classify addresses into network layers

UNIT I Introduction**7**

ISO OSI Layer Architecture, TCP/IP Layer Architecture, Functions of Network layer, General Classification of routing, Routing in telephone networks, Dynamic Non hierarchical Routing (DNHR), Trunk status map routing (TSMR), real-time network routing (RTNR), Distance vector routing, Link staterouting, Hierarchical routing.

UNIT II Internet Routing**10**

Interior protocol : Routing Information Protocol (RIP), Open Shortest Path First(OSPF), Bellman Ford Distance Vector Routing. Exterior Routing Protocols: Exterior Gateway Protocol (EGP) and Border Gateway Protocol (BGP). Multicast Routing: Pros and cons of Multicast and Multiple Unicast Routing, Distance Vector Multicast Routing Protocol (DVMRP), Multicast Open Shortest Path First (MOSPF), MBONE, Core Based Tree Routing.

UNIT III Routing In Optical Wdm Networks**10**

Classification of RWA algorithms, RWA algorithms, Fairness and Admission Control, Distributed Control Protocols, Permanent Routing and Wavelength Requirements,Wavelength Rerouting-Benefits and Issues, Lightpath Migration, Rerouting Schemes, Algorithms- AG, MWPG.

UNIT IV Mobile - IP Networks**9**

Macro-mobility Protocols, Micro-mobility protocol:Tunnel based : Hierarchical Mobile IP, Intra domain Mobility Management, Routing based: Cellular IP, Handoff Wireless Access Internet Infrastructure (HAWAII).

Internet-based mobile ad-hoc networking communication strategies, Routing algorithms – Proactive routing: destination sequenced Distance Vector Routing (DSDV), Reactive routing: Dynamic Source Routing (DSR), Ad hoc On-Demand Distance Vector Routing (AODV), Hybrid Routing: Zone Based Routing (ZRP).

Total Hours: 45

Text Books:

1. William Stallings, „High speed networks and Internets Performance and Quality of Service“, 2nd Edition, Pearson Education Asia. Reprint India 2002
2. M. Steen Strub, „Routing in Communication network, Prentice –Hall International, Newyork, 1995.

References:

1. S. Keshav, „An engineering approach to computer networking“ Addison Wesley 1999.
2. William Stallings, „High speed Networks TCP/IP and ATM Design Principles, Prentice-Hall, New York, 1995
3. C.E Perkins, „Ad Hoc Networking“, Addison – Wesley, 2001
4. Ian F. Akyildiz, Jiang Xie and Shantidev Mohanty, “A Survey of mobility Management in Next generation-All IP- Based Wireless Systems”, IEEE Wireless Communications Aug.2004, pp 16-27.
5. A.T Campbell et al., “Comparison of IP Micro mobility Protocols,” IEEE Wireless Communications Feb.2002, pp 72-82.
6. C.Siva Rama Murthy and Mohan Gurusamy, “ WDM Optical Networks – Concepts, Design and Algorithms”, Prentice Hall of India Pvt. Ltd, New Delhi –2002.

COURSE OBJECTIVES:

- To serve as an introductory course to under graduate students with an emphasis on the design aspects of Data Mining and Data Warehousing □
- To introduce the concept of data mining with in detail coverage of basic tasks, metrics, issues,
- Core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing with special emphasis on architecture and design.
- Various association rules are to be discussed
- Discuss recent trends in data mining

COURSE OUTCOMES:

- Understand why there is a need for data warehouse in addition to traditional operational database system
- Identify components in typical data warehouse architectures
- Understand why there is a need for data mining and in what ways it is different from Traditional statistical techniques
- Understand the details of different algorithms
- Solve real data mining problems to find interesting patterns
- Understand a typical knowledge discovery process

UNIT- I Introduction and Data Warehousing**9**

Introduction, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Implementation, Further Development, Data Warehousing to Data Mining

UNIT- II Data Preprocessing, Language, Architectures, Concept Description**9**

Why Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.

UNIT- III Association Rules**9**

Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases

UNIT- IV Classification And Clustering**9**

Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, Outlier Analysis.

UNIT- V Recent Trends**9**

Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining

Total Hours: 45

Text Books:

1. J. Han, M. Kamber, Data Mining: Concepts and Techniques, Harcourt India / Morgan Kauffman, 3rd edition, 2011.
2. Sam Anahory, Dennis Murry, Data Warehousing in the real world, Pearson Education, 2007

References:

1. Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education 2006
2. David Hand, Heikki Mannila, Padhraic Smyth, Principles of Data Mining, PHI 2004
3. W.H. Inmon, Building the Data Warehouse, Wiley 2005.

COURSE OBJECTIVES:

- To study the concept of menus, windows, interfaces.
- To study the characteristics and components of windows.
- To study the various controls for the windows.
- To study about various problems in windows design with color, text, graphics
- To implement the basics and in-depth knowledge about UID.
- To enable the students to take up the design the user interface, design, menu creation and windows creation and connection between menu and windows

COURSE OUTCOMES:

- Able to understand all the concept of Human Computer Interface
- To demonstrate knowledge of some theories of user interface design
- To demonstrate knowledge of different interaction controls
- To be able to analyze a user interface from a communication perspective
- To demonstrate an awareness of the relation between interaction design and users expectations
- Develop Web page using User Interface

UNIT- I Introduction**9**

Introduction- Importance-Human-Computer interface-characteristics of graphics interface-Direct manipulation graphical system - web user interface-popularity-characteristic & principles.

UNIT- II UI Design Process**9**

User interface design process- obstacles-usability-human characteristics in design - Human interaction speed-business functions-requirement analysis-Direct-Indirect methods-basic business functions-Design standards-system timings - Human consideration in screen design - structures of menus - functions of menus-contents of menu-formatting -phrasing the menu - selecting menu choice-navigating menus-graphical menus.

UNIT- III UI Controls**9**

Windows: Characteristics-components-presentation styles-types-managements-organizations-operations-web systems-device-based controls: characteristics-Screen -based controls: operate control - text boxes-selection control-combination control-custom control-presentation control.

UNIT- IV Web Page Designing**9**

Text for web pages - effective feedback-guidance & assistance-Internationalization-aaccessibility-Icons-Image-Multimedia -coloring.

UNIT- V UI Tests**9**

Windows layout-test: prototypes - kinds of tests - retest - Information search - visualization - Hypermedia - www - Software tools.

Total Hours: 45

Text Books:

1. Wilbent. O. Galitz, The Essential Guide to User Interface Design, John Wiley& Sons, 2007

References:

1. Ben Sheiderman, Design the User Interface, Pearson Education, 5th edition, 2010
2. Alan Cooper, The Essential of User Interface Design, Wiley – Dream Tech Ltd, 2002

COURSE OBJECTIVES:

- To make the students to understand the windows programming concepts including Microsoft Foundation Classes
- To introduce the concepts of windows programming
- To introduce GUI programming using Microsoft Foundation Classes
- To enable the students to develop programs and simple applications using Visual C++
- Identify and use the features of a Visual Basic (VB) development environment.
- Locate, resolve, and handle various types of programming errors.

COURSE OUTCOMES:

- Students are able to use the different elements of a visual programming language as building blocks to perform programming in Windows
- Able to understand the overview of Unicode
- Able to develop correct and coherent programs in Visual C++
- Analyze problems, develop conceptual designs that solve those problems, and transform those designs to Visual Programs.
- Program using the fundamental software development process, including design, coding, documentation, testing, and debugging.
- Perform Activex and object linking, embedding and advanced concepts in Windows.

UNIT I Windows Programming 9

Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – introduction to GDI – device context – basic drawing – child window controls-An introduction to Unicode-An architectural overview-processing the messages

UNIT II Visual C++ Programming – Introduction 9

Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – colors – fonts – modal and modeless dialog – windows common controls – bitmaps-Overview of MFC programming ,Class hierarchy simple graphics programs-Creating frame windows

UNIT III The Document And View Architecture 9

Menus – Keyboard accelerators – rich edit control – toolbars – status bars – reusable frame window base class – separating document from its view – reading and writing SDI and MDI documents – splitter window and multiple views – creating DLLs – dialog based applications-Virtual key code,CTOOLBar class ,RC files

UNIT IV Activex And Object Linking And Embedding (OLE) 9

ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime – Component Object

Model (COM) – containment and aggregation Vs. inheritance – OLE drag and drop – OLE embedded component and containers – Dialogue based applications – Writing simple dialog based programs

UNIT V Advanced Concepts

9

Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC classes – sample database applications – filter and sort strings – DAO concepts – displaying database records in scrolling view – Threading – Connecting visual C++ programs to remote database, M-strsort, M-strfilter variables

Total hours:45

Text Books:

1. Steve Holtzner, Visual C++ Programming, Wiley Dreamtech India Pvt. Ltd. 2003

References:

1. Charles Petzold, Windows Programming, Microsoft press 2010
2. David J. Kruglinski, George Shepherd and Scot Wingo, Programming Visual C++, Microsoft press 2003

COURSE OBJECTIVES:

- Gives an introduction to Ad-Hoc Wireless Networks, Issues, and Classification of MAC Protocols.
- Describes different types of Ad-Hoc Routing Protocols and TCP over Ad-Hoc Protocol.
- Provides in-depth knowledge about Sensor Network Architecture, its Applications and MAC Protocols for sensor networks.
- Different Issues in Wireless Sensor Routing are discussed.
- Discusses Indoor and outdoor Localization and Quality of Service in WSN.
- Emphasizes necessity for Mesh Networks , IEEE 802.11s Architecture and different types of Mesh Networks

COURSE OUTCOMES:

- Identify the basic problems, limitations, strengths and current trends of mobile computing
 - Able to explain the current wireless networking mechanisms for mobile computing
- Able to explain concepts related to WSN-MAC
- Analyse and critique the routing, localization and QOS performance of different networks and algorithms for WSN
- Develop an attitude to propose solutions with comparisons for problems related to mobile computing through investigation of different protocols and mobile/wireless networks
- Illustrate the various concepts of mesh networks

UNIT I Ad-Hoc MAC 9

Issues in Ad-Hoc Wireless Networks. MAC Protocols – Issues, Classifications of MAC protocols, Multi channel MAC & Power control MAC protocol.

UNIT II Ad-Hoc Network Routing & TCP 9

Issues – Classifications of routing protocols – Hierarchical and Power aware. Multicast routing – Classifications, Tree based, Mesh based. Ad Hoc Transport Layer Issues. TCP Over Ad Hoc – Feedback based, TCP with explicit link, TCP-Bus, Ad Hoc TCP, and Split TCP.

UNIT III WSN –MAC 9

Introduction – Sensor Network Architecture, Data dissemination,
– self-organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT IVWSN Routing, Localization & OOS 9

Issues in WSN routing – OLSR, AODV. Localization – Indoor and Sensor Network Localization. OoS in WSN.

UNIT V Mesh Networks 9

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic routing – Self configuration and Auto configuration – Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks.

Text Books:

1. C.Siva Ram Murthy and B.Smanoj, “ Ad Hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2011.

References:

1. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.
2. C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, “Wireless Mesh Networking”, O’Reilly Publishers, 2007

COURSE OBJECTIVES:

- To analyze the components of cloud computing and its business perspective.
- To understand the basics of cloud computing concepts
- To evaluate the various cloud development tools.
- To collaborate with real time cloud services and file system
- To analyze the need for virtualization and ways in which we can perform virtualization
- To understand the security, standards and various applications of cloud computing

COURSE OUTCOMES:

- Able to understand the basic concepts of cloud computing
- Understand and appreciate the technological impact of service and file systems
- Analyze cloud computing for future enterprises, and the technologies underpinning it.
- Apply systematic and principled practices to designing, implementing and deploying service and cloud-oriented computing.
- Review and assess the risks, opportunities, costs and steps towards migrating existing systems to service and cloud computing.
- Developing cloud computing for real time applications

UNIT- I Cloud Introduction 9

Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing , usage scenarios and Applications, Business models around Cloud – Major Players in Cloud Computing - Issues in Cloud - Eucalyptus - Nimbus – Open Nebula, CloudSim.

UNIT-II Cloud Services and File System 9

Types of Cloud services: Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers - Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to MapReduce, GFS, HDFS, Hadoop Framework.

UNIT-III Collaborating with Cloud 9

Collaborating on Calendars, Schedules and Task Management – Collaborating on Event Management, Contact Management, Project Management – Collaborating on Word Processing ,Databases – Storing and Sharing Files- Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Collaborating via Social Networks – Collaborating via Blogs and Wikis.

UNIT-IV Virtualization for Cloud 9

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT-V Security, Standards, and Applications

9

Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.

Total Hours: 45

Text Books:

1. John Rittinghouse & James Ransome, “Cloud Computing Implementation Management and Strategy”, CRC Press, 2010.

References:

2. Bloor R., Kanfman M., Halper F. Judith Hurwitz “Cloud Computing for Dummies” (Wiley India Edition), 2010.
3. Antohy T Velte , Cloud Computing : “A Practical Approach”, McGraw Hill,2009.
4. Michael Miller, Cloud Computing: “Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers, 2006.

COURSE OBJECTIVES:

- Explain the basic concepts of Artificial Intelligence and its problem solving capacity
- Artificial Intelligence aims at developing computer applications, which encompasses perception, reasoning and learning
 - To provide an in-depth understanding of major techniques used to simulate intelligence.
 - To provide a strong foundation of fundamental concepts in Artificial Intelligence
 - To provide a basic exposition to the goals and methods of Artificial Intelligence
 - To enable the student to apply these techniques in applications which involve perception, reasoning and learning.

COURSE OUTCOMES:

- Understand the history, development and various applications of artificial intelligence
- Familiarize with propositional and predicate logic and their roles in logic programming;
- Understand the programming language Prolog and write programs in declarative programming style;
- Learn the knowledge representation and reasoning techniques in rule-based systems, case based systems, and model-based systems;
- Appreciate how uncertainty is being tackled in the knowledge representation and reasoning process, in particular,
- Interpreted the techniques based on probability theory and possibility theory (fuzzy logic);

UNIT I Introduction and Problem Solving**9**

Introduction – Foundations of AI – History of AI – Intelligent agent – Types of agents - Structure – Problem solving agents – Uninformed search strategies – Breadth first search – Uniform cost search – Depth first search – Depth limited search – Bidirectional search – Searching with partial Information.

UNIT II Informed Search and Game Playing**9**

Informed search – Strategies – A* Heuristic function – Hill Climbing – Simulated Annealing – Constraint Specification problem – Local Search in continuous space – Genetic algorithm – Optimal decisions in games - Pruning- Imperfect decisions – Alpha-Beta pruning – Games that include an element of chance.

UNIT III Knowledge and Reasoning**9**

Knowledge based agent – The Wumpus world environment – Propositional logic – Inference rules – First-order logic – Syntax and semantics – Situation calculus – Building a knowledge base – Electronic circuit domain – Ontology – Forward and backward chaining – Resolution – Truth maintenance system.

UNIT IV Acting Logically**9**

Planning – Representation of planning – Partial order planning – Planning and acting in real world – Acting under uncertainty – Bayes's rules – Semantics of Belief networks – Inference in Belief networks – Making simple decisions – Making complex decisions.

Learning from observation – Learning decision trees – Ensemble learning – Learning general logical descriptions – Computational learning theory – Neural networks – Applications – Reinforcement learning – Passive reinforcement – Active reinforcement – Communication as action – Types of communicating agents – Parsing – DCG – Semantic interpretation.

Total hours:45

Text Books:

1. Stuart J. Russel, Peter Norvig, “Artificial Intelligence A Modern Approach”, Pearson Education, 2010.

References:

1. Elaine Rich, Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw Hill, 2001.

COURSE OBJECTIVES:

- To make students understand the principles of software testing
- To explain the basics of software testing
- To highlight the strategies for software testing
- To stress the need and conduct of testing levels
- To identify the issues in testing management
- To bring out the ways and means of controlling and monitoring testing activity

COURSE OUTCOMES:

- Understand and apply the principal approaches to software testing, together with their associated techniques.
- Plan, analyze, design, implement, execute and evaluate the testing of a software component or system intended to implement a given software specification.
- Apply test automation techniques and testing tools in support of test execution and evaluation.
- Apply appropriate international standards for test documentation
- Able to perform various types of test management
- Defining various terms and controlling and monitoring various data software testing

UNIT- I Introduction**9**

Testing as an Engineering Activity- Role of Process in Software Quality-Testing as a Process-Basic Definitions- Software Testing Principles- The Tester's Role in a Software Development Organization-Origins of Defects- Defect Classes- The Defect Repository and Test Design- Defect Examples-Developer/Tester Support for Developing a Defect Repository

UNIT -II Test Case Design**9**

Introduction to Testing Design Strategies, The Smarter Tester- Test Case Design Strategies-Using Black Box Approach to Test Case Design- Random Testing- Equivalence Class Partitioning, Boundary Value Analysis- Other Black-box Test Design Approaches- Black-box testing and COTS- Using White-Box Approach to Test design- Test Adequacy Criteria-Coverage and Control Flow Graphs- Covering Code Logic- Paths: Their Role in White-box Based Test Design- Additional White Box Test Design Approaches- Evaluating Test Adequacy Criteria

UNIT-III Levels of Testing**9**

The Need for Levels of Testing- Unit Test- Unit Test Planning- Designing the Unit Tests- The Class as a Testable Unit- The Test Harness- Running the Unit tests and Recording results-Integration tests- Designing Integration Tests- Integration Test Planning- System Test – The Different Types- Regression Testing- Alpha- Beta and Acceptance Tests

UNIT- IV Test Management**9**

Introductory Concepts- Testing and Debugging Goals and Policies- Test Planning- Test Plan Components-Test Plan Attachments- Locating Test Items-Reporting Test Results- The role of three groups in Test Planning and Policy Development- Process and the Engineering Disciplines- Introducing the test specialist- Skills needed by a test specialist- Building a Testing Group

Defining Terms-Measurements and Milestones for Controlling and Monitoring- Status Meetings- Reports and Control Issues- Criteria for Test Completion- SCM- Types of reviews-Developing a review program-Components of Review Plans- Reporting review results

Total Hours: 45

Text Books:

1. Elfriede Dustin, “Effective Software Testing”, Pearson Education New Delhi, 2003
2. Renu Rajani and Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw-Hill, New Delhi, 2003

References:

1. Ilene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, 2010.
2. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education, New Delhi, 2000

COURSE OBJECTIVES:

- To explore the fundamental concepts of big data analytics
- To learn to analyze the big data using intelligent techniques.
- To understand the various search methods and visualization techniques.
- Explain basic concepts in Hadoop
- To learn to use various techniques for mining data stream.
- To understand the applications using Map Reduce Concepts.

Intended Outcomes

- Understanding of Big Data and Hadoop ecosystem
- Understanding fundamentals of Hadoop ecosystem and NoSQL technologies
- Working with Hadoop Distributed File System (HDFS)
- Ability to write MapReduce programs and implementing HBase
- Ability to write Hive and Pig scripts
- Able to perform Big Data Analysis in Hadoop environment

UNIT I Introduction to Big Data 8

Introduction to BigData Platform –Challenges of Conventional Systems -Intelligent data analysis – Nature of Data -Analytic Processes and Tools -Analysis vs Reporting-Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions -Re-Sampling -Statistical Inference -Prediction Error.

UNIT II Mining Data Streams 9

Introduction To Streams Concepts –Stream Data Model and Architecture -Stream Computing - Sampling Data in a Stream –Filtering Streams –Counting Distinct Elements in a Stream –Estimating Moments –Counting Oneness in a Window –Decaying Window -Real time Analytics Platform(RTAP)Applications -Case Studies -Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III Hadoop 10

History of Hadoop-The Hadoop Distributed File System –Components of Hadoop-Analyzing the Data with Hadoop-Scaling Out-Hadoop Streaming-Design of HDFS-Java interfaces to HDFSBasics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort –Task execution -Map Reduce Types andFormats-Map Reduce Features

UNIT IV Hadoop Environment 9

Setting up a Hadoop Cluster -Cluster specification -Cluster Setup and Installation –Hadoop Configuration-Security in Hadoop -Administering Hadoop –HDFS -Monitoring-Maintenance-Hadoop bench marks-Hadoop in the cloud

Applications on Big Data Using Pig and Hive–Data processing operators in Pig –Hive services – HiveQL –Querying Data in Hive-fundamentals of HBase and ZooKeeper -IBM InfoSphere BigInsights and Streams. Visualizations-Visual data analysis techniques, interaction techniques;Systems and applications.

Total Hours: 45

Text Books:

1. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGrawHill Publishing, 2012

References:

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. Tom White, “ Hadoop: The Definitive Guide”, Third Edition, O’reilly Media, 2012.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, JohnWiley & sons, 2012.
4. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007
5. PeteWarden, “Big Data Glossary”, O’Reilly, 2011.
6. Paul Zikopoulos ,Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles David Corrigan , Harness the Power of Big Data -The IBM Big Data Platform, Tata McGraw HillPublications, 2012
7. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, BigAnalytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses,WileyPublications,2013

COURSE OBJECTIVES:

- To understand the concepts of sensor networks
- To learn how to program sensor motes
- Explain Communication Characteristics and Deployment Mechanisms in networks
- Study basic concepts of Mac Layer Network Layer and Transport Layer
- To understand the challenging issues in each layer of sensor networks
- Discuss in detail about Middleware and Security Issues

COURSE OUTCOMES:

- Able to understand concepts of Sensor Networks in detail
- Apply deployment in various networks and analyse the communication aspects
- Apply knowledge of wireless sensor networks to various application areas.
- Ability to Design, implement and maintain wireless sensor networks.
- Ability to formulate and solve problems creatively.
- Understood various middleware and security issues

UNIT I Fundamentals of Sensor Networks 9

Introduction and Overview - Overview of sensor network protocols, architecture, and applications, Challenges, Main features of WSNs; Research issues and trends, Platforms-Standards and specifications-IEEE802.15.4/Zigbee, Hardware: Telosb, Micaz motes ,Software: Overview of Embedded operating systems-Tiny OS, Introduction to Simulation tools- TOSSIM, OPNET, Ns-2.

UNIT II Communication Characteristics and Deployment Mechanisms 9

Wireless Communication characteristics - Link quality, fading effects, Shadowing, Localization, Connectivity and Topology - Sensor deployment mechanisms, Coverage issues, Node discovery protocols.

UNIT III Mac Layer 9

Fundamentals of Medium access protocol- Medium access layer protocols - Energy efficiency, Power allocation and Medium access control issues.

UNIT IV Network Layer and Transport Layer 9

Network layer protocols-Data dissemination and processing, multichip and cluster based routing protocols- Energy efficient routing- Geographic routing, Transport layer- Transport protocol Design issues- Performance of Transport Control Protocols.

UNIT V Middleware and Security Issues 9

Middleware and Application layer -Data dissemination, Data storage, Query processing, Security - Privacy issues, Attacks and Countermeasures

Total Hours :45

Text Books:

1. Waltenegus Dargie, Christian Poellabauer , “Fundamentals of Wireless Sensor Networks, Theory and Practice”, Wiley Series on wireless Communication and Mobile Computing, 2010.
2. Kazem Sohraby, Daniel manoli , “Wireless Sensor networks- Technology, Protocols and Applications”, Wiley InderScience Publications, 2010.

References:

1. Bhaskar Krishnamachari , “ Networking Wireless Sensors”, Cambridge University Press, 2011.
2. C.S Raghavendra, Krishna M.Sivalingam, Taieb znati , “Wireless Sensor Networks”, Springer Science, 2006.

COURSE OBJECTIVES:

- Discuss the contributions of human factors and technical constraints on human-computer
- Explain the role of current HCI theories in the design of software.
- Apply HCI techniques and methods to the design of software.
- Categorize and carefully differentiate various aspects of multimedia interfaces.
- Design and develop issues related to HCI for real application.
- Explain the overall process of HCI developing and testing

COURSE OUTCOMES:

- Understand key aspects of human psychology which can determine user actions at and satisfaction of the interface.
- Describe the key design principles for user interfaces.
- Set up and carry out a process to gather requirements for, engage in iterative design
 - Evaluate the usability of an user interface.
- Describe how user interface development can be integrated into an overall software development process.
- Understanding of the ethical issues involved in design and testing user interfaces.

UNIT I Design Process 9

Humans – Information Process – Computer – Information Process – Differences and Similarities – Need for Interaction – Models – Ergonomics – Style – Context – Paradigms – Designing of Interactive Systems – Usability – Paradigm shift – Interaction Design Basics – Design Process – Scenarios – Users Need –Complexity of Design

UNIT II Design and Evaluation of Interactive Systems 9

Software Process – Usability Engineering – Issue based Information Systems – Iterative Design Practices – Design Rules – Maximum Usability – Principles – Standards and Guidelines – Design Patterns – Programming Tools – Windowing Systems – Interaction Tool Kit – User Interface Management System – Evaluation Techniques – Evaluation Design – Evaluating Implementations – Observational Methods.

UNIT III Models 9

Universal Design Principles – Multimodal Systems – User Support – Presentation and Implementation Issues – Types – Requirements – Approaches – Cognitive Model – Hierarchical Model – Linguistic Model – Physical and Device Models – Socio technical Models – Communication and Collaboration Models – Task Models – Task Analysis And Design.

UNIT IV Experimental Design and Statistical Analysis of HCI 9

Basic Design Structure – Single Independent Variable – Multiple Independent Variable – Factorial Design – Split-Plot Design – Random Errors – Experimental Procedure – Statistical Analysis – T Tests – Analysis of Variance Test – Regression – Chi-Square Test – Survey – Probabilistic Sampling – Non-Probabilistic Sampling – Developing Survey Questions.

Dialogue Notations and Design – Dialogue Need – Dialogue Design Notations – Graphical – Textual - Representing Dialogue – Formal Descriptions – Dialogue Analysis – System Models – Interaction Models – Relationship with Dialogue – Formalisms – Formal Notations – Interstitial Behavior – Virtual Reality – Modeling Rich Interaction – Status Event Analysis – Properties – Rich Contexts – Sensor-based Systems – Groupware – Applications – Ubiquitous Computing – Virtual Reality

Total Hours:45

Text Books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, Third Edition, Prentice Hall, 2004.

References:

1. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, “Research Methods in Human Computer Interaction”, Wiley, 2010.
2. Ben Shneiderman and Catherine Plaisant, “Designing the User Interface: Strategies for Effective Human-Computer Interaction”, Fifth Edition, Addison-Wesley Publishing Co, 2010.

COURSE OBJECTIVES:

- To describe the basic concepts of TQM
- To facilitate the understanding of Quality Management principles and process.
- To study various tools and techniques of TQM
- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
- Discuss the various concepts of Quality analysis of systems
- Student should be able to analyze the overall quality of the software

COURSE OUTCOMES:

- Understand the fundamental principles of Total Quality Management;
- Choose appropriate statistical techniques for improving processes;
- Write reports to management describing processes and recommending ways to improve them;
- Develop research skills that will allow them to keep abreast of changes in the field of Total Quality Management;
- Develop various tools and techniques for TQM, Able to analyze quality of various systems
- Emphasis the process of learning and discovery rather than the presentation of fact.

UNIT I Introduction**9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Quality statements - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Costs of quality.

UNIT II Tqm Principles**9**

Leadership - Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Quality circles Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III Tqm Tools and Techniques I**9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV Tqm Tools and Techniques II**9**

Control Charts - Process Capability - Concepts of Six Sigma - Quality Function Development (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V Quality Systems**9**

Need for ISO 9000 - ISO 9001-2008 Quality System - Elements, Documentation, Quality Auditing - QS 9000 - ISO 14000 - Concepts, Requirements and Benefits - TQM Implementation in manufacturing and service sectors.

Total Hours - 45

Text Books:

1. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.

References:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8 th Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006

COURSE OBJECTIVES:

- Understand the advanced concepts of mobile computing
- Apply transactions for complex model
- Explore the modern design structures of pervasive computing
- Analyze various advanced mobile network models
- Describe various concepts of pervasive computing
- Illustrate different applications present in pervasive computing

COURSE OUTCOMES:

Upon the completion of this course given in the curriculum, students should be able to

- Outline the basic problems, performance requirements of pervasive computing applications
- Analyze the trends of pervasive computing and its impacts on future computing applications and society
- Analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications
- Analyze the performance of different sensor data management and routing algorithms for sensor networks.
- Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.
- Able to categorize various concepts about the pervasive computing application device

UNIT I Introduction to Mobile Computing**9**

Mobility of bits and bytes – Wireless the beginning – Mobile computing- Dialogue control-Networks – Middleware and gateways- Application and services- Developing mobile computing applications- Security- Standards- Players in wireless space- Architecture for mobile computing-Three tier architecture- Design considerations-Mobile computing through internet-Making existing applications mobile enabled-Developing IVR application.

UNIT II Mobile Technologies**9**

Emerging technologies: Bluetooth-Radio frequency identification- Wireless broadband-Mobile IP- Internet protocol version 6-Java card- GSM- Short message services- General packet radio services: Packet data network Architecture-Operations-Data services-Application for GPRS-Limitations of GPRS-Wireless application protocol CDMA and 3G.

UNIT III Mobile Networking Wireless**9**

LAN advantage-Standards-Architecture-Mobility-Deploying-Mobile Ad Hoc networks and sensor networks-Security- Wi Fi verses 3G-Internet networks and interworking: Fundamentals of call processing – Intelligence in the networks-SS #7 signaling-IN conceptual model-Soft switch-Programmable networks-Client programming.

UNIT IV Introduction to Pervasive Computing**9**

Introduction to pervasive computing: Scenarios–Roaming environment-Pervasive computing infrastructure Personalized services – Pervasive computing market- m-business- Applications examples-Hardware - Human - Machine interfaces biometrics and Operating systems-Java for pervasive devices.

Connectivity – Protocols, security and device management - Pervasive web application architecture – Transcoding –Client authentication via internet- WAP and beyond - Voice technology: Speech application–Personal digital assistants: Device- Operating systems-Characteristics-Software components-Standards-Mobile applications.

Total Hours - 45

Text Books:

1. Asoke K Talukder and Poopa R Yavagal, Mobile Computing, Tata McGraw-Hill, 2nd edition, 2010.
2. Jochen Bueckhardt, Horst Henn, Stefan Hepper, Klaus Rintdorff and Thomas Schack, Pervasive Computing: Technology and architecture of mobile internet applications, Pearson Education, 2009.

References:

1. Reza B Fat and Roy T Fielding, Mobile Computing Principles, Cambridge University Press, 2010.
2. Hansmann Uwe, Merk Lothar and Nicklous Mart, Pervasive Computing: The Mobile World, Springer Professional, 2011.
3. Chimay J, Anumba and Xiangyu Wang, Mobile and Pervasive Computing, Springer Professional, 2012.

COURSE OBJECTIVES:

- Explain various concepts of semantics web services and processing
- Discuss about RDF data model available and its organization
- To discuss about queries in Semantic web
- To discuss about OWL concepts in ontology
- To describe about logic and inference
- Familiarize with the applications of semantic web technology

COURSE OUTCOMES:

- Gained knowledge on basic concepts of semantic web technologies
- Students are able to categorize RDF and various querying semantic web
- Gained knowledge on OWL and ontology movement
- Critically assess the adequacy of relevant standards (WSDL, RDF, OWL, etc) as a basis for building practical systems.
- Demonstrate an understanding of logic inference
- Develop the applications of Semantic Web Technologies

□

UNIT I Introduction**9**

History – Semantic web layers – Semantic web technologies – Semantics in semantic web – XML: Structuring – Namespaces – Addressing – Querying-Processing XML.

UNIT II Rdf and Querying the Semantic Web**9**

RDF data model-syntaxes-Adding semantics-RDF schema-RDF and RDF schema in RDF schema-An axiomatic semantics for RDF and RDF schema-Querying the semantic web-SPARQL-Basics-Filters-Constructs-Organizing result sets-Querying schemas.

UNIT III Ontology**9**

Introduction – Ontology movement – OWL – OWL specification - OWL elements – OWL constructs: Simple and complex – Ontology engineering: Introduction – Constructing ontologies – Reusing ontologies – On-To-Knowledge semantic web architecture

UNIT IV Logic and Inference**9**

Logic – Description logics - Rules – Monotonic rules: syntax, semantics and examples – Non-monotonic rules – Motivation, syntax, and examples – Rule markup in XML: Monotonic rules - Non-Monotonic rules

UNIT V Applications of Semantic Web Technologies**9**

Good relations-BBC artists-BBC world cup 2010 website-Government data, Newyork times-Sigma and sindiceopen Calais-schema.org-Future of semantic web

Text Books:

1. Grigorous Antoniou and Van Hermelen, A Semantic Web Primer. New Delhi: The MIT Press, 2012.
2. James Hendler, Henry Lieberman and Wolfgang Wahlster, Spinning the Semantic Web: Bringing the World Wide Web to its full potential. New Delhi: The MIT Press, 2005.

References:

1. Shelley Powers, Practical RDF. Mumbai: O'reilly publishers, 2009
2. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, Chapman & Hall/CRC, 2009

COURSE OBJECTIVES:

- Identify the data structures for Unix Kernel.
- Get thorough understanding of the kernel.
- Describe the methods for managing a Buffer Cache.
- Illustrate the concept of Inter Process Communication
- Implement the various system calls for Unix OS.
- Enhance knowledge about various system calls.

COURSE OUTCOMES

Upon successful completion of this course, students will be able to

- Look up information using man pages.
- Use a debugger and a program profiler; benchmark program execution and identify both critical and dead code.
- Write C programs that use UNIX system calls and behave as Unix commands and filters.
- Use structures to pass information and document structures using labelled diagrams.
- Set up callback routines such as those used in handling signals.
- Create a C program and a script that interprets command line options.
- Develop test data and test scripts.

UNIT I Kernel Data Structures and Buffer Cache 9

History of Unix OS– System Structure- User Perspective- Operating System Services-User & Kernel Modes .Introduction to Kernel: Architecture –Introduction to system concepts. The Buffer Cache: Buffer Headers – Structure of Buffer Pool- Scenarios for retrieval of a buffer- Advantages and Disadvantages of Buffer Cache. 9 Hours Reading and writing disk blocks

UNIT II Files and System Calls for File System 9

Inode- Structure of a regular File- Directories-Conversion of pathname to an Inode- Super block – Inode assignment to a file- System calls for File System. Allocation of Disk blocks

UNIT III Process Structure and Control Structure of a Process 9

Process states and transitions- Layout of System Memory-Context of a process- saving the context- manipulation of process address space. Process Control: Process Creation- Signal. Process Termination

UNIT IV Process Scheduling and Memory Management Policies 9

Process Scheduling: Scheduling-System calls for time and clock. Memory Management: Swapping – Demand Paging.

UNIT V Drivers and Inter Process Communication 9

The I/O Subsystem: Driver Interfaces- Disk drivers-Terminal Drivers-Streams Inter Process Communication: Process Tracing- System V IPC – Network Communications.

Text Books:

1. Leffler S.J., Mckusick M.K., Karels M.J. and Quarterman J.S., The Design and Implementation of the 4.3 BSD Unix Operating System, Addison Wesley, 1998

References:

1. Bach M.J. The Design of the Unix Operating System, Prentice Hall Of India, 2011
2. Goodheart B. Cox J, The Magic Garden Explained, Prentice Hall of India, 1994

COURSE OBJECTIVES:

- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design
- To learn advanced concepts such as service composition, orchestration and Choreography
- To know about various WS-* specification standards
- review several issues in the business adoption of SOA in an IT context

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to

- Look up information using man pages.
- Use a debugger and a program profiler; benchmark program execution and identify both critical and dead code.
- Write C programs that use UNIX system calls and behave as Unix commands and filters.
- Use structures to pass information and document structures using labelled diagrams.
- Set up callback routines such as those used in handling signals.
- Create a C program and a script that interprets command line options.
- Develop test data and test scripts.

UNIT I Introduction**9**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT II Services**9**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III Analysis**9**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task- centric business service design

UNIT IV SOA**9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS- Security

Total Hours: 45

Text Books:

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2nd edition, 2015.
2. Judith Hurwitz, Robin Bloor, “Service Oriented Architecture for Dummies”, Willey Publications, 2nd edition, 2009

References:

1. Nicolai M. Josuttis, “ SOA-The Art of Distributed System Design”, O’Reily Publications, 2009.
2. Douglas K. Barry, “ Web Services, Service Oriented Architecture and Cloud Computing”, Elsevier Publications, 2nd Edition, 2013.

COURSE OBJECTIVES:

- To understand software metrics and measurement.
- To emphasize the use of product and quality metrics.
- To explain quality assurance and various tools used in quality management.
- To learn in detail about various quality assurance models.
- To understand the audit and assessment procedures to achieve quality.
- To introduces the concepts and methods required for the construction of large software intensive systems.

COURSE OUTCOMES:

- Identify the fundamental issues that a project manager has to consider, and describe, chiefly in the context of software development projects, what approaches exist to manage these issues
- Identify and analyze software project activities using contemporary work breakdown techniques
- Identify and apply selected techniques for estimating the effort and duration of project activities
- Construct a schedule of project activities using contemporary planning techniques
- Construct a quality model for a software development project
 - Includes identification of suitable quality attributes, suitable metrics for measuring these, and suitable threshold values for these metrics to indicate acceptable quality

UNIT I Software Process and People Management**9**

Process Maturity – Capability Maturity Model (CMM) – Variations in CMM - Productivity improvement process. Organization structure – Difficulties in people management - Effective team building – Role of Project manager - Team structures – Comparison of different team structures.

UNIT II Software Metrics**9**

Role of metrics in software development - Project metrics – Process metrics – Data gathering - Analysis of Data for measuring correctness, integrity, reliability and maintainability of Software products.

UNIT III Project Management**9**

Project initiation – Feasibility study - Planning - Estimation - Resource allocation - Root Cause Analysis.

UNIT IV Risk Management**9**

Risk analysis and management - Types of Risk involved - RMM plan.

Scheduling - Critical path – Tracking - Timeline chart – Earned value chart. Baselines - Software configuration items - The SCM process- Version control- Change control -Configuration audit - SCM standards.

Total Hours:45

Text Books:

1. Pankaj Jalote, “Software Project Management in practice”, Pearson Education, New Delhi, 2002.

References:

1. Roger S Pressman, “Software Engineering, A Practitioner’s Approach” McGraw Hill Edition, New Delhi, 8th edition, 2014.
2. Watts Humphrey, “Managing the Software Process “, Pearson Education, New Delhi, 2000.

COURSE OBJECTIVES:

- Evaluate storage architectures and key data center elements in classic, virtualized and cloud environments
- Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems
- Explain the process of taking backup and virtualization for the same
- Describe storage networking technologies such as FC-SAN, IP-SAN, FCoE, NAS and object-based, and unified storage
- Understand and articulate business continuity solutions – backup and replications,
- Explain the process to archive for managing fixed content Explain key characteristics, services, deployment models, and infrastructure components for a cloud computing

COURSE OUTCOMES:

- Describe and apply storage technologies
- Identify leading storage technologies that provide cost-effective IT solutions for medium to large scale businesses and data centers
- Describe important storage technologies’ features such as availability, replication, scalability and performance
- Work in project teams to install, administer and upgrade popular storage solutions
- Identify and install current storage virtualization technologies
- Manage virtual servers and storage between remote locations
- Design, analyze and manage clusters of resources

UNIT I Storage System**9**

Introduction to information storage, Virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk drive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)

UNIT II Storage Networking Technologies and Virtualization**9**

Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCSI and FCIP as an IP-SAN solutions, Converged networking option – FCoE, Network Attached Storage (NAS) – components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform.

UNIT III Backup, Archive and Replication**9**

Business continuity terminologies, planning and solutions, Clustering and multipathing to avoid single points of failure, Backup and recovery – methods, targets and topologies, data deduplication and backup in virtualized environment, fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection.

Characteristics and benefits, Services and deployment models, Cloud infrastructure components, Cloud migration considerations.

Storage Infrastructure Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle Management (ILM) and storage tiering.

Total Hours:45

Text Books:

1. Information Storage and Management: Storing, Managing and Protecting Digital Information in classic, Virtualized and Cloud Environments, 2nd Edition, EMC Educations Services, Wiley, May 2012.

References:

1. Ulf Troppens, Rainer Erkens, Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Haustein , "Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, 2nd Edition, Wiley, July 2009
2. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley, January 2010

COURSE OBJECTIVES:

- To understand the basics of Information Security
- Understand the investigation based on various security need
- To know the legal, ethical and professional issues in Information Security
- Teach in order to develop various logical designs
- To know the aspects of risk management
- To study the critical need for ensuring Information Security in Organizations

COURSE OUTCOMES:

- Understood the basic concepts of information security
- Learn to select appropriate techniques to tackle and solve problems in the discipline of information security management
- Learn the importance of security and its management for any modern organization;
- Learn how an information security management system should be planned, documented, implemented and improved, according to the BSI standard on information security management.
- Able to describe the physical design of the system security
- Develop a secured application using the information security concepts

UNIT I Introduction 9

History, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC.

UNIT II Security Investigation 9

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III Security Analysis 9

Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV Logical Design 9

Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V Physical Design 9

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

Total Hours: 45

Text Books:

1. Michael E Whitman and Herbert J Mattord. "Principles of Information Security", Second Edition, Vikas Publishing House, New Delhi, 2003.

References:

1. Micki Krause, Harold F. Tipton, "Handbook of Information Security Management", Auerbach Publications, 4th edition, 2012.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 7th edition, 2012.

COURSE OBJECTIVES:

- To provide the student with knowledge of various levels of analysis involved in NLP.
- To explain the basic concepts of word level and semantic analysis
- To understand language modeling.
- To explain the process of Semantic Analysis and Discourse Processing
- To explain Natural Language Generation and Machine Translation
- To gain knowledge in automated natural language generation and machine translation.

COURSE OUTCOMES:

- Compose key NLP elements to develop higher level processing chains
- Assess / Evaluate NLP based systems
- Choose appropriate solutions for solving typical NLP subproblems (tokenizing, tagging, parsing)
- Describe the typical problems and processing layers in NLP
- Analyze NLP problems to decompose them in adequate independent components
- Understood the basic concepts of Information Retrieval and Lexical Resources

UNIT I Overview and Language Modeling**8**

OVERVIEW: Origins and challenges of NLP- Language and Grammar- Processing Indian Languages-NLP Applications-Information Retrieval.

LANGUAGE MODELING: Introduction-Various Grammar-based Language Models-Statistical Language Model.

UNIT II Word Level and Syntactic Analysis**9**

WORD LEVEL ANALYSIS: Introduction- Regular Expressions-Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. **SYNTACTIC ANALYSIS:** Introduction-Context-free Grammar-Constituency-Parsing-Probabilistic Parsing.

UNIT III Semantic Analysis and Discourse Processing**10**

SEMANTIC ANALYSIS: Introduction- Meaning Representation-Lexical Semantics- Ambiguity-Word Sense Disambiguation. **DISCOURSE PROCESSING:** Introduction- cohesion-Reference Resolution- Discourse Coherence and Structure.

UNIT IV Natural Language Generation and Machine Translation**9**

NATURAL LANGUAGE GENERATION: Introduction-Architecture of NLG Systems- Generation Tasks and Representations-Application of NLG.**MACHINE TRANSLATION:** Introduction-Problems in Machine Translation- Characteristics of Indian Languages- Machine Translation Approaches-Translation involving Indian Languages.

INFORMATION RETRIEVAL: Introduction-Design features of Information Retrieval Systems-Classical, Non-classical, Alternative Models of Information Retrieval – Evaluation. **LEXICAL RESOURCES:** Introduction-WordNet-FrameNet-Stemmers-POS Tagger- Research Corpora.

Total Hours: 45

Text Books:

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press, 2008.

References:

1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, Prentice Hall, 2nd Edition, 2008.
2. James Allen, Benjamin/cummings, “Natural Language Understanding”, 2nd edition, 1995.

OPEN ELECTIVES OFFERED BY COMPUTER SCIENCE AND ENGINEERING

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings.
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs.
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs.
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs.
- Structure simple Python programs for solving problems.
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.
- Understand various program object and graphics based on python

UNIT I	Fundamentals	9
---------------	---------------------	----------

The Universal Machine-Program power- What is Computer Science?-Hardware Basics-Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II	Decision Structures and Loops	9
----------------	--------------------------------------	----------

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III	Functions	9
-----------------	------------------	----------

Function of functions -Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV	Sequences	9
----------------	------------------	----------

String data type- String Processing -List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V	Objects and Graphics	9
---------------	-----------------------------	----------

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

Text Books:

1. John Zelle, “ Python Programming: An Introduction to Computer Science”, 2nd Edition, Franklin & Associates, 2009

References:

1. Mark Lutz, “Learning Python”, OReily, 2013
2. David Beazly & Brian K. Jones, “Python Cookbook”, OReily, 2013

COURSE OBJECTIVES:

- To introduce the Java programming language and explore its current strengths and Weaknesses
- To study the way that object-oriented concepts are implemented in the Java programming language
- To write working Java code to demonstrate the use of applets for client side programming
- To study the way that exceptions are detected and handled in the Java programming language
- To write working Java code that demonstrates multiple threads of execution
- To study the concepts of Internet Telephony

COURSE OUTCOMES:

- Implement interactive web page(s) using HTML, CSS and JavaScript.
- Design a responsive web site using HTML5 and CSS3.
- Demonstrate Rich Internet Application.
- Build Dynamic web site using server side PHP Programming and Database connectivity.
- Describe and differentiate different Web Extensions and Web Services.
- Demonstrate web application using Python web Framework-Django

UNIT I Introduction**9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML**9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL**9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV Client-Server programming**9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic

transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony

9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

Text Books:

1. Paul Deitel, Harvey Deitel and Abby Deitel, "Internet and World Wide Web-How to Program", 5th Edition, 2011.
2. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.

References:

1. Rahul Banerjee, Internetworking Technologies, An Engineering Perspective, PHI Learning, Delhi, 2011.
2. Robert W. Sebesta, "Programming the World Wide Web", Pearson Education, 2015

COURSE OBJECTIVES:

- To study the graphics techniques and algorithms.
- To study the multimedia concepts and various I/O technologies.
- To enable the students to develop their creativity
- To impart the fundamental concepts of Computer Animation and Multimedia.
- To understand various networking aspects used for multimedia applications.
- To develop multimedia application and analyze the performance of the same.

COURSE OUTCOMES:

- Developed understanding of technical aspect of Multimedia Systems.
- Understand various file formats for audio, video and text media.
- Develop various Multimedia Systems applicable in real time.
- Design interactive multimedia software.
- Apply various networking protocols for multimedia applications.
- To evaluate multimedia application for its optimum performance

UNIT I**Introduction9**

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II Creating Animation in Flash**9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D Animation & its Concepts**9**

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption**9**

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V Concept Development**9**

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45

Text Books:

1. Computer Graphics, Multimedia and Animation-Malay K. Pakhira, PHI Learning PVT Ltd, 2010

References:

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

COURSE OBJECTIVES:

- Assemble/setup and upgrade personal computer systems
- Perform installation, configuration, and upgrading of microcomputer hardware and software.
- Install/connect associated peripherals.
- Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.
- Understand the concept of networking models, protocols, functionality of each layer.
- Learn basic networking hardware and tools

COURSE OUTCOMES:

- Know what are registers, various types of registers and interfacing various registers.
- learn about the architecture of common bus system.
- learn about the different micro-operations used.
- learn about Instruction Cycle, Interrupt Cycle.
- learn about I/O interface, DMA controller, modes of data transfer and various address modes.
- learn how to assemble a PC

UNIT I Introduction**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

Total Hours: 45**Text Books:**

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.

References:

1. Peter Abel, Niyaz Nizamuddin, "IMB PC Assembly Language and Programming", Pearson Education, 2007
2. Scott Mueller, "Repairing PC's", PHI, 1992

COURSE OBJECTIVES:

- To understand the basic history and genres of games
- To demonstrate an understanding of the overall game design process
- To explain the design tradeoffs inherent in game design
- To design and implement basic levels, models, and scripts for games
- To describe the mathematics and algorithms needed for game programming
- To design and implement a complete three-dimensional video game

COURSE OUTCOMES:

- Initiating projects of game development
- creative design of games
- design and preparation of user interface
- selection of method of implementation of a designed game
- specification and preparation of games assets
- programming of developing games

UNIT I**Introduction9**

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II Safecracker Project**9**

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III Match Game Project**9**

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV Pizza Delivery Project**9**

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V Moon Landing Project**9**

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

Total Hours: 45**Text Books:**

1. Philip Conrod, Lou Tylee, "Programming Games with Java",2013

References:

1. Timothy M.Right, “Fundamental 2D Game Programming with Java”,Cengage Learning PTR,2015
2. Wayne Holder,Doug Bell, “Java Game Programming for Dummies”,

VALUE ADDED COURSES

COURSE OBJECTIVES:

- To demonstrate various principles involved in solving mathematical problems and adopt new and faster methods of calculations.
- To bring out behavioral changes among the trainees so that they develop interpersonal, communication, team building skills and leadership skills.
- It helps them in enhancing productivity and performance at the workplace. The training helps them to acquire employability skills so that they can get employment easily.
- The objective of this course is to enhance the problem solving skills in the areas of 'Quantitative Aptitude' and 'Reasoning' which will enable the students to achieve in Campus Placements and competitive examinations.
- To improve the logical thinking and mathematical ability of the students.
- To enable the students to give better presentation and explanation on their projects, posters and assignments – this makes them industry ready.

COURSE OUTCOMES:

- To solve basic and complex mathematical problems in short time.
- To perform well in various competitive exams and placement drives.
- To communicate with more confidence using better spoken and written English
- To give better presentation and explanation with the use of digital inventions
- During class time the students are expected to engage in group & pair work
- To perform well during Campus Drives and different Interviews

Module -1

Introduction, Speed Math's, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

Module – 2

Percentage, Data Interpretation, Profit and loss, Simple and Compound Interest

Module – 3

Time Speed and Distance, Time and Work, Pipes and Cistern, Geometry, Probability, Permutation and Combination

Module-4

Overview to communication, self Introduction, Presentation on their own topic, Extempore, Group Activity

Module -5

Group Discussion, Do's and Don'ts of Group Discussion, Body language, Grooming and Resume, Resume correction

Module -6

Introduction to HR, HR questions and Do's and Don'ts in HR, HR Interview, Mock GD & HR

Text books:

1. Quantitative Aptitude – Abhijit Guha
2. Quantitative Aptitude – R.S.Agarwal

COURSE OBJECTIVES:

- To familiarize the students with various approaches, methods and techniques of Animation Technology.
- To develop competencies and skills needed for becoming an effective Animator.
- Mastering traditional & digital tools to produce stills and moving images.
- Exploring different approaches in computer animation.
- To enable students to manage Animation Projects from its Conceptual Stage to the final Product creation.
- To train students in applying laws of human motion and psychology in 2-D or 3-D Characters.

COURSE OUTCOMES:

- Understand what Flash is and what you can do with it.
- Manage Website Content. Use the Timeline.
- Add and Manage Tweens.
- Create Slideshows.
- Incorporating Sound and Video.
- Use ActionScript

UNIT I

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation? Concept Development –Story Developing. Interface Fundamentals: The Tool panel – The Document Window – The Timeline Window – Drawing in Flash: Using Geometric shape Tools – Using Drawing Tools – Creating fPrecise Lines with the Pen Tool – Using Fill and Stroke Controls – Optimizing Drawings: - Putting selection Tools to work – Designing and Aligning Elements. Symbols, Instances, and the Library : Understanding the Document Library – Defining Content Types – Editing Symbols – Modifying Instance properties – Building Nested Symbol Structures – 9-Slice Scaling for Movie Clip backgrounds – using the Movie Explorer – Using Author time Shared Libraries. Applying Color: Introducing Color Basics – Working in the Color swatches Panel – Using the Color Mixer Panel – Working with Droppers, Paint Buckets and Ink Bottles.

UNIT II

Working with Text; Considering Typography – Text Field Type in Flash – The Text Tool and the Property Inspector – Font Export and Display – Font Symbols and Shared Font Libraries – Modifying Text.

Modifying Graphics : Sampling and Switching Fills and Strokes – Transforming Gradients and Bitmap Fills – Gradient Transform used for Lighting Effects – Applying Modify Shape Menu commands – Free Transform Commands and Options – Modifying Item Types – Working with Drawing Objects and Combine Object Commands – Working with Compound Shapes Animation Strategies : Establishing Ground Rules – Defining variables – Adding Personality – Manipulating Perception and Illusion – Understanding the Laws of Nature Timeline Animation : Basic Methods of Flash Animation – Frame –by – Frame Animation – Modifying Multiframe Sequences – Using Tweens for Animation – Integrating Multiple Animation Sequences.

Text Books:

1. Alex Michael, Animating with Flash MX: Professional Creative Animation Techniques, CRCPress,2012

References:

1. Ranjan Parekh, Principles Of Multimedia, TMH, 2007
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies, McGraw Hill Publication, 2010
3. Robert Reinhardt and Snow Dowd, Macromedia Flash 8 Bible, Wiley India Edition, 2006
4. Geoff Johns, Howard Porter, Ashok Banerji, Ananda Mohan Ghosh, The Flash: rogue war, McGraw Hill Publication, 2006
5. **Alex Michael, Animating with Flash 8: Creative Animation Techniques, CRC Press, 2006

OPEN ELECTIVES

Department of Science & Humanities

Course Objectives

- To develop analytical skills for solving engineering problems
- To teach the students the basic concepts of LPP,
- To learn the techniques to solve transportation and Assignment problems
- To make the students to study about the Integer Programming and Network Analysis
- Analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

- To define and formulate linear programming problems and appreciate their limitations.
- To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To be able to build and solve Transportation Models, Assignment Models,
- To construct linear integer programming models and discuss the solution techniques.
- To formulate and solve problems as networks and graphs.
- To be able to solve problems in different environments and develop critical thinking

UNIT I LINEAR PROGRAMMING PROBLEM**9**

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method.

UNIT II TRANSPORTATION PROBLEM**9**

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM**9**

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING**9**

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS**9**

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication

1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarsi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. www.mathworld.Wolfram.com
2. www.mit.edu
3. www.nptel.com

Course Objectives

- To kindle analytical skills for solving engineering problems
- To impact the knowledge about inventory models
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making.
- To analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

The students will

- To be able to solve simple models in Inventory problems and Replacement problems.
- To understand different queuing situations and find the optimal solutions using models for different situations.
- Simulate different real life probabilistic situations using Monte Carlo simulation technique.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- Convert and solve the practical situations into replacement mod
- To understand how to model and solve problems using non integer programming.

UNIT-1 INVENTORY MODELS**9**

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT- II NONLINEAR PROGRAMMING**9**

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT- III SIMULATION MODELS**9**

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT-IV DECISION MODELS**9**

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT-V REPLACEMENT MODELS**9**

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time-Replacement of items that fail suddenly and completely.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. www.mathworld.Wolfram.com
2. www.mit.edu
3. www.nptel.com

Course Objectives

- To gain knowledge in measures of central tendency.
- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of correlation and spectral densities.
- To learn the knowledge about application of it

Course Outcomes

- Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- The students will have an exposure of various distribution functions, correlation and spectral densities.
- To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- To apply the concept random processes in engineering disciplines.
- To understand and apply the concept of correlation and spectral densities.

UNIT I MEASURES OF CENTRAL TENDENCYANDPROBABILITY**9****Measures of central tendency – Mean, Median, Mode - Standard Deviation****Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.****UNIT II STANDARD DISTRIBUTIONS****9****Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.****UNIT III TWO DIMENSIONALRANDOMVARIABLES****9****Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression**

UNIT IV CLASSIFICATION OF RANDOM PROCESS**9**

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES**9**

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL: 45 HOURS**TEXT BOOK**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Veerarajan, T.	Probability, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002

WEBSITES

1. www.cut-the-knot.org/probability.shtml

2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

Course Objectives

- To gain knowledge in measures of central tendency and probability.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To introduce the basic concepts of classifications of design of experiments
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments and statistical quality control.
- Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

UNIT I	MEASURES OF CENTRAL TENDENCY AND PROBABILITY	12
---------------	---	-----------

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration. Probability-Random variable-Axioms of probability-Conditional probability
Total probability – Baye's theorem - Probability mass function - Probability density function.

UNIT II	STANDARD DISTRIBUTIONS	12
----------------	-------------------------------	-----------

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT III	TWO DIMENSIONAL RANDOM VARIABLES	12
-----------------	---	-----------

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT IV	TESTING OF HYPOTHESIS	12
----------------	------------------------------	-----------

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT V	DESIGN OF EXPERIMENTS	12
---------------	------------------------------	-----------

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

Note: Use of approved statistical tables permitted in the examination.

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios	Probability Random	McGraw-Hill	2002
	Papoulis and S Unnikrishna Pillai	variables and Stochastic Processes	Publications, New Delhi.	

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Walpole, R.E., Myers, R.H., Myers, S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearson Education Inc., Delhi.	2007
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education Inc., Delhi.	2014
4	Johnson, R.A, Irwin Miller	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEBSITES

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

Course Objectives

- To understand the fundamental knowledge of probability theory.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To introduce the concepts of random processes and Markov chain
- To understand the different Queuing models and solve problems
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Understand the concepts of random process and markov chains
- They will be able to solve the Queuing models
- The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT I PROBABILITY AND RANDOM VARIABLE**9**

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS**9**

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES**9**

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT IV RANDOM PROCESS AND MARKOV CHAINS**9**

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT V QUEUEING THEORY**9**

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross,S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2 nd Edition, New Delhi.	2008
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross, D., Shortle, J. F., Thompson J.M. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons Inc., NewJersey.	2008
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

Course Objectives

- Be able to understand basic knowledge of fuzzy sets and fuzzy logic
- Be able to apply basic knowledge of fuzzy operations.
- To know the basic definitions of fuzzy relations
- Be able to apply basic fuzzy inference and approximate reasoning
- To know the applications of fuzzy Technology.
- To learn the knowledge about application of it

COURSE OUTCOME:

- To gain the main subject of fuzzy sets.
- To understand the concept of fuzziness involved in various systems and fuzzy set theory.
- To gain the methods of fuzzy logic.
- To comprehend the concepts of fuzzy relations.
- To analyze the application of fuzzy logic control to real time systems.
- The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZYSETS

9

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – F u z z y functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZYSETS

9

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZYRELATIONS

9

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZYMEASURES

9

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZYINFERENCE

9

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

Course Objectives

- To know the fundamentals of Tensors.
- To know the series solutions to differential equations.
- To introduce the concepts of special functions.
- To study about Calculus of variations and integral equations
- To learn the knowledge about application of it

Course Outcomes

- Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- Learn about special type of matrices that are relevant in physics and then learn about tensors.
- Get introduced to Special functions like Bessel, Legendre, Hermite and Laguerre functions and their recurrence relations
- Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
- Students will master in calculus of variations and linear integral equations.
- The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS**8**

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation – example

UNIT III SPECIAL FUNCTIONS**8**

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre, Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS**9**

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS**12**

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations –

15BESHOE07

MATHEMATICAL PHYSICS

L T P C 3 0 0 3

integro–differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2013
2	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.nptel.ac.in

Course Objectives

- To introduce the concepts of special functions.
- To find the solutions to partial differential equations and their applications
- To study about mathematical physics and perturbation techniques
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making
- To learn the knowledge about application of it

Course Outcomes

- Students know the concepts of improper integrals, Beta and Gamma functions.
- The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
- Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- Convert and solve the practical situations into replacement models.
- To understand how to model and solve problems using non integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS**9**

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wavefunction.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS**9**

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT III PERTURBATION TECHNIQUES**9**

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT IVSIMULATION MODELS

9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M|M|1): (\infty|FIFO)$, $(M|M|c): (\infty|FIFO)$ Models.

UNIT VDECISIONMODELS

9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig, E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES

1. www.mathworld.wolfram.com
2. www.efunda.com
3. www.nptel.ac.in

Course Objectives

- To introduce the basic concepts of vector space
- To know the fundamentals of linear Algebra
- To solve system of linear equations
- To study about the linear transformations
- To introduce the concepts of inner product spaces Course Outcomes
- To learn the knowledge about application of it

Course Outcomes

The student will be able to

- To explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- To apply the fundamental concepts in their respective engineering fields
- To visualize linear transformations as matrix form
- To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- To articulate the importance of Linear Algebra and its applications in branches of Mathematics
- To analysis the real time application

UNIT I VECTOR SPACES**9**

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space, UNIT II EIGEN VALUES AND EIGEN VECTORS **9**

Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS**9**

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS**9**

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES**9**

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

- **TOTAL: 45 HOURS**

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

Course Objectives

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the basic concepts of PDE for solving standard partial differential equations
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Course Outcomes:

- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- The learners can equip themselves in the transform techniques and solve partial differential equations
- Understand how to solve the given standard partial differential equations.
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES**10**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM**9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS**9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS

8

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Outcomess. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. www.nptel.ac.in

Course Objectives

- To Develop abilities to write technically and expressively,
- To Recognize writing as a constructive, meaningful process,
- To Practise using reading strategies for effective writing.
- To equip them to write for academic as well as work place context.
- To enable students to be familiar with structure and style of formal written communication
- To learn the knowledge about application of it

Course Outcomes

- Construct simple sentences, correct common grammatical errors in written English.
- Build confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.
- Know the value of LSRW skills in document writing.
- Understand the structure, content and format of technical documents.
- Improve their writing skills and be ready with documents related ideas and notions.

UNIT I BASICSOFWRITING**7**

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer’s block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT2PARAGRAPHSANDESSAYS**9**

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kindsofparagraphs–Writingdrafts–Paragraphlengthandpattern–TypesofEssays– Characteristics of Essays – Salient point of sentence constructions.

UNIT3MEMOSANDEMAIL**9**

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS 9

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – DialogueWriting.

UNIT 5 REPORTS ANDRESEARCHARTICLES**11**

Discussion of newspaper articles -Course Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
	V.N. Arora & LakshmiChandra	Improve Your Writing: Revised First Edition	OUP, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	David Morley	The Cambridge Intro. to Creative Writing	CUP, New Delhi.	2010
2	Graham King	Collins Improve Your Writing	Collins; First edition, UK	2009
3	Crème, P. and M. Lea.	Writing at University: A guide for Outcomess.	OUP, New Delhi.	2003

WEBSITES

1. <http://www.stevepavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/> - Unit-I
2. <http://www.nyu.edu/classes/keefer/brain/net2.html> - Unit-I, II, &III
3. <https://www.udemy.com/technical-writing-and-editing/> - Unit-IV &V
4. <http://techwhirl.com/what-is-technical-writing/> - AllUnits

Course Objectives

- To inculcate the basics of brief history of Earth sciences
- To divulge knowledge on the basics of structure of earth and earth's gravitational field.
- To disseminate the fundamentals of magnetic field and thermal distribution of earth.
- To introduce the concepts of seismology and seismic waves .
- To impart the basic knowledge of oceans
- To learn the knowledge about application of it

Course Outcomes

- Gain knowledge on the basics of history of Earth sciences.
- Acquire knowledge on concepts of structure of earth and earth's gravitational field.
- Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
- Obtain knowledge on the basics of seismic waves.
- Understand the basics of oceans and properties of sea water.
- Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNIT I ORIGIN OF EARTH**9**

A brief history of the development of Earth Sciences . An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition.

UNIT II STRUCTURE OF EARTH**9**

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy.

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH**9**

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle.

UNIT IV SEISMOLOGY**9**

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS**9**

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A.Jacobs, R.D.Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES

1. www.ocw.mit.edu
2. www.physicsclassroom.com
3. www.nptel.ac.in
4. www.physics.org

Course Objectives

- To disseminate the fundamentals of acoustic waves. (K)
- To inculcate the characteristics of radiation and reception of acoustic waves. (K)
- To divulge knowledge on the basics of pipe resonators and filters.(S)
- To introduce the features of architectural acoustics.(S)
- To impart the basic knowledge of transducers and receivers.(K)
- To learn the knowledge about application of it

Course Outcomes

- Develop the idea of the fundamentals of acoustic waves.
- Apply the concepts of radiation and reception of acoustic waves.
- Explain the basic ideas of pipe resonators and filters.
- Illustrate the basics of architectural acoustics..
- Illustrate the transducers and receivers and its applications in various electronic devices.
- Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION 9

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient.

UNIT III PIPES RESONATORS AND FILTERS 9

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS 9

Sound in enclosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION 9

Transducer as an electrical network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser –microphone – moving coil electrodynamic microphone piezoelectric microphone – calibration of receivers.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Lawrence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	John Wiley & Sons	4th edition 2000

REFERENCE

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	F. Alton Everest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	6 th edition 2014

WEBSITES

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

15BESHOE14 ALTERNATE FUELS AND ENERGY SYSTEMS L T P C 3 0 0 3

Course Objectives

- To understand about the fuel
- To study about the alcohols and its importance in engine
- To gain knowledge on the fuel gas and oils
- To get the information on fuel cell
- To understand electric, hybrid and solar cars
- To learn the knowledge about application of it

Course Outcomes

- Students will know about the basic concepts of alternate fuels
- Students will know about the basic concepts of alcohols.
- Students will understand about fuel gas and oils
- Students can enrich their knowledge about the alternate fuels and energy systems
- Develop their knowledge in studies of vegetable oils
- Students knows about the importance of electric, hybrid and solar cars

UNIT I INTRODUCTION

9

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS

9

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

10

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications.

UNIT IV VEGETABLE OILS

8

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

9

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jain, P.C. and Monika Jain	Engineering Chemistry	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
2	Richard.L.Bechford	Alternative Fuels	SAE International , USA	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2 nd edition.	Gulf Professional Publisher, USA	2012
2	Nagpal G.R	Power Plant Engineering	Khanna Publishers, Delhi.	2002

WEBSITES

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. <http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
3. <http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

Course Objectives

- To make the students conversant with basics of Solid wastes and its classification.
- To make the student acquire sound knowledge of different treatments of solid wastes.
- To acquaint the student with concepts of waste disposals.
- To develop an understanding of the basic concepts of Hazardous waste managements.
- To acquaint the students with the basics of energy generation from waste materials.
- To get the information on energy conservation.

Course Outcomes

- Outline the basic principles of Solid waste and separation of wastes (K)
- Identify the concepts of treatment of solid wastes (S)
- Identify the methods of wastes disposals. (S)
- Examine the level of Hazardousness and its management. (S)
- Examine the possible of the energy production using waste materials. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLID WASTE**9**

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste.

UNIT II WASTE TREATMENT**9**

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration.

UNIT III WASTE DISPOSAL**9**

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation.

UNIT IV HAZARDOUS WASTE MANAGEMENT**9**

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE**9**

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dara.S.S,Mishra.D. D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management-	McGraw Hill Publishing Ltd., Newyork, 2 nd edition	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES

1. www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2. <http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
3. www.alternative-energy-news.info/technology/garbage-energy/
4. nzic.org.nz/ChemProcesses/environment/

Course Objectives

- To make the students conversant about the green chemistry
- To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
- To acquaint the student with concepts of green technology.
- To develop an understanding of the basic concepts of renewable energy resources.
- To acquaint the students with the basic information on catalysis.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of green chemistry (K)
- Examine the different atom efficient process and synthesis elaborately (S)
- Apply the concepts combustion of green technology (S)
- Identify and apply the concepts of renewable energy (S) Apply the concepts of green catalysts in the synthesis (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)
- Analysis the real time application of it

UNIT I INTRODUCTION TO GREENCHEMICALPRINCIPLES**9**

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOMEFFICIENT PROCESSES**9**

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III BIOTECHNOLOGY ANDGREENCHEMISTRY**9**

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology- Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and biocatalysts.

UNIT IVRENEWABLE RESOURCES**9**

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V CATALYSIS INGREENCHEMISTRY**9**

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press , London	2010
2	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry	Anamaya publishers., New Delhi. 2 nd edition	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1 st edition	Academic Press, Elsevier., New Delhi.	2007
3	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>
5. <http://www.amazon.in/Green-Chemistry-Catalysis>

Course Objectives

- To make the students conversant with **the information on electrochemical material**.
- To make the student acquire sound knowledge of **conducting polymers**.
- To acquaint the student with concepts of Energy storage devices.
- To develop energy storage devices.
- To impart knowledge on basic principles of solar cells and its application.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of chemistry in **electrochemical material (K)**
- Examine the properties of conducting polymers (S)
- Apply the concepts of electrochemistry in storage devices. (S)
- Identify the concepts of storage devices and its applications. (S)
- Apply the suitable materials for the manufacturing of storage devices. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METAL FINISHING**9**

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electroless plating of nickel- anodizing – Electroforming – Electrowinning.

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS**9**

Electropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- polyacetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I**9**

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II**9**

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE**9**

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elsevier.,UK	2007
2	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M. Barak	Electrochemical Power Sources	I.EEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
2	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

Course Objectives

- To make the students conversant with **cement and lime** and its uses.
- To make the student acquire sound knowledge of abrasives and refractories.
- To acquaint the student with concepts of inorganic chemicals.
- To develop an understanding of the basic concepts **explosives**.
- To acquaint the students with the basics of **agriculture chemicals**.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic chemistry of **cement and lime** (K)
- Examine the uses of abrasives and refractories (S)
- Identify the usage of the inorganic chemicals. (S)
- Identify the concepts of explosives and smoke screens (S)
- Identify the usage of the **agriculture** chemicals (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME**9**

Manufacture of Portland cement – setting and hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydrauliclime.

UNIT II ABRASIVES AND REFRACTORIES**9**

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS**9**

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3 , caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES**9**

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS**9**

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harikrishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	James A. Kent	Hand Book of Industrial Chemistry, 9 th edition	Van Nostrand Reinhold, New York.	1992
3	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4	S.D. Shukla and G.N. Pandey	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>
4. <http://toxics.usgs.gov/topics/agchemicals.html>

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
- Structure simple Python programs for solving problems
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python Programs
- Understand various program object and graphics based on python

UNIT I FUNDAMENTALS**9**

The Universal Machine-Program power- What is Computer Science?-Hardware Basics-Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II DECISION STRUCTURES AND LOOPS**9**

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops- indefinite loops-common loop patterns-Booleans

UNIT III FUNCTIONS**9**

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV SEQUENCES**9**

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V OBJECTS AND GRAPHICS**9**

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

TOTAL: 45 HOURS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Zelle	Python Programming: An Introduction to Computer Science	2 nd Edition, Franklin & Associates	2009
2	Mark Lutz	Learning Python	OReily	2013
3	David Beazly & Brian K. Jones	Python Cookbook	OReily	2013

COURSE OBJECTIVES:

- To study concepts of Internet, IP addresses and protocols
- To explain the concept of web page development through HTML
- To introduce the PERL and explore its current strengths and Weaknesses
- To write working Java code to demonstrate the use of applets for client-side programming
- To study Internet telephony and various multimedia applications
- To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

- Learn the advanced concepts & techniques of Internet and Java.
- Analyze the requirements for and create and implement the principles of web page development
- Understand the concepts of PERL
- Implement client-side programming using java applets
- Generate internet telephony based upon advanced concepts
- Develop applications on internet programming based on java applets and scripts

UNIT I INTRODUCTION

9

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML

9

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL

9

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV CLIENT-SERVER PROGRAMMING

9

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V INTERNET TELEPHONY

9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning, Delhi	2013
2	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011

COURSE OBJECTIVES:

- To impart the fundamental concepts of Computer Animation and Multimedia
- To study the graphic techniques and algorithms using flash
- Explain various concepts available in 3D animation
- Explain various devices available for animation
- To study the multimedia concepts and various I/O technologies for concept development
- To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

- Develop their creativity using animation and multimedia
- Understand the concepts of Flash and able to develop animation using it
- Understand about various latest interactive 3D animation concepts
- Know the various devices and software available in motion capture
- Understand the concept development process
- Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I**INTRODUCTION****9**

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II CREATING ANIMATION IN FLASH**9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D ANIMATION & ITS CONCEPTS**9**

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV MOTION CAPTION**9**

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V CONCEPT DEVELOPMENT**9**

Story Developing – Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL: 45 HOURS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ranjan Parekh	Principles of Multimedia	TMH	2007
2	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning PVt Ltd	2010
3	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011

15BEC SOE04 PC HARDWARE AND TROUBLE SHOOTING L T P C 3 0 0 3

COURSE OBJECTIVES:

- To study the basic parts of computer in detail
- Introduce various peripheral devices available for computer and its detailed working concepts
- Overview of various interfaces and other hardware overview
- Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
- To study basic concepts and methods in troubleshooting
- To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

- Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
- Identify various peripheral devices available and its working
- Understand various concepts of hardware and its interface and control
- Perform basic installation of PC. Importance of maintenance is understood
- Understand Various faults and failures are identified and troubleshooting in detail
- Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I INTRODUCTION

9

Introduction-Computer Organization-Number Systems and Codes-Memory-ALU-CU-

Instruction prefetch-Interrupts-I/O Techniques-Device Controllers-Error Detection Techniques

– Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES

9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD

– Special Types of Disk Drives – Mouse and Trackball – Modem – Fax – Modem – CDROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW

9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE

9

Introduction – system configuration – pre installation planning – Installation practice – routine checks

– PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNITV TROUBLESHOOTING**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification– Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL: 45 HOURS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	2/E, TMH	2002
2	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	PHI Learning, Delhi	2011
3	Scott Mueller	Repairing PC's	PHI	1992

COURSE OBJECTIVES:

- To understand the basic requirements, installation and structure of gaming using Java
- Discuss various aspects of safe cracker projects
- Discuss various aspects of match game projects
- Discuss various aspects of pizza delivery projects
- Discuss various aspects of moon landing projects
- Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Interpret various concepts of gaming based on Java
- Design the frame and code to develop safe cracker project
- Design the frame and code to develop match game project
- Design the frame and code to develop pizza delivery project
- Design the frame and code to develop moon landing project
- Design and develop various games using Java

UNIT I INTRODUCTION

9

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II SAFE CRACKER PROJECT

9

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III MATCH GAME PROJECT

9

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV PIZZA DELIVERY PROJECT

9

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project- Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V MOON LANDING PROJECT

9

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Philip Conrod, Lou Tylee	Programming Games with Java		2013
2	Timothy M.Right	Fundamental 2D Game Programming with Java	Cengage Learning PTR	2013
3	Wayne Holder,Doug Bell	Java Game Programming for Dummies		

Course Objectives

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To study about task management
- To learn about semaphore management and message passing
- To study about memory management
- To impart knowledge on

Course Outcomes

At the end of the course the students will be able to

- Understand overview of embedded systems architecture
- Acquire knowledge on embedded system, its hardware and software.
- Gain knowledge on overview of Operating system
- Discuss about task Management
- Gain knowledge about semaphore management and message passing.
- Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM**9**

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT II OPERATING SYSTEM OVERVIEW**9**

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT III TASK MANAGEMENT**9**

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING**9**

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue –

Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT VMEMORYMANAGEMENT

9

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

• REFERENCES

S.NO	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARMArchitecture ReferenceManual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

Course Objectives

- To study about various speakers and microphone
- To learn the fundamental of television systems and standards
- To learn the process of audio recording and reproduction
- To study various telephone networks
- To discuss about the working of home appliances
- To familiarize with TV services like ISDN.

Course Outcomes

At the end of the course the students will be able to

- Understand working of various type of loud speakers
- Acquire knowledge on various types of picture tubes
- Demonstrate the working of various optical recording systems
- Distinguish various standards for color TV system
- Acquire knowledge on various telecommunication networks
- Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES**9**

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDS AND SYSTEMS**9**

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III OPTICAL RECORDING AND REPRODUCTION**9**

Audio Disc – Processing of the Audio signal – read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IV TELECOMMUNICATIONS SYSTEMS**9**

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT V HOME APPLIANCES**9**

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

TOTAL: 45 HOURS**TEXT BOOK**

S.NO	Author(s)Name	Title of the book	Publisher	Year of Publication
1	S.P.Bali	Consumer Electronics	Pearson Education	2005

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I LIMITATIONS OF CMOS**9**

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – Structures of MOS devices: SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.

UNIT II MICRO AND NANO FABRICATION**9**

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nanolithography.

UNIT III CHARACTERIZATION EQUIPMENTS**9**

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV NANO DEVICES-I**9**

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V NANO DEVICES-II**9**

Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TOTAL: 45 HOURS

TEXT BOOK

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3 rd Edition	2012

REFERENCES

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

Course Objectives

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study the image compression procedures.
- To study the image segmentation and representation techniques.
- To study the video processing fundamentals
- To know the concepts of motion estimation

Course outcomes

- Understand the image fundamentals and mathematical transforms necessary for image processing.
- Understand the image enhancement techniques
- Understand the image compression procedures.
- Understand the image segmentation and representation techniques.
- Understand the video processing fundamentals
- Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 9

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES 9

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION 9

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING 9

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION 9

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TOTAL: 45 HOURS

TEXTBOOKS

1. Gonzalez and Woods ,”Digital Image Processing “, 3rd edition Pearson.
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, ”Video processing and communication “,1st edition PHI.

REFERENCES

1. M. Tekalp ,”Digital video Processing”, Prentice llInternational.
2. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", JohnWiley &Sons.
3. Chris Solomon, Toby Breckon , "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley &Sons.

Course Objectives

- To learn the processing steps in fabrication of VLSI devices.
- To learn the concepts of assembling and packaging for VLSI devices.
- To impart a good knowledge in reactive plasma etching techniques and equipment.
- To familiarize the students with the NMOS and CMOS IC technology.
- To make the student acquire reactive Plasma Etching techniques and Equipment.
- To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

- List out various fabrication techniques
- Understand the etching principle in IC fabrication
- Gain knowledge on deposition and diffusion methods
- Understand the process simulation and integration.
- Assembling and packing techniques
- various technologies used for fabricating VLSI devices

UNIT I**9**

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds} - V_{ds} relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II**9**

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III**9**

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IV**9**

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V**9**

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TOTAL: 45 HOURS

TEXT BOOKS

S.NO.	Author(s)Name	Title of the book	Publisher	Year of publication
1	K. Eshraghian Eshraghian. D, A.Pucknell	Essentials of VLSI Circuits and Systems	PHI	200 5
2	Wayne Wolf	Modern VLSI Design	Pearson Education, 3rd edition	199 7

REFERENCES

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., AdissonWesley.

Course Objectives

- To study materials used for MEMS and its working
- To study the fabrication process used for MEMS
- To study the packaging process used for MEMS
- To familiarize the students with various micro actuators and micro sensors.
- To learn the survey of materials central to micro engineering.
- To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

- Appreciate the underlying working principles of MEMS devices.
- Understand the working of Micro sensors and actuators
- Explain the IC fabrication processes
- Gain knowledge on bulk manufacturing
- Understand the Design of Micro systems.
- Design and model MEMS devices.

UNIT I INTRODUCTION TO MEMS AND MICROFABRICATION

9

History of MEMS Development, Characteristics of MEMS-Miniaturization - Micro electronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS

9

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION

9

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors-Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS AND ACTUATOR

9

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V POLYMER AND OPTICAL MEMS**9**

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP)- PDMS – PMMA – Parylene - Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TOTAL: 45 HOURS**TEXT BOOK**

S.No	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES

S.No	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J.Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W.Gardner and Vijay K Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

15BEECOE07 NEURAL NETWORKS AND ITS APPLICATIONS L T P C 3 0 03

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS

9

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks.

UNIT II LEARNING PROCESS

9

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION

9

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm.

UNIT IV ATTRACTOR NEURAL NETWORK AND ART

9

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain- Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP.

UNIT V SELF ORGANIZATION

9

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements.

TOTAL: 45 HOURS

REFERENCES

S.No	Author(s)Name	Title of the book	Publisher	Year of Publication
1	Simon Haykin	Neural Networks and Learning Machines	-3/E - Pearson/ Prentice Hall	2009
2	Satish Kumar	Neural Networks :A ClassroomApproach	TMH	2008
3	Freeman J.A., Skapura D.M	Neural networks, algorithms, applications, and programming techniques	Addition Wesley	2005
4	Laurene Fausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/ Prentice Hall	2000
5	Robert J Schalkoff	Artificial Neural Networks	McGraw Hill	1997

Course Objectives

- To introduce the basic concepts of Fuzzy logic and its applications in various domain
- To educate how to use Fuzzy computation to solve real-world problems
- To have a solid understanding of Basic fuzzy models.
- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- To learn about applications on Fuzzy based systems
- To familiarize with fuzzy inference and defuzzy inference procedures

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control
- Ability to develop how to use Fuzzy computation to solve real-world problems
- Design fuzzy based model for any application

UNIT I**9**

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT II**9**

Theory Of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT III**9**

Fuzzy Knowledge Based Controllers (FKBC): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT IV**9**

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V**9****FUZZY BASED SYSTEMS**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TOTAL: 45 HOURS**TEXT BOOKS**

S.No	Author(s)Name	Title of the book	Publisher	Year of Publication
1	D. Diankar, H. Hellendoom and M. Reinfrank	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G. J. Klir and T. A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

Course Objectives

- To impart basic knowledge in bioprocess Engineering
- To design the bioreactors for various operations.
- To understand the principle and working of heat transfer equipment.
- To extend the knowledge in principle of heat transfer inside a bioreactor
- To construct the equipment's used in mass transfer operations.
- To learn the equipment's used in separation process.

Course Outcomes

- Summarize the basic concepts in bioprocess Engineering.
- Ability to design the bioreactors for various operations.
- Ability to develop the heat transfer equipment's for Bioprocess Engineering.
- Ability to construct the equipment's used in mass transfer operations.
- To acquire the knowledge of regulatory constraints in bioprocess
- Categorize the equipment's used in separation process.

UNIT I ENGINEERING PROPERTIES AND STORAGE TANK**9**

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II REACTOR DESIGN**9**

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III HEAT TRANSFER EQUIPMENTS**9**

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV MASS TRANSFER EQUIPMENTS**9**

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V SEPARATION EQUIPMENTS**9**

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotary drum drier and Swenson –walker crystallizer.

TEXT BOOKS

S. No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering	McGraw-Hill	2007

2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw-Hill Companies	2008
---	-------------------------------	-----------------------------------	------------------------------	------

REFERENCES

S. No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

Course Objectives

- To learn the scope and importance of food processing.
- To impart basic knowledge in different food processing methods carried out in the food tech companies.
- To extend the brief knowledge in food conservation operations.
- To study the methods of food preservation by cooling.
- To familiarize the students on the concepts of preservation methods for fruits.
- To create deeper understanding on preservation methods for vegetables.

Course Outcomes

- Describe the scope and importance of food processing.
- Outline the various processing methods for foods.
- Extend the knowledge in food conservation operations.
- Describe the methods of food preservation by cooling.
- Summarize the preservation methods for fruits.
- Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING

9

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS

9

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS

9

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipment- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING

9

Refrigeration, Freezing- Theory, freezing time calculation, methods of freezing, freezing equipment, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES

9

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing	2000
3	Mircea Enachescu Dauthy	Vegetable Processing	FAO agricultural services	1995

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

COURSE OBJECTIVES

1. To understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. To use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. To study reaction mechanisms, relative free energies and structural dynamics
4. To compute different experimental properties and spectra using computational techniques.
5. To understand how to construct, interpret and utilise potential energy surfaces.
6. To understand the theoretical and practical challenges associated with computational modeling.

COURSE OUTCOMES

1. Understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. Can use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. Study reaction mechanisms, relative free energies and structural dynamics
4. Compute different experimental properties and spectra using computational techniques.
5. Understand how to construct, interpret and utilise potential energy surfaces.
6. Understand the theoretical and practical challenges associated with computational modeling.

UNIT I MOLECULAR MODELLING**9**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima.

UNIT II QUANTUM MECHANICS**9**

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree-Fock equations; calculating molecular properties using ab initio and semiempirical methods.

UNIT III MOLECULAR MECHANICS**9**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non-bonded interactions; force field parameterization and transferability; energy minimization; derivative and non-derivative methods, applications of energy minimization.

UNIT IV MOLECULAR DYNAMICS**9**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamics simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT V MODELLING AND DRUG DESIGN**9**

Macromolecular modeling, design of ligands for known macromolecular target sites, Drug-receptor interaction, classical SAR/QSAR studies and their implications to the 3D modeler, 2-D and 3-D database

searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TOTAL: 45 HOURS

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Yvonne C. Martin, editor, Peter Willett	Designing bioactive molecules : three- dimensional techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; Har	1998

COURSE OBJECTIVES

1. To understand the basics of biology
2. To gain knowledge about different biomolecules
3. To get familiarize with human diseases.
4. To learn about DNA & RNA.
5. To learn about different clinical investigations
6. To know the recent advances in biology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non-communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the concept of biomechanics

UNIT I OVERVIEW OF BIOREMEDIATION**9**

Pollution : Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT II BIOFILM PROCESSES**9**

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes.

UNIT III BIOREMEDIATION FOR SOIL ENVIRONMENT**9**

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination.

UNIT IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMENT**9**

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream- Biofiltration, Bio-trickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters.

UNIT V BIOREMEDIATION OF METALS**9**

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Biobenification, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann,B.E., and McCarty, P.L.,	Environmental Biotechnology : Principles andApplications.	McGraw Hill,	2001
2	JohnCookson	BioremediationEngineering: DesignandApplications	McGraw- Hill	1995

REFERENCES

S.No.	Author(s) Name	Titleofthebook	Publisher	Year of Publications
1	Prescott,L.M., Harley, and Klein,D.A	Microbiology	McGraw- HillHigher Education	2008

COURSE OBJECTIVES

1. To study selected biological phenomena using physical principles.
2. To understand the biological and environmental sciences.
3. To gain the knowledge on technical enormous impact of the biological sciences.
4. To acquire the knowledge about molecular structure of biological systems.
5. To know the uses of proteins and its functions.
6. To understand the biological structure & function: Size and shape of macromolecules.

COURSE OUTCOMES

1. Study selected biological phenomena using physical principles.
2. Understand the biological and environmental sciences.
3. Gain the knowledge on technical enormous impact of the biological sciences.
4. Acquire the knowledge about molecular structure of biological systems.
5. Know the uses of proteins and its functions.
6. Understand the biological structure & function: Size and shape of macromolecules.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS 9

Intramolecular bonds—covalent—ionic and hydrogen bonds—biological structures—general features — water structure— hydration — interfacial phenomena and membranes — self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS 9

Primary structure—the bases—sugars and the phosphodiester bonds—double helical structure—A, B and Z forms—properties of circular DNA—topology—polymorphism and flexibility of DNA—structure of ribonucleic acids—hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS 9

Conformation of the peptide bond—secondary structures—ramachandran plots—use of potential functions—tertiary structure—folding—hydration of proteins—hydropathy index.

UNIT IV ENERGY & DYNAMICS OF BIOLOGICAL SYSTEMS 9

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bimolecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES 9

Techniques for the study of biological structure & function: Size and shape of macromolecules—methods of direct visualization—macromolecules as hydrodynamic particles—macromolecules diffusion—ultra centrifugation—viscometry—x-ray crystallography—determination of molecular structures, X-ray fibre diffraction—electron microscopy—neutron scattering—light scattering.

TOTAL: 45 HOURS

TEXTBOOKS

S.No	Author(s)Name	Titleofthebook	Publisher	Year of Publications
1	RolandGlaser	Biophysics	Springer Science &Business Media	2001
2	MichelDaune	Molecular Biophysics: StructuresinMotion	Oxford University Press	1999
3	CharlesR.Cantor	BiophysicalChemistry, Part2:Techniques of theStudy ofBiologic StructureandFunction	W. H. Freeman and Company	1980

COURSE OBJECTIVES

1. To understand the available tools and databases for performing research in bioinformatics.
2. To expose students to sequence alignment tool in bioinformatics.
3. To construct the phylogenetic trees for evolution.
4. To get familiar with the 3D structure of protein and classification.
5. To acquire basic knowledge in protein secondary structure prediction.
6. To extend the brief knowledge in Micro array data analysis.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. *Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.*

UNIT I OVERVIEW OF BIOINFORMATICS**9**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases—contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**9**

Data retrieval with Entrez & DBGET/LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**9**

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**9**

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS**9**

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharminformatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TOTAL: 45 HOURS

TEXTBOOK

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayme	Fundamental Concepts of Bioinformatics	Pearson Education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCES

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

COURSE OBJECTIVES

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nanodevices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nanodevices.
6. **Describe the socio-economic issues in nanobiotechnology.**

UNIT I INTRODUCTION**9**

Introduction, Scope and Overview, Length scales, Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANOPARTICLES**9**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/Dip-pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nanowires and Nanotubes.

UNIT III APPLICATIONS**9**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**9**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinal chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**9**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Special Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TOTAL: 45 HOURS

TEXTBOOKS

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Niemeyer,C.M. andMirkin,C.A	Nanobiotechnology:Concepts, Applicationsand Perspectives	Wiley- VCH	2004
2	Goodsell,D.S.	Bionanotechnology	JohnWiley andSons, Inc	2004

REFERENCES

S.No.	Author(s) Name	Titleofthebook	Publisher	Yearof Publications
1	Shoseyov,O. and Levy,I	Nanobiotechnology: BioinspiredDevicesand Materialsof theFuture	Humana Press	2007
2	Bhushan,B.	SpringerHandbookof Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	FreitasJrR.A	Nanomedicine	Landes Biosciences	2004
4	Kohler,M.and Fritzsche,W.	Nanotechnology–An IntroductiontoNanostructuring Techniques	Wiley- VCH	2004

Course Objective

1. To explain to the students about MEMS Technology, Present, Future and Challenges.
2. To gain a knowledge of basic approaches for microsystem design.
3. To gain a knowledge of state-of-the-art lithography techniques for microsystems.
4. To learn new materials, science and technology for microsystem applications.
5. To understand materials science for microsystem applications.
6. To understand state-of-the-art micromachining and packaging technologies.

Course Outcome

1. Students will explain MEMS Technology, Present, Future and Challenges.
2. Gain a knowledge of basic approaches for microsystem design
3. Gain a knowledge of state-of-the-art lithography techniques for microsystems
4. Learn new materials, science and technology for microsystem applications
5. Understand materials science for microsystem applications
6. Understand state-of-the-art micromachining and packaging technologies

UNIT I INTRODUCTION**9**

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I**9**

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II**9**

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING**9**

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistrication methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS**9**

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Education Inc	2006
2	Stephen D Senturia	Microsystem Design	Springer Publication	2000
3	Tai Ran Hsu	MEMS & Micro systems Design and Manufacture	Tata McGraw Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nadim Maluf	An Introduction to Micro Electro Mechanical System Design	Artech House	2000
2	Mohamed Gad-el-Hak	The MEMS Handbook	CRC press Baco Raton	2000
3	Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim	Micro Sensors MEMS and Smart Devices	John Wiley & Son LTD	2002
4	James J.Allen	Micro Electro Mechanical System Design	CRC Press Publisher	2010
5	Thomas M.Adams and Richard A.Layton	Introduction MEMS, Fabrication and Application	Springer	2012

Course Objective

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

Course Outcome

1. Develop the student's knowledge in various robot structures and their workspace.
2. Develop student's skills in performing spatial transformations associated with rigid body motions.
3. Develop student's skills in perform kinematics analysis of robot systems.
4. Provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. Provide the student with some knowledge and analysis skills associated with trajectory planning.
6. Provide the student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT 9

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS 9

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS 9

Robot programming languages – VAL programming – Motion Commands, Sensors commands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION 9

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD, CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., Chmielewski T.A and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig J.J	Introduction to Robotics Mechanics and Control	Pearson Education	2008
2	Deb S.R	Robotics Technology and Flexible Automation	Tata McGraw Hill Book Co	1994
3	Koren Y	Robotics for Engineers	Mc Graw Hill Book Co	1992
4	Fu.K.S.,Gonzalz R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	Mc Graw Hill Book Co	1987
5	Janakiraman P.A	Robotics and Image Processing	Tata McGraw Hill	1995
6	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company	2008
7	Surender Kumar	Industrial Robots and Computer Integrated Manufacturing	Oxford and IBH Publishing Co. Pvt. Ltd	1991

Course Objective

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS**9**

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN**9**

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS**9**

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES**9**

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM**9**

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain	The St. Lencie press	2000

		management		
--	--	------------	--	--

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement	Lean production, customer focused quality, McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

Course Objective

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

Course Outcome

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS 9

General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS 9

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT 9

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT 9

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT 9

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. <https://laulima.hawaii.edu/portal>

Course Objective

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

Course Outcome

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION**9**

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS**9**

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY**9**

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION**9**

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM**9**

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

Course Objectives:

- To impart knowledge on the constructional details and principle of operation of various automobile components.
- To learn the function and working of various components in transmission and drive lines.
- To study the concept and working of steering and suspension systems in an automobile.
- To give knowledge on the wheels, tyres and brakes of automobiles.
- To provide information on the current and future trends in automobiles.
- Identify and explain the types of steering system.

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Demonstrate the operating principles and constructional details of various automobile components.
- Explain the function and working of components in transmission and drive lines.
- Identify and explain the types of steering system.
- Identify and explain the types of suspension system.
- Classify and describe the types of wheels, tyres and brakes of automobiles.
- Discuss the current and future trends in the automobiles.

UNIT I ENGINE AND FUEL FEED SYSTEMS**9**

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI).

UNIT II TRANSMISSION SYSTEMS**9**

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III SUSPENSION SYSTEM**9**

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV BRAKES**9**

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM

9

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment”, 3rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

Course Objectives

- The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
- Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION 9

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS 9

2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION 9

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES 9

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS

9

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

Course Objectives

- **The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.**
- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.
- Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES**9**

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE**9**

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE**9**

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE**9**

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY**9**

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing,

greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

LTPC
3003

- To impart knowledge on trends in the vehicle power plants.
- To learn the various advanced driver assistance systems.
- To study the working of advanced suspension and braking systems in an automobile.
- To give information about motor vehicle emission and noise pollution control.
- To provide knowledge of the vehicle telematics.
- To give information about the noise control techniques

- Distinguish and describe the various modern vehicle power plant systems.
- List and explain the various driver assistant mechanisms.
- Identify and describe the working of advanced suspension and braking systems.
- Apply the knowledge of motor vehicle emission and noise pollution control.
- Describe the noise control techniques
- Describe the vehicle telematics and its applications.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems Progress in Technology	Automotive Electron Series,SAE, USA	1998

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	William B Riddens	“Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3.	Robert Bosch,	“Automotive HandBook”, 5 th Edition	SAE	2000

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES

9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS

9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN

9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS

9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION

9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2		Handbook for Building Engineers in Metric systems	NBC, New Delhi	2005

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2005.
3. National Building Code.

OBJECTIVES:

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

OUTCOMES:

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

UNIT I COASTAL ZONE**9**

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVE DYNAMICS**9**

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES**9**

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES**9**

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS**9**

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Richard Sylvester	Coastal Engineering, Volume I and II	Elseiner Scientific Publishing Co	2006
2	Quinn, A.D	Design & Construction of Ports and Marine Structures	McGraw-Hill Book Co	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ed. A.T. Ippen	Coastline Hydrodynamics	McGraw-Hill Inc., New York	2002
2	Dwivedi, S.N., Natarajan, R and Ramachandran, S	Coastal Zone Management in Tamilnadu	Wiley – 2 nd edition	2012

OBJECTIVE:

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

OUTCOMES:

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS**9**

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING**9**

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES**9**

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES**9**

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE**9**

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dally J W and Riley W.F	Experimental stress Analysis	McGraw-Hill, Inc. New York	2005
2	Srinath L S et al	Experimental Stress Analysis	Tata McGraw-Hill Publishing co., Ltd., New Delhi	2006

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rangan C S et al	Instrumentation – Devices and Systems	Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2002
2	Sadhu Singh	Experimental Stress Analysis	Khanna Publishers, New Delhi	2006

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I IRRIGATION SYSTEM REQUIREMENTS 9
Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II IRRIGATION SCHEDULING 9
Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNIT III MANAGEMENT 9
Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV OPERATION 9
Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study.

UNIT V INVOLVEMENT OF STAKE HOLDERS

9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000
2	R.T. Gandhi, et. al	Hand book on Irrigation Water Requirement	Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi	

REFERENCES

1. **Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000**
2. **Maloney, C. and Raju, K.V., “Managing Irrigation Together”, Practice and Policy in India, Stage Publication, New Delhi, India, 2000**

OBJECTIVE

At the end of this course, the students should have learnt the fundamentals of CAD, computer graphics, fundamentals of finite elements analysis, design and optimization and expert systems.

UNIT I INTRODUCTION**9**

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS**9**

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

UNIT III STRUCTURAL ANALYSIS**9**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION**9**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V EXPERT SYSTEMS**9**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Groover M.P. and Zimmers E.W. Jr	CAD/CAM, Computer Aided Design and Manufacturing	Prentice Hall of India Ltd, New Delhi	2005
2	Krishnamoorthy C.S.Rajeev S	Computer Aided Design	Narosa Publishing House, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harrison H.B	Structural Analysis and Design	Part I and II Pergamon Press, Oxford	2002
2	Rao S.S	Optimisation Theory and Applications	Wiley Eastern Limited, New Delhi	2002
3	Richard Forsyth (Ed)	Expert System Principles and Case Studies	Chapman and Hall, London	2000

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

9

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS

9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS

9

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS

9

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kadiyali, L.R	Principles and Practice of Highway Engineering	Khanna tech. Publications, New Delhi	2007
2	Croney, D	Design and Performance of Road Pavements	HMO Stationary Office	2005
3	Wright, P.H	Highway Engineers	John Wiley & Sons, Inc., New York	2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 2003.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2001, The Indian Roads Congress, New Delhi.
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001.

OBJECTIVES:

1. To understand the role of geology in the design and construction process of underground openings in rock.
2. To apply geologic concepts and approaches on rock engineering projects
3. To identify and classify rock using basic geologic classification systems.
4. To use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. To sequential design process used in geotechnical engineering practice.
6. To Require civil engineering students to read and summarize geologic literature for site specific projects.

OUTCOMES:

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Geologic concepts and approaches on rock engineering projects
3. Identify and classify rock using basic geologic classification systems.
4. Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. Sequential design process used in geotechnical engineering practice.
6. Require civil engineering students to read and summarize geologic literature for site specific projects.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 9

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 9

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 9

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING 9

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Goodman P.E	Introduction to Rock Mechanics	John Wiley and Sons	2005

2	Stillborg B	Professional User Handbook for rock Bolting	Tran Tech Publications	2006
---	-------------	---	------------------------	------

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Brow E.T	Rock Characterisation Testing and Monitoring	Pergaman Press	2002
2	Arogyaswamy R.N.P	Geotechnical Application in Civil Engineering	Oxford and IBH	2000
3	Hock E. and Bray J	Rock Slope Engineering	Institute of Mining and Metallurgy	1991

OBJECTIVE:

1. To learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. To design the storage structures.
3. To gain knowledge of steel water tanks and their design.
4. To get a brief idea about concrete water tanks.
5. To design steel bunkers and silos
6. To design pre stressed concrete water tanks

OUTCOMES:

1. The design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. Design the storage structures.
3. Gain knowledge of steel water tanks and their design.
4. Get a brief idea about concrete water tanks.
5. Design steel bunkers and silos
6. Design pre stressed concrete water tanks

UNIT I STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation

UNIT II CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS**9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rajagopalan K	Storage Structures	Tata McGraw-Hill, New Delhi	2002
2	Krishna Raju N	Advanced Reinforced Concrete Design	CBS Publishers and Distributors, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	R.G.Hopkinson and J.D.Kay	The Lighting of buildings	Faber and Faber, London	2000
2	William H.Seaverns and Julian R.Fellows	Air-conditioning and Refrigeration	John Wiley and Sons, London	2000

OBJECTIVES:

1. To understand the need of energy conversion and the various methods of energy storage
2. To explain the field applications of solar energy
3. To identify Winds energy as alternate form of energy and to know how it can be tapped
4. To explain bio gas generation and its impact on environment
5. To understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. To illustrate the concepts of Direct Energy Conversion systems & their applications.

OUTCOMES:

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. Illustrate the concepts of Direct Energy Conversion systems & their applications.

UNIT I INTRODUCTION**9**

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES**9**

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES**9**

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN**9**

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL**9**

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peter Sachs	Wind Forces in Engineering	Pergamon Press, New York	2002
2	Lawson T.V	Wind Effects on Buildings, Vols. I and II	Applied Science and Publishers, London	2005

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottawa, 2003
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 2002.

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT I MODERN CONSTRUCTION METHODS**9**

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES**9**

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines.

UNIT III MODERN CONSTRUCTION EQUIPEMENTS -I**9**

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting.

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS -II**9**

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant.

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peurifoyu , R. L., , Ledbette, W.B	Construction Planning , Equipment and Methods	Mc Graw Hill Co	2000
2	Antill J.M	PWD, Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Varma.M	Construction Equipment and its Planning & Applications	Metropolitian Book Co	2000
2	Nunnaly, S.W	Construction Methods and Management	Prentice – Hall	2000
3	Ataev, S.S	Construction Technology	MIR , Pub	2000

LIST OF OPEN ELECTIVES OFFERED BY

ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT

**15BEEEOE01
3 0 0 3**

ELECTRIC HYBRID VEHICLE

L T P C

Course Objectives

- To understand the basic concepts of electric hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives
- To understand and gain the knowledge about various energy storage devices

Course Outcomes:

- Summarize the basic concepts in bioprocess Engineering.
- Explain the concept of Hybrid Electric Vehicles.
- Understand the concept of Hybrid Electric Drive-Trains.
- Identify the different Energy Management Strategies.
- Understand the concept of different Energy Storage devices.
- Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press – 2 nd edition	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	Standardsmedia – 2 nd edition	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley – 2 nd edition	2012

Course Objectives:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT

9

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS

9

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT

9

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS

9

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS

9

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	▪ Lulu Enterprises, Inc. - 8th Edition Volume II	2013

Course Objectives

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

Course Outcomes (COs)

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3. Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS**9**

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS9

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER 9

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLEANEOUS TRANSDUCERS 9

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	London : McGraw-Hill Higher Education 5 th edition	2003
2	Patranabi. D	Sensors and Transducers	PHI Learning Pvt. Ltd – 2 nd edition	2003
3	John. P, Bentley	Principles of Measurement Systems	4th Edition, Prentice Hall	2004
4	Murthy.D.V.S	Transducers and Instrumentation	PHI Learning Pvt. Ltd 2 nd edition	2010

Course Objectives

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flowcharts of ladder and spray process system
- To understand the principles of PID.

Course Outcome

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION**9**

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment

Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING**9**

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS**9**

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS**9**

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and

Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES**9**

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, 5 th Edition	2009

WEBSITE

<http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,-> Introduction to programmable Logic controller

Course Objectives

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

- Analyze the Energy Scenario in India
- Understand the concept of Solar Energy
- Understand the concept of Wind Energy
- Understand the concept of Hydro Energy
- Analyze the different energy sources
- Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION**9**

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY**9**

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY**9**

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY**9**

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES**9**

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

**TOTAL: 45
HOURS**

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional sources of energy	Khanna publishers	2011
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Eleventh Reprint	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis – 3 rd edition	2015

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objectives

- To study the state variable analysis
- To provide adequate knowledge in the phase plane analysis and also describing function analysis.
- To study the analysis discrete time systems using conventional techniques.
- To analyze the stability of the systems using different techniques.
- To study the design of optimal controller.
- To study the types of compensators

Course Outcomes

At the end of the course the student will be able to

- understand the state variable analysis, Z- transform, state equation
- Construct the frequency response of the system using various plots
- Correlate the time and frequency domain specifications and effect of compensation
- Design the different types of compensators using frequency response plots to stabilize the control system
- Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT 1 STATE VARIABLE ANALYSIS**9**

Concept of state – State Variable and State Model – State models for linear and continuous time

systems – Solution of state and output equation – controllability and observability - Pole Placement – State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS**9**

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearizing non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM**9**

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM**9**

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL**9**

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers – 4 th edition	2006
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press – 2 nd edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.Gopal	Modern control system theory	New Age International Publishers	2002
2	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Prentice Hall, 7 th edition	2014
3	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University Press,	2002



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Established Under Section 3 of UGC Act 1956)

Eachanari post, COIMBATORE 641 021, INDIA

**DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY
REGULATIONS 2015
CREDIT SYSTEM**

These regulations are effective from the academic year 2015-2016 and applicable to the candidates admitted to B. E. / B. Tech. during 2015-2016 and onwards.

1. ADMISSION

1.1 Candidates seeking admission to the first semester of the eight semesters B. E./B.Tech Degree Programme:

Should have passed the Higher Secondary Examination (10+2) (Academic Stream) prescribed by the Government of Tamil Nadu with Mathematics, Physics and Chemistry as three of the four subjects of study under Part-III or any similar examination of any other University or authority accepted by the Karpagam Academy of Higher Education as equivalent thereto.

(OR)

Should have passed the Higher Secondary Examination of Vocational stream (Vocational groups in Engineering / Technology) as prescribed by the Government of Tamil Nadu.

1.2 Candidates seeking admission to the first semester of the eight semesters B. Tech. (Bio-Technology) Degree Programme:

Should have passed the Higher Secondary Examination (10+2) (Academic Stream) prescribed by the Government of Tamil Nadu with Mathematics, Physics and Chemistry (or) Physics, Chemistry and Biology as three of the four subjects (or) Physics, Chemistry, Botany and Zoology as subjects of study under Part-III or any similar examination conducted by any other authority accepted by the Karpagam Academy of Higher Education as equivalent thereto.

(OR)

Should have passed the Higher Secondary Examination of Vocational stream (Vocational groups in Engineering / Technology) as prescribed by the Government of Tamil Nadu.

1.3 Lateral Entry Admission

Candidates who possess Diploma in Engineering / Technology (10+3 or 10+2+2) awarded by the Directorate of Technical Education, Tamil Nadu or its equivalent and candidates who possess Bachelor Degree in Science (10+2+3) with Mathematics as one of the subjects, awarded by any University or its equivalent are eligible to apply for admission to the third semester of B. E./B. Tech. such candidates shall undergo two additional engineering subjects in the 3rd and 4th semester as prescribed by the Karpagam Academy of Higher Education. Eligibility criteria are given in the table below.

S. No.	Programme	Eligibility criteria
1.	B. Tech. Aerospace Engineering	Diploma in Mechanical Engg./ Metallurgy/Automobile Engg./ Mechanical and Rural Engg. / Machine Tool Maintenance and Repairs / Machine Design and Drafting / Refrigeration and Air-conditioning / Production Engg. / Tool and Die Design.
2.	B. E. Automobile Engineering	Diploma in Automobile Engg./ Mechanical Engg. / Metallurgy/ Mechanical and Rural Engg. / Machine Tool Maintenance and Repairs / Machine Design and Drafting / Refrigeration and Air-conditioning / Production Engg. / Tool and Die Design.
3.	B. E. Civil Engineering	Diploma in Civil Engg./ Sanitary Engg. / Civil and Rural Engg.
4.	B. E. Computer Science and Engineering	Diploma in Computer Engg. / Electrical Engg./ Electronics Engg. / Electrical & Electronics Engg. / Electronics & Communication Engg. / Electronics & Telecommunication Engg./ Information Technology/ Computer Science / Instrumentation & Control Engg. / Electronics & Instrumentation.
5.	B. E. Electrical and Electronics Engineering	Diploma in Electrical Engg./ Electronics Engg. / Electrical & Electronics Engg. / Electronics & Communication Engg. / Electronics & Telecommunication Engg./ Information Technology/ Computer Science / Instrumentation & Control Engg. / Electronics & Instrumentation.
6.	B. E. Electronics and Communications Engineering	Diploma in Electronics Engg. / Electronics & Communication Engg. / Electrical Engg. / Instrument Technology / Electronics with specialization in Instrumentation / Electrical & Electronics Engg./ Information Technology/ Computer Science/ Instrumentation & Control Engg./ Electronics & Telecommunication Engg.
7.	B. E. Mechanical Engineering	Diploma in Mechanical Engg./ Metallurgy/Automobile Engg./ Mechanical and Rural Engg. / Machine Tool Maintenance and Repairs / Machine Design and Drafting / Refrigeration and Air-conditioning / Production Engg. / Tool and Die Design.

1.4 Migration from other University

Candidates who have completed their first to sixth semesters of B. E./B. Tech. study in any university are eligible to apply for admission to their next semester of B. E./B. Tech. in the branch corresponding to their branch of study. The student will be exempted from appearing for examination of the equivalent courses passed in the earlier programme and will have to appear for courses which he/she has not done during the period of his/her earlier programme. Along with the request letter and mark sheets, he/she has to submit a copy of syllabus of the programme duly attested by registrar, competent authority, he/she has undergone. Equivalence Certificate shall be provided by the “Students’ Affairs Committee” of Karpagam Academy of Higher Education. Students’ Affairs Committee comprises of all the Heads of the Departments and Dean of the Faculty of Engineering and a nominee of The Registrar.

2 . PROGRAMMES OFFERED

A candidate may undergo a programme in any one of the branches of study approved by the Karpagam Academy of Higher Education as given below.

List of B. E. and B. Tech. Degree Programmes

1. B. E. Automobile Engineering
2. B. E. Bio-Engineering
3. B. E. Civil Engineering
4. B. E. Computer Science and Engineering
5. B. E. Electrical and Electronics Engineering
6. B. E. Electronics and Communications Engineering
7. B. E. Fire and Safety Engineering
8. B. E. Mechanical Engineering
9. B. Tech. Aerospace Engineering
10. B. Tech. Bio-Technology

3. MODE OF STUDY

3.1 Full-Time:

In this mode of study, the candidates are required to attend classes regularly on the specified working days of the Karpagam Academy of Higher Education.

3.2 Conversion from full time mode of study to part time is not permitted.

3.3 Change from one programme to another is not permitted.

4. STRUCTURE OF PROGRAMMES

4.1 Every programme will have curriculum with syllabus consisting of theory and practical courses such as:

(i) General core courses comprising Mathematics, Basic Sciences, Engineering Sciences and Humanities.
(ii) Core courses of Engineering/Technology.

(iii) Elective courses for specialization in related fields.

(iv) Workshop practice, computer practice, engineering graphics, laboratory work, in-plant training, seminar presentation, project work, industrial visits, camps, etc. Every student is Encouraged to participate in at least any one of the following programmes

- NSS / Sports/Physical exercise/NCC/YRC/Red Ribbon club/Environment club and Energy club
- Other Co-Curricular and Extra Curricular activities

(V) **Choice Based Credit System has been in vogue.** Number of electives have been increased to eight. One among the elective is an open elective being offered by other than the parent department.

4.2 Each course is normally assigned certain number of credits.

No. of credits per lecture period per week	: 1
No. of credits per tutorial period per week	: 1
No. of credits for 3 periods of laboratory course per week	: 2
No. of credits for 3 periods of project work per week	: 2
No. of credits for 2 periods of Value added course per week	: 1
No. of credits for 3 weeks of in-plant training during semester vacations	: 1

4.3 In every semester, curriculum shall normally have a blend of theory courses not exceeding 6 and practical courses not exceeding 3. However, the total number of courses per semester shall not exceed 8.

4.4 The prescribed credits required for the award of the degree shall be within the limits specified below.

PROGRAMME	PRESCRIBED CREDIT RANGE
B. E./B. Tech.	185 – 190

4.5 The medium of instruction for all Courses, Examinations, Seminar presentations and Project/Thesis reports is English.

4.6 Value Added Course

Besides core courses and elective courses, value added course is introduced. The blend of different courses is so designed that the student would be trained not only in his / her relevant professional field but also as a socially conscious human being.

4.7 Evaluation in the courses comprises two parts, one is the Continuous Internal Assessment (CIA) and the other one is the End Semester Examination (ESE). Evaluation in few courses may be by Internal Assessment only.

5. DURATION OF THE PROGRAMME

5.1 The prescribed duration of the programme shall be

Programme	Min. No. of semesters	Max. No. of semesters
B. E./B. Tech. (H. Sc. Candidates)	8	14
B. E./B. Tech. (Lateral Entry Candidates)	6	12

5.2 Each semester shall normally consist of 90 working days or 540 hours.

5.3 Additional classes for improvement, conduct of model test, etc., over and above the specified periods shall be arranged, if required. But for the purpose of calculation of attendance requirement for eligibility to appear for the end semester examinations (as per clause 11) by the students, 540 hours conducted within the specified academic schedule alone shall be taken into account and the overall percentage of attendance shall be calculated accordingly.

6. REQUIREMENTS FOR COMPLETION OF THE SEMESTER

6.1 Ideally every student is expected to attend all classes and secure 100% attendance. However, in order to allow for certain unavoidable circumstances, the student is expected to attend at least 75% of the classes and the conduct of the candidate has been satisfactory during the course.

6.2 A candidate who has secured attendance between 65% and 74% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) or due to participation in University / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Extension activities or similar programmes with prior permission from the Registrar shall be given exemption from prescribed attendance requirements and shall be permitted to appear for the examination on the recommendation of the Head of the Department concerned and Dean to condone the lack of attendance. The Head of the Department has to verify and certify the genuineness of the case before recommending to the Dean. However, the candidate has to pay prescribed condonation fees.

6.3 Candidates who are not recommended for condonation and those who have less than 65% attendance will not be permitted to proceed to the next semester and have to redo the course. However they are permitted to write the arrear examinations if any.

7. CLASS ADVISOR

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a teacher of the Department who shall function as Class Advisor for those students throughout their period of study. Such Class Advisors shall advise the students and monitor the courses undergone by the students, check the attendance and progress of the students and counsel them periodically. If necessary, the Class Advisor may display the cumulative attendance particulars in the Department notice board and also discuss with or inform the Parents/Guardian about the progress of the students. Each student shall be provided with course plan for each course at the beginning of each semester.

8. CLASS COMMITTEE

8.1. Every class shall have a class committee consisting of teachers of the class concerned, Maximum of six student representatives [boys and girls] and the concerned Head of the Department. It is like the 'Quality Circle' with the overall goal of improving the teaching-learning process. The functions of the class committee include

- Clarifying the regulations of the degree programme and the details of rules therein particularly clause 4 and 5 which should be displayed on department Notice-Board.
- Informing the student representatives the details of Regulations regarding weightage used for each assessment. In the case of practical courses (laboratory / drawing / project work / seminar etc.) the breakup of marks for each experiment / exercise /module of work, should be clearly discussed in the class committee meeting and informed to the students.
- Solving problems experienced by students in the class room and in the laboratories.
- Informing the student representatives the academic schedule including the dates of assessments and the syllabus coverage for each assessment.
- Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.
- Identifying the weak students, if any and requesting the teachers concerned to provide some additional academic support.

8.2 The class committee for a class under a particular branch is normally constituted by the Head of the Department. However, if the students of different branches are mixed in a class (like the first semester which is generally common to all branches), the class committee is to be constituted by the Dean.

8.3 The class committee shall be constituted within the first week of each semester.

8.4 The Chairperson of the Class Committee may convene the meeting of the class committee.

8.5 The Dean may participate in any Class Committee of the Faculty.

8.6 The Chairperson is required to prepare the minutes of every meeting, submit the same to Dean through the HOD within two days of the meeting and arrange to circulate it among the students and teachers concerned. If there are some points in the minutes requiring action by the Management, the same shall be brought to the notice of the Registrar by the HOD through Dean.

8.7 The first meeting of the Class Committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments within the framework of the regulations. Two subsequent meetings may be held in a semester at suitable intervals. During these meetings the student members representing the entire class, shall meaningfully interact and express their opinions and suggestions of the other students of the class in order to improve the effectiveness of the teaching-learning process.

9. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group, shall have a “Course Committee” comprising all the teachers handling the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Dean depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The ‘Course Committee’ shall meet to arrive at a common scheme of evaluation for the test and shall ensure a uniform evaluation of the tests. Where ever feasible, the Course Committee may also prepare a common question paper for the Internal Assessment test(s).

10. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

10.1 Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' (Log book) which consists of attendance marked in each theory or practical or project work class, the test marks and the record of class work (topic covered), separately for each course.

10.2 Continuous Internal Assessment (CIA): The performance of students in each subject will be continuously assessed by the respective teachers as per the guidelines given below:

THEORY COURSES:

S. No.	CATEGORY	MAXIMUM MARKS
1.	Seminar*	5
2.	Attendance	5
3.	Test – I	8
4.	Test – II	8

S. No.	CATEGORY	MAXIMUM MARKS
5.	Test – III – Model Exam	14
Continuous Internal Assessment : TOTAL		40

*Evaluation shall be made by a committee.

PATTERN OF TEST QUESTION PAPER (Test I & II)

INSTRUCTION	REMARKS
Maximum Marks	50 marks for all Tests
Duration	2 Hours
Part - A	14 Objective type Questions, uniformly covering the two and half units of the syllabus. All the 14 Questions are to be answered. (14 x 1 = 14 Marks).
Part- B	Question 15 to 17 will be of either or choice, covering two and half units of the syllabus. (3 x 12 = 36 Marks).

PATTERN OF MODEL EXAM (Test III)

INSTRUCTION	REMARKS
Maximum Marks	100
Duration	3 Hours
Part - A	Part A will be online examination of Objective type Questions. Questions No. 1 to 20, covering all the 5 units. (20 x 1 = 20 Marks).
Part- B	5 Sixteen mark Questions. Totally 10 Questions with either or type covering all the units. Students has to answer 5 questions. (5 x 16 = 80 Marks).

PRACTICAL COURSES:

S. No	CATEGORY	MAXIMUM MARKS
1.	Attendance	5
2.	Observation work	5
3.	Record work	5
4.	Model examination	15
5.	Viva – voce [Comprehensive]	10
Continuous Internal Assessment: TOTAL		40

Every practical exercise / experiment shall be evaluated based on the conduct of exercise/ experiment and records maintained.

10.3 ATTENDANCE

Marks Distribution for Attendance

S. No.	Attendance %	Marks
1	91 and above	5.0
2	86-90	4.0
3	81-85	3.0
4	75-80	2.0
5	Less than 75	0

10.4 PROJECT WORK:

Final year project work will be always in-house. However, as a special case, if a student is able to get a project from a government organization or private or public sector company with a turn over about Rs. 50 crore, the student may be permitted to do his/her project work in institution/research organization/industry.

11. REQUIREMENTS FOR APPEARING FOR END SEMESTER EXAMINATION (ESE)

A candidate shall normally be permitted to appear for the ESE of any semester commencing from I semester if he/she has satisfied the semester completion requirements (Subject to Clause 5) and has registered for examination in all courses of the semester. Registration is mandatory for Semester Examinations as well as arrear examinations failing which the candidate will not be permitted to attend the next semester. A candidate already appeared for a subject in a semester and passed the examination is not entitled to reappear in the same subject of the semester for improvement of grade.

12. END SEMESTER EXAMINATION

ESE will be held at the end of each semester for each subject, which consists of 100 marks, later scaled down to 60 marks.

PATTERN OF ESE QUESTION PAPER:

INSTRUCTION	REMARKS
Maximum Marks	100 marks for all Semester Examinations.
Duration	3 Hours
Part - A	Part A will be online examination of Objective type Questions. Questions No. 1 to 20, covering all the 5 units. (20 x 1 = 20 Marks) .
Part- B	5 Sixteen mark Questions Totally 5 Questions with either or type covering all the units. One question from each units. 5 Questions will correspond to 5 unit. Student has to answer 5 questions. (5 x 16 = 80 Marks) .

13. PASSING REQUIREMENTS

13.1 Passing minimum: The passing minimum for CIA is 20 (i.e. out of 40 marks). The passing minimum for ESE is 30 (i.e. out of 60 marks). The overall passing minimum for theory/laboratory course is 50 (Sum of his/her score in CIA and ESE) out of 100 marks.

13.1.1 The passing minimum for value added course is 50 marks out of 100 marks. There will be two tests, of which one will be class test covering 50% of syllabus for 50 marks and the other for 50 marks.

13.2 If the candidate fails to secure a pass in a particular course ESE, it is mandatory that candidate shall register and reappear for the examination in that course during the subsequent semester when examination is conducted in that course. Further the candidate should continue to register and reappear for the examination till a pass is secured in such supplementary exam within the stipulated maximum duration of the programme (clause 5.1).

The CIA marks obtained by the candidate in his/her first or subsequent appearance where he/she secures a pass shall be retained by the office of the Controller of Examinations and considered valid for all remaining attempts till the candidate secures a pass in his/her ESE.

13.3 If the candidate fails to secure a pass in a particular course CIA, it is mandatory that candidate shall register and reappear for the CIA in that course during the subsequent semester when CIA is conducted in that course by the faculty member assigned for that particular course during that semester by the concerned HOD. Further the candidate should continue to register and reappear for the CIA till a pass is secured in such subsequent exam within the stipulated maximum duration of the programme (clause 5.1).

13.3.1 If a candidate fails to secure a pass in value added course, he/she has to appear for the test at the end of the semester conducted in the course subsequently.

14. AWARD OF LETTER GRADES

14.1 All assessments of a course will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points will be awarded as per the range of total marks (out of 100) obtained by the candidate in each subject as detailed below:

Letter grade	Marks Range	Grade Point	Description
O	91 - 100	10	OUTSTANDING
A+	81- 90	9	EXCELLENT
A	71-80	8	VERY GOOD
B+	66- 70	7	GOOD
B	61 – 65	6	ABOVE AVERAGE
C	55 - 60	5	AVERAGE
P	50 - 54	4	PASS
RA	<50	-	REAPPEARANCE
AB		0	ABSENT

14.2 GRADE SHEET

After results are declared, Grade sheet will be issued to each student which will contain the following details:

- i. The list of courses enrolled during the semester and the grade scored.
- ii. The Grade Point Average (**GPA**) for the semester and
- iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of Credits (**C**) of courses enrolled and the Grade Points (**GP**) corresponding to the grades scored in those courses, taken for all the courses to the sum of the number of credits of all the courses in the semester.

$$\text{GPA} = \frac{\text{Sum of [C * GP]}}{\text{Sum of C}}$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from First semester. **RA** grade and value added course will be excluded for calculating **GPA** and **CGPA**.

14.3 REVALUATION

A candidate can apply for revaluation of his/her semester examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Head of the Department and Dean. A candidate can apply for revaluation of answer scripts for not exceeding 5 subjects at a time. The Controller of Examinations will arrange for the revaluation and the results will be intimated to the candidate through the Head of the Department and Dean. Revaluation is not permitted for Supplementary exams, Practical exams, Technical Seminars, In-plant Training and Project Work.

14.4 TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Re-totaling is allowed on representation. Student may get the Photostat copy of the answer script on payment of prescribed fee, if he/she wishes. The students represent the grievance, if any, to the Grievance Committee, which consists of Dean of the Faculty, (if Dean is HOD, the Dean of another Faculty nominated by the Karpagam Academy of Higher Education), HOD of the Department concerned, the faculty of the course and Dean from other discipline nominated by the Karpagam Academy of Higher Education and the COE. If the Committee feels that the grievance is genuine, the script may be sent for external valuation; the marks awarded by the External examiner will be final. The student has to pay prescribed fee for the same.

15. ELIGIBILITY FOR AWARD OF DEGREE

A student shall be declared to be eligible for award of Degree if he/she has

- Successfully gained the required number of total credits as specified in the curriculum corresponding to his/her programme within the stipulated time.
- No disciplinary action is pending against him/her.

The award of the degree must be approved by the Board of Management of Karpagam Academy of Higher Education.

16. CLASSIFICATION OF THE DEGREE AWARDED

16.1 A candidate who qualifies for the award of the Degree (vide clause 15) having passed the examination in all the courses in his/her first appearance within the specified minimum number of semesters (vide clause 5.1) securing a CGPA of not less than **8** shall be declared to have passed the examination in First Class with Distinction.

16.2 Candidates are eligible to register for **BE (Honors)** degree, provided he/she should maintain an average of 75% marks in the first appearance till the VI semester. Candidates registering for honors degree should study one additional course in VII semester and VIII semester each and should maintain 75% from I semester to VIII semester. However if he/she fails in additional subjects, they are not eligible for honors but eligible for First Class with Distinction.

16.3 A candidate who qualifies for the award of the Degree (vide clause 15) having passed the examination in all the courses within the specified minimum number of semesters (vide clause 5.1) plus one year (two semesters), securing CGPA of not less than **6.5** shall be declared to have passed the examination in First Class.

16.3 All other candidates (not covered in clauses 16.1 and 16.2) who qualify for the award of the degree (vide Clause 15) shall be declared to have passed the examination in Second Class.

17. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

17.1 A candidate may for valid reasons and on prior application, be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.

17.2 Such withdrawal shall be permitted only once during the entire duration of the degree programme. Withdrawal application shall be valid only if the candidate is otherwise eligible to write the examination.

17.3 Withdrawal application is valid only if it is made within 10 days prior to the commencement of the

examination in that course or courses and recommended by the Head of the Department, Dean and approved

by the Registrar.

17.3.1 Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for special cases under extraordinary conditions may be considered on the merit of the case.

17.4 Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is not applicable to those who seek withdrawal during VIII semester.

17.5 Withdrawal from the ESE is NOT applicable to arrear exams.

17.6 The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

18. PROVISION FOR AUTHORISED BREAK OF STUDY

18.1 Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he/she applies to the Registrar, through the Head of the Department and Dean stating reasons thereof and the probable date of rejoining the programme.

18.2 The total number of semesters for completion of the programme from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum no. of semesters specified in clause 5.1 irrespective of the period of break of study (vide clause 18) in order that he/she may be eligible for the award of the degree (vide clause 15). The candidate thus permitted to rejoin the programme at the commencement of the semester after the break shall be governed by the curriculum and regulations in force at the time of rejoining. Such candidates may have to do additional courses as per the curriculum and regulations in force at that period of time.

18.3 The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification (vide Clause 16). However, additional break of study granted will be counted for the purpose of classification.

18.4 The total period for completion of the programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5.1 irrespective of the period of break of study (vide clause 18.3) in order that he/she may be eligible for the award of the degree.

18.5 If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Withdrawal' or 'Break of Study' (Clause 17 and 18 respectively).

19. SUPPLEMENTARY ESE: After the publication of VIII semester results, if a student has **ONE** arrear in any theory course of the entire programme, he/she will be permitted to apply within 15 days of the publication of results, and appear for supplementary examination.

20. INDUSTRIAL VISIT

Every student is required to undergo one industrial visit for every semester, starting from the third semester of the programme.

21. DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the Karpagam Academy of Higher Education and not to indulge in any activity which will tend to bring down the prestige of the Karpagam Academy of Higher Education. The erring student will be referred to the Disciplinary Committee constituted by the Karpagam Academy of Higher Education, to enquire into acts of indiscipline and recommend to the Karpagam Academy of Higher Education about the disciplinary action to be taken.

If a student indulges in malpractice in any of the ESE/CIA he/she shall be liable for punitive action as prescribed by the Karpagam Academy of Higher Education from time to time.

22. REVISION OF REGULATION AND CURRICULUM

The Karpagam Academy of Higher Education may from time to time revise, amend or change the Regulations, Scheme of Examinations and syllabi, if found necessary on the recommendations of Board of Studies, Academic Council and Board of Management of Karpagam Academy of Higher Education.

B. E. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM AND SYLLABI 2015

**Department of Electronics and Communication
Engineering
FACULTY OF ENGINEERING**



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Established Under Section 3 of UGC Act 1956)

Eachanari post, COIMBATORE 641 021, INDIA

**ELECTRONICS AND COMMUNICATION ENGINEERING
COURSE OF STUDY AND SCHEME OF EXAMINATIONS**

(2015 onwards)

SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
SEMESTER I								
THEORY:								
15BECC101	Communicative English –I	3	0	0	3	40	60	100
15BECC102	Engineering Mathematics – I	3	2	0	4	40	60	100
15BECC103	Engineering Physics	3	0	0	3	40	60	100
15BECC104	Engineering Chemistry	3	0	0	3	40	60	100
15BEEC105	Computer Fundamentals and C Programming	3	0	0	3	40	60	100
PRACTICALS :								
15BECC111	Engineering Physics and Chemistry Laboratory	0	0	3	2	40	60	100
15BEEC112	Computer Practice and Programming Laboratory	0	0	3	2	40	60	100
15BEEC113	Engineering Graphics	1	0	4	3	40	60	100
	TOTAL	16	2	10	23	320	580	900
	Total Contact hours	30						
Value added Course								
15BECC151	Human values	1	1	0	1	100	0	100
SEMESTER II								
THEORY:								
15BECC201	Communicative English –II	3	0	0	3	40	60	100
15BECC202	Engineering Mathematics – II	3	2	0	4	40	60	100
15BECC203	Materials Science	3	0	0	3	40	60	100
15BECC204	Environmental Studies	3	0	0	3	40	60	100
15BEEC205	Electron Devices	3	2	0	4	40	60	100
15BEEC206	Basic Electrical Engineering	3	0	0	3	40	60	100
PRACTICAL :								
15BEEC211	Engineering practice Laboratory	0	0	3	2	40	60	100
15BEEC212	Electron Devices Laboratory	0	0	3	2	40	60	100
	TOTAL	18	4	6	24	320	580	900
	Total Contact hours	30						
Value added Course								
15BECC251	Elementary Biology	1	1	0	1	100	0	100
SEMESTER III								
THEORY:								
15BECC301	Methods of Applied Mathematics	3	2	0	4	40	60	100
15BEEC302	Circuit Theory	3	2	0	4	40	60	100
15BEEC303	Digital Electronics	3	0	0	3	40	60	100
15BEEC304	Electromagnetic Theory and Waveguides	3	1	0	4	40	60	100
15BEEC305	Signals and Systems	3	1	0	4	40	60	100
PRACTICAL :								
15BEEC311	Electric Circuits Laboratory	0	0	3	2	40	60	100
15BEEC312	Digital Electronics Laboratory	0	0	3	2	40	60	100

15BEEEC313	Electrical Machines Laboratory	0	0	3	2	40	60	100
	TOTAL	15	6	9	24	320	580	900
	Total Contact hours	30						

Value added Course

15BEEEC351	Yoga/NSS/NCC	1	1	0	1	0	100	100
------------	--------------	---	---	---	---	---	-----	-----

SEMESTER IV

THEORY:

15BEEEC401	Electronic Circuits	3	2	0	4	40	60	100
15BEEEC402	Control systems	3	0	0	3	40	60	100
15BEEEC403	Linear Integrated Circuits	3	0	0	3	40	60	100
15BEEEC404	Transmission lines and Networks	3	2	0	4	40	60	100
15BEEEC405	Communication Theory	3	0	0	3	40	60	100

PRACTICAL :

15BEEEC411	Electronic Circuits and Simulation lab	0	0	3	2	40	60	100
15BEEEC412	Scientific Computing Laboratory	2	0	2	3	40	60	100
15BEEEC413	Linear Integrated Circuits Laboratory	0	0	3	2	40	60	100
	TOTAL	17	3	10	24	320	580	900
	Total Contact hours	30						

Value added Course

15BEEEC451	Life skills / Technical Seminar	1	1	0	1	100	0	100
15BEEEC452	Foreign Language(German, Japanese)/Hindi	1	1	0	1	100	0	100

SEMESTER V

THEORY:

15BEEEC501	Microprocessors and Microcontrollers	3	0	0	3	40	60	100
15BEEEC502	Digital Communication	3	0	0	3	40	60	100
15BEEEC503	Digital Signal Processing	3	1	0	4	40	60	100
15BEEEC504	Antennas and Wave Propagation	3	2	0	4	40	60	100
15BEEEC5E_ _	Department Elective- I	3	1	0	4	40	60	100

PRACTICAL :

15BEEEC511	Digital Signal Processing Laboratory	0	0	3	2	40	60	100
15BEEEC512	Microprocessor and Microcontroller Laboratory	0	0	3	2	40	60	100
15BEEEC513	Communication Systems Laboratory	0	0	3	2	40	60	100
	TOTAL	15	4	11	24	320	580	900
	Total Contact Hours	30						

Value added Course

15BEEEC551	In plant Training	0	0	0	1	100	0	100
15BEEEC552	Mini Project	0	0	2	1	100	0	100

SEMESTER VI

THEORY:

15BEEEC601	Microwave Engineering	3	2	0	4	40	60	100
15BEEEC602	Computer Networks	3	0	0	3	40	60	100
15BEEEC603	Mobile Communication	3	2	0	4	40	60	100
15BEEEC604	Engineering Economics and Financial Management	3	0	0	3	40	60	100

15BEEC6E_ _	Department Elective_II	3	0	0	3	40	60	100
15BEEC6E_ _	Department Elective-III	3	0	0	3	40	60	100
PRACTICAL :								
15BEEC611	Networks Laboratory	0	0	3	2	40	60	100
15BEEC612	Microwave Laborator y	0	0	3	2	40	60	100
	TOTAL	18	4	8	24	320	580	900
	Total Contact Hours	30						
Value added Course								
15BEEC651	Analog s ystem design using ASLK PRO/ ARM Cortex M4/ Mixed Signal Microcontroller	1	1	0	1	100	0	100
15BEEC652	Communication skills and development	1	1	0	1	100	0	100
SEMESTER VII								
THEORY:								
15BECC701	Professional Ethics	3	0	0	3	40	60	100
15BECC702	VLSI Design	3	2	0	4	40	60	100
15BECC703	Optical Communication	3	2	0	4	40	60	100
15BEEC7E_ _	Department Elective-IV	3	0	0	3	40	60	100
15BE_ _7OE_ _	Open Elective-I	3	0	0	3	40	60	100
PRACTICAL :								
15BEEC711	VLSI Design Laboratory	0	0	3	2	40	60	100
15BEEC712	Electronic system design Laboratory	0	0	3	2	40	60	100
15BEEC713	Optical Laboratory	0	0	3	2	40	60	100
	TOTAL	15	4	9	23	320	480	800
	Total Contact Hours	28						
Value added Course								
15BEEC751	Real Time controller / VLSI Design using Cadence tool	1	1	0	1	100	0	100
SEMESTER VIII								
	THEORY:							
15BEEC8E_ _	Department Elective-V	3	0	0	3	40	60	100
15BEEC8E_ _	Department Elective-VI	3	0	0	3	40	60	

15BEEC7E15	Virtual Instrumentation using Lab View	3	0	0	3	40	60	100
15BEEC7E16	Wireless networks	3	0	0	3	40	60	100
15BEEC7E17	Optoelectronic devices	3	0	0	3	40	60	100
15BEEC7E18	Telecommunication System Modeling and Simulation	3	0	0	3	40	60	100
15BEEC7E19	Speech Processing	3	0	0	3	40	60	100
15BEEC7E20	Satellite Communication	3	0	0	3	40	60	100
15BEEC7E21	Radar and Navigational Aids	3	0	0	3	40	60	100
15BEEC7E22	Embedded Systems	3	0	0	3	40	60	100
15BEEC7E23	Total Quality Management	3	0	0	3	40	60	100
VIII Semester								
15BEEC8E24	Cellular Mobile Communication	3	0	0	3	40	60	100
15BEEC8E25	ASIC Design	3	0	0	3	40	60	100
15BEEC8E26	Artificial Intelligence	3	0	0	3	40	60	100
15BEEC8E27	Disaster Management	3	0	0	3	40	60	100
15BEEC8E28	Power Electronics	3	0	0	3	40	60	100
15BEEC8E29	Digital Image processing	3	0	0	3	40	60	100
15BEEC8E30	Computer Hardware and Interfacing	3	0	0	3	40	60	100
15BEEC8E31	High Speed Networks	3	0	0	3	40	60	100
15BEEC8E32	Advanced digital signal processing	3	0	0	3	40	60	100
15BEEC8E33	Photonics	3	0	0	3	40	60	100
15BEEC8E34	Artificial Neural Networks	3	0	0	3	40	60	100
15BEEC8E35	FPGA Design	3	0	0	3	40	60	100
15BEEC8E36	Internet and java	3	0	0	3	40	60	100
15BEEC8E37	Nano Electronics	3	0	0	3	40	60	100

L: Lecture Hour T: Tutorial Hour P: Practical hour C : Credit

CIA: Continuous Internal Assessment ESE: End Semester Examination

COURSES OFFERED TO OTHER DEPARTMENTS

LIST OF OPEN ELECTIVES

Electronics & Communication Engineering								
15BEEC7OE01	Real Time Embedded Systems	3	0	0	3	40	60	100
15BEEC7OE02	Consumer Electronics	3	0	0	3	40	60	100
15BEEC7OE03	Fundamentals of Nanotechnology	3	0	0	3	40	60	100
15BEEC7OE04	Image & Video Processing	3	0	0	3	40	60	100
15BEEC7OE05	VLSI Technology	3	0	0	3	40	60	100

15BEEC7OE06	Fundamentals of MEMS	3	0	0	3	40	60	100
15BEEC7OE07	Neural Networks and its Applications	3	0	0	3	40	60	100
15BEEC7OE08	Fuzzy Logic and its Applications	3	0	0	3	40	60	100

COURSES OFFERED BY OTHER DEPARTMENTS

LIST OF OPEN ELECTIVES

Science & Humanities								
SUB. CODE	TITLE OF THE COURSE	L	T	P	C	CIA	ESE	TOTAL
15BESH7OE01	Industrial Mathematics I	3	0	0	3	40	60	100
15BESH7OE02	Industrial Mathematics II	3	0	0	3	40	60	100
15BESH7OE03	Probability and Random Process	3	0	0	3	40	60	100
15BESH7OE04	Probability and Statistical Methods	3	0	0	3	40	60	100
15BESH7OE05	Probabiliy and Queuing Theory	3	0	0	3	40	60	100
15BESH7OE06	Fuzzy Mathematics	3	0	0	3	40	60	100
15BESH7OE07	Mathematical Physics	3	0	0	3	40	60	100
15BESH7OE08	Advanced Engineering Mathematics	3	0	0	3	40	60	100
15BESH7OE09	Linear Algebra	3	0	0	3	40	60	100
15BESH7OE10	Transforms and partial differential equations	3	0	0	3	40	60	100
15BESH7OE11	Technical Writing	3	0	0	3	40	60	100
15BESH7OE12	Geophysics	3	0	0	3	40	60	100
15BESH7OE13	Engineering Acoustics	3	0	0	3	40	60	100
15BESH7OE14	Alternate Fuels and Energy Systems	3	0	0	3	40	60	100
15BESH7OE15	Solid Waste Management	3	0	0	3	40	60	100
15BESH7OE16	Green Chemistry	3	0	0	3	40	60	100
15BESH7OE17	Applied Electrochemistry	3	0	0	3	40	60	100
15BESH7OE18	Industrial Chemistry	3	0	0	3	40	60	100
Computer Science Engineering								
15BECS7OE01	Python Programming	3	0	0	3	40	60	100
15BECS7OE02	Internet Programming	3	0	0	3	40	60	100
15BECS7OE03	Multimedia and Animation	3	0	0	3	40	60	100
15BECS7OE04	PC hardware and Trouble shooting	3	0	0	3	40	60	100
15BECS7OE05	Game Programming	3	0	0	3	40	60	100
Electrical & Electronics Engineering								
15BEEE7OE01	Electric Hybrid Vehicles	3	0	0	3	40	60	100

15BEEE7OE02	Energy Management & Energy Auditing	3	0	0	3	40	60	100
15BEEE7OE03	Sensors & Transducers	3	0	0	3	40	60	100
15BEEE7OE04	Programmable Logic Controller	3	0	0	3	40	60	100
15BEEE7OE05	Renewable Energy Resources	3	0	0	3	40	60	100
15BEEE7OE06	Advanced Control Systems	3	0	0	3	40	60	100
Bio Technology								
15BTBT7OE01	Bioreactor Design	3	0	0	3	40	60	100
15BTBT7OE02	Food Processing and Preservation	3	0	0	3	40	60	100
15BTBT7OE03	Molecular Modeling	3	0	0	3	40	60	100
15BTBT7OE04	Bioremediation	3	0	0	3	40	60	100
15BTBT7OE05	Biophysics	3	0	0	3	40	60	100
15BTBT7OE06	Basic Bioinformatics	3	0	0	3	40	60	100
15BTBT7OE07	Fundamentals of Nano Biotechnology	3	0	0	3	40	60	100
Mechanical Engineering								
15BEME7OE01	Introduction to MEMS	3	0	0	3	40	60	100
15BEME7OE02	Robotics	3	0	0	3	40	60	100
15BEME7OE03	Industrial Safety & Environment	3	0	0	3	40	60	100
15BEME7OE04	Transport phenomena	3	0	0	3	40	60	100
15BEME7OE05	Introduction to Bio Mechanics	3	0	0	3	40	60	100
Automobile Engineering								
15BEAE7OE01	Automobile Engineering	3	0	0	3	40	60	100
15BEAE7OE02	Basics of two and three wheelers	3	0	0	3	40	60	100
15BEAE7OE03	Automobile Maintenance	3	0	0	3	40	60	100
15BEAE7OE04	Introduction to Modern Vehicle Technology	3	0	0	3	40	60	100
Civil Engineering								
15BECE7OE01	Housing, Plan and Management	3	0	0	3	40	60	100

15BECE7OE02	Building Services	3	0	0	3	40	60	100
15BECE7OE03	Coastal Zone Management	3	0	0	3	40	60	100
15BECE7OE04	Experimental method and model analysis	3	0	0	3	40	60	100
15BECE7OE05	Management of Irrigation systems	3	0	0	3	40	60	100
15BECE7OE06	Computer aided design of structures	3	0	0	3	40	60	100
15BECE7OE07	Pavement Engineering	3	0	0	3	40	60	100
15BECE7OE08	Rock Engineering	3	0	0	3	40	60	100
15BECE7OE09	Storage structures	3	0	0	3	40	60	100
15BECE7OE10	Wind Engineering	3	0	0	3	40	60	100
15BECE7OE11	Advanced construction technology	3	0	0	3	40	60	100

L: Lecture Hour T: Tutorial Hour P: Practical hour C : Credit

CIA: Continuous Internal Assessment ESE: End Semester Examination

Karpagam Academy of Higher Education		
Category	No. of credits	Percentage
Science and Humanities	35 Credits	18.63%
Core Engineering	86 Credits	45.74%
Allied Engineering & Management	33 Credits	17.55%
Project	12 Credits	6.38%
Department Electives	22 Credits	11.70%
Total Credits	188 Credits	100

SEMESTER I

15BECC101

COMMUNICATIVE ENGLISH – I

3 0 0 3 100

OBJECTIVES:

- ☐ To enable students to develop their basic communication skills.
- ☐ To help students acquire their ability to speak effectively in real life situations.
- ☐ To inculcate the habit of reading and to develop their effective reading skills.
- ☐ To ensure that students use dictionary to improve their active and passive vocabulary.
- ☐ To enable students to improve their lexical, grammatical and communicative competence.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- ☐ Use English language for communication: written & spoken.
- ☐ Enrich comprehension and acquisition of speaking & writing ability.
- ☐ Gain confidence in using English language in real life situations.
- ☐ Improve word power: lexical, grammatical and communication competence

Unit I

Listening – Types of listening - Listening to class reading - Video tapes/ audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II

Listening – Understanding the passage in English –Pronunciation Practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical Reading – Finding key information in a given text (Skimming - scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar** – Parts of Speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary** – Compound Nouns/Adjectives – Irregular verbs.

Unit III

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction Writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate, Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence Pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit V

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students to have hands on experience in the language lab at two periods per unit.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIO
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIO
1	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
2	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006
3	Lakshminara yanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008

WEBSITES:

www.learnerstv.com
www.usingenglish.com
www.englishclub.com
www.ispeakyouspeak.blogspot.com
www.teachertube.com
www.Dictionary.com

OBJECTIVES:

- ☐ To develop analytical skills for solving different engineering problems.
- ☐ To understand the concepts of Matrices, sequences and series.
- ☐ To solve problems by applying Differential Calculus and Differential equations.

INTENDED OUTCOMES:

- The student will be able to
- ☐ apply advanced matrix knowledge to Engineering problems.
 - ☐ improve their ability in solving geometrical applications of differential calculus problems
 - ☐ solve engineering problems involving hyperbolic functions, Beta and Gamma functions
 - ☐ expose the concept of sequences and series

UNIT I MATRICES

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III SEQUENCES AND SERIES

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi	2014
2	Sundaram, V. Lakhminarayan, K.A. & Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home , New Delhi	2006

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ramana. B. V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
2	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2011
3	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	BS Publications	2008
4	Shahnaz Bathul	Text book of Engineering Mathematics (Special Functions and Complex Variables)	PHI Publications	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2006

WEBSITES :

- | |
|---|
| <ol style="list-style-type: none"> 1. www.efunda.com 2. www.mathcentre.ac.uk 3. www.intmath.com/matrices-determinants |
|---|

OBJECTIVE:

- ☐ To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology

INTENDED OUTCOME:

- ☐ The students will have the knowledge on the basics of physics related to properties of matter, fiber optics, quantum, crystal physics and that knowledge will be used by them in different engineering and technology applications

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER - CO₂, Semiconductor LASER Applications of LASER in industry and Medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (Block diagram)

UNIT III QUANTUM PHYSICS

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box. Scanning electron microscope.

UNIT IV CRYSTAL PHYSICS

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS

Production of Ultrasonics by piezo electric method-Non destructive testing-Pulse echo-system through transmission and reflection modes-A, B and C scan displays, medical Applications-Sonogram.

Introduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors –semi conductor detector. Reactors –essentials of nuclear reactor- power reactor.

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	2007
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	2003

WEBSITES:

1. www.nptel.ac.in 2. www.physicsclassroom.com 3. www.oyc.yale.edu 4. www.physics.org
--

OBJECTIVES:

- ☐ To understand about the water technology.
- ☐ To get the information on electrochemical cells, batteries, fuels and combustion.
- ☐ To study about the corrosion and protective coatings.
- ☐ To gain knowledge on adsorption phenomena.

INTENDED OUTCOME:

- ☐ This course will create an impact on the students and make them to realize the modern utility on electrochemical cells, batteries, fuels and combustion process, corrosion and adsorption methods.

UNIT I WATER TECHNOLOGY

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode – Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, H_2 - O_2 Fuel Cell -Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electroless plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial

adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water- Applications of adsorption.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr.S.Vairam	Engineering chemistry	Gems publishers	2014
2.	Ravikrishnan, A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Kuriakose, J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
2.	Sharma, B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001
3.	Raman sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., New Delhi, 3 rd reprint.	2013
4.	Dara, S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009

WEBSITES:

1. <http://www.studynotes.ie/leaving-cert/chemistry/>
2. <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>
3. <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>
4. <https://www.sophia.org/subjects/chemistry>
5. <http://ocw.mit.edu/courses/#chemistry>

15BEEC105 COMPUTER FUNDAMENTALS AND C PROGRAMMING 3 0 0 3 100

INTENDED OUTCOMES:

- ☐ Identify and understand the working of key components of a computer system.
- ☐ Identify and understand the various kinds of input-output devices and different types of storage media commonly associated with a computer
- ☐ Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure
- ☐ Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language

UNIT I: OVERVIEW OF COMPUTER

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types-Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages-Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP-Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II: OVERVIEW OF 'C'

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III: SELECTION AND ITERATION

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop-break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV: FUNCTIONS

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V: ARRAYS AND STRINGS

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters

TEXT BOOK:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Balagurusamy, E	Computing Fundamentals and C Programming	Tat McGrawHill Company Ltd. New Delhi.5 th Edition	2014

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	H. M. Deitel and D. J. Deitel,	C: How to Program'	Prentice Hall India, New Delhi 7 th Edition	2012
2	E. Balagurusamy	Programming in ANSIC	Tata McGrawHill Company Ltd., New Delhi	6 th edition, 2012
3	Yashavant kanetkar. C	Let Us C	BPB Publishers, Chennai. 13 th Edition	2013

Websites:

1. <https://scratch.mit.edu/> for Programming in Scratch

OBJECTIVE:

- ☐ To develop basic laboratory skills and demonstrating the application of physical principles.

INTENDED OUTCOME:

- ☐ The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

OBJECTIVE:

- ☐ To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

INTENDED OUTCOME:

- ☐ The students will be outfitted with hands-on knowledge in quantitative chemical analysis of water quality parameters and corrosion measurement.

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of Chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Determination of molecular weight and degree of polymerization using viscometry.
6. Conductometric Titration (Simple acid base).
7. Conductometric Titration (Mixture of weak and strong acids).
8. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
9. pH Titration (acid & base).

10. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Estimation of Ferric ion by spectrophotometry.
13. Determination of Chemical Oxygen Demand.

15BEEEC112 COMPUTER PRACTICES AND PROGRAMMING LABORATORY

0 0 3 2 100

INTENDED OUTCOMES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> To know the correct and efficient ways of solving problems<input type="checkbox"/> To learn to develop algorithm for simple problem solving<input type="checkbox"/> To learn to program in C |
|---|

LIST OF EXERCISES

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and functions

INTENDED OUTCOMES

1. To introduce the basic concepts and the use of engineering drawing in the design and manufacturing field.
2. To develop graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings

UNIT I INTRODUCTION

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam):

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TEXT BOOKS

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEB REFERENCES

1. **IS 10711** – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. **IS 9609** (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. **IS 10714** (Part 20) – 2001 and **SP 46** – 2003: Lines for technical drawings.
4. **IS 11669** – 1986 and **SP 46** – 2003: Dimensioning of Technical Drawings.
5. **IS 15021** (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

INTENDED OUTCOMES:

To educate the values and meaning of life in the young minds and to transform them as responsible citizens

UNIT – I : Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT – II : Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT – III : Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT – IV : Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT - V : Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings

Reference Books

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

SEMESTER II
15BECC201
OBJECTIVES:

COMMUNICATIVE ENGLISH – II

3 0 0 3 100

- ☐ To motivate learners to acquire listening & speaking skills in both formal and informal context.
- ☐ To focus on question forms & to make them understand the importance of using question tags and also the functional use of transformation of sentences.
- ☐ To improve their reading habit and to train them in critical and analytical reading.
- ☐ To equip them to write for academic as well as work place context.
- ☐ To enable students to face interviews.

INTENDED OUTCOMES:

Students undergoing this course will be able to

- ☐ Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- ☐ Enhance their reading texts critically and analytically.
- ☐ Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- ☐ Enrich the ability to face interviews with confidence.

UNIT-1

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a Covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentence - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome Address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid Reading – Skimming, Scanning and Surveying. (SQ3R) **Writing** - Essay writing -Minutes of Meeting - Agenda – **Grammar** - Active and Passive voice - Purpose Expression. **Vocabulary** - Same words used as noun and verb - often misspelt and confused words.

UNIT-IV

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading Comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job Application - Resume Writing - Checklist Preparation. **Grammar** - Numerical Expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT- V

Listening – Types of Listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - voice, quality, volume, pitch etc., **Reading** -Note Making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation Writing – Short Essays Writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabulary with their meanings.

Note: Students to have hands on experience in the language lab at two periods per unit.

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIO
1	<u>Sangeeta Sharma</u> , <u>Meenakshi Raman</u>	<u>Technical Communication: Principles And Practice</u> 2 nd Edition	OUP	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIO
1	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
2	Rutherford Andrea,J.	Basic Communication Skills for Technology 2 nd Edition	Pearson Education, New Delhi.	2006
3	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008

WEBSITES :

www.learnerstv.com

www.usingenglish.com

www.englishclub.com

www.ispeakyouspeak.blogspot.com

www.teachertube.com

www.Dictionary.com

OBJECTIVES:

- ☐ To understand the concepts and applications of partial differential equations
- ☐ To have knowledge in integral calculus and Vector calculus
- ☐ To expose to the concept of Analytical function and Complex integration.

INTENDED OUTCOMES:

The student will be able to

- ☐ solve problems in Fluid Dynamics, Theory of Elasticity, heat and mass transfer etc.
- ☐ find the areas and volumes using multiple integrals
- ☐ improve their ability in Vector calculus
- ☐ expose to the concept of Analytical function.
- ☐ apply Complex integration in their Engineering problems

UNIT-I PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II MULTIPLE INTEGRALS

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelopipeds.

UNIT-IV ANALYTIC FUNCTIONS

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

TEXT BOOK:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011

REFERENCES:

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2004
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2006

WEBSITES:

1. www.maths-dur.ac
2. www.efunda.com
3. www.mathcentre.ac.uk
4. www.sosmath.com/diffeq/laplace/basic/basic.html

OBJECTIVE:

- ☐ To enrich the understanding of various types of materials and their applications in engineering and technology

INTENDED OUTCOME:

- ☐ The students will have the knowledge on different types of materials and that knowledge will be used by them in different engineering and technology applications

UNIT I CONDUCTING MATERIALS

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Clausius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application. Composite materials, Aircraft materials and non-metallic materials. Nano materials: synthesis – Physical and chemical vapour deposition – ball milling – properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley and Sons Inc., , New York,	6 th Edition 2003
2	James F Shackelford	Introduction to materials Science for Engineers	Macmillan Publication Company, New York	6 th Edition 2004
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	7 th Edition 2007

WEBSITES:

1. www.nptel.ac.in 2. www.physicsclassroom.com 3. www.oyc.yale.edu 4. www.physics.org
--

OBJECTIVES:

- ☐ To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- ☐ To educate the ways and means of the environment
- ☐ To protect the environment from various types of pollution.
- ☐ To impart some fundamental knowledge on human welfare measures.

INTENDED OUTCOME:

- ☐ Students will prepare themselves to go ecofriendly and help preserving the nature and environment.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources-role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM

Chemistry and Environment-Environmental segments, Composition and Structure of atmosphere-Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, food web and ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY

Introduction to biodiversity, Definition- Genetic diversity, species diversity and ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity-Hot Spots of biodiversity-Threats to biodiversity-Endangered and endemic Species of India – Conservation of biodiversity- In- Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION

Definition – Causes, effects and control Measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-.Causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management:-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and global warming, acid rain, ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value Education, Role of Information Technology in Environment and human health-Population growth, variation of population among nations-Population explosion.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (p) Ltd., New Delhi.	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Limited, New Delhi.	2005
2.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
3.	William P.Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
4.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing Private Limited, Ahmadabad	2005
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications.	2003

WEBSITES:

1. <http://people.eku.edu/ritchison/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=120>
3. www.newagepublishers.com/samplechapter/001281.
4. www.unesco.org/ext/field/beijing/scienceb.htm, www.infinitepower.org/education.htm
5. <http://www.sciencedaily.com/news/top/environment/>

OBJECTIVES

- ☐ To understand the operational characteristics of a Semiconductor in Equilibrium and Non-Equilibrium conditions.
- ☐ To understand the working of PN junction diodes and special purpose diodes.
- ☐ To understand the basic working physics of BJT and FET both in ideal and non-ideal conditions.
- ☐ To understand the working of Rectifiers and Voltage regulators.
- ☐ To understand the fabrication process of Monolithic ICs

INTENDED OUTCOMES

- ☐ Understand the fundamental concepts
- ☐ Logically analyze any electronic circuit
- ☐ Apply the logic in any application

UNIT I-SEMICONDUCTOR DIODES AND SPECIAL PURPOSE DIODES

Overview on Physics and Properties of Semiconductors: Intrinsic semiconductor – extrinsic semiconductor – Fermi level in an intrinsic semiconductor – conductivity of a metal, intrinsic semiconductor and extrinsic semiconductor – drift – diffusion – recombination – carrier life time.

Semiconductor diodes : Formation of PN junction – working principle – VI characteristics – PN diode currents – diode current equation – diode resistance – transition and diffusion capacitance – diode models – voltage breakdown in diodes.

Special purpose diodes : Zener diode – point-contact diode – backward diode – varactor diode – step-recovery diode – schottky diode, PNP diode – RF diode.

UNIT II-BIPOLAR TRANSISTORS

Bipolar Transistors: Construction – working – transistor currents – transistor configurations and input-output characteristics – Early effect (base width modulation) – Ebers Moll model – transistor as an amplifier – Transistor as a switch.

UNIT III-FIELD-EFFECT TRANSISTORS

Field-Effect Transistors: construction, working and VI characteristics of JFET – comparison of BJT and JFET – MOSFET – enhancement MOSFET, depletion MOSFET, their working principle and VI characteristics, comparison of MOSFET with JFET, comparison of D MOSFET with E MOSFET, CMOS, MESFET, CCD.

UNIT IV-DC POWER SUPPLIES

Rectifiers and Filters: Block schematic of a typical DC power supply, single phase HWR, FWR, full-wave bridge rectifier, power supply filters (ripple factor and efficiency analysis), bleeder resistor, voltage dividers.

Voltage regulators: voltage regulation, Zener diode shunt regulator, transistor series regulator, transistor shunt regulator, switching regulators, design of complete DC power supply circuit.

UNIT V-INTEGRATED CIRCUIT FABRICATION

Integrated circuit – advantages and drawback of ICs – scale of integration –classification of ICs – definition of linear IC and digital IC with examples –manufacturing process of monolithic ICs – fabrication of components (diode, capacitor, bipolar transistor and resistor) on monolithic IC – comparison of MOS ICs and bipolar ICs.

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Millman and Halkias	Electronic devices and Circuits	Tata McGraw Hill International	2010
2	David A.Bell	Fundamental of electronic devices and circuits	Oxford press	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Street Man	Solid State Electronic Devices'	Prentice Hall Of India, 6 th edition	2005
2	Mathur Kulshrestha and Chadha	Electron devices and Applications and Integrated circuits'	Umesh Publications	2005
3	Thomas L. Floyd	Electron Devices	Charles and Messil Publications	2012
4	G.K.Mithal	Electronic Devices and Circuits	Khanna Publishers	2013
5	Robert L. Boylestad and Louis Nashelsky	Electronic Devices and Circuit Theory	Pearson Education, 9th Edition,	2009.
6	B. Somanathan Nair	Electronic Devices and Applications	PHI,	2006

INTENDED OUTCOMES

- ☐ To enable the students to understand the basic concepts in DC (circuit) and AC (circuit) Fundamentals.
- ☐ To enable the students to understand the basic principles of electromagnetic fields.
- ☐ To understand the basic concepts of DC and AC machines.
- ☐ To understand the basic concepts of Transformers.

UNIT I DC CIRCUITS

Definition of voltage, current - Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Magnetic field - Magnetomotive force - Magnetic field strength – Reluctance - Laws of magnetic circuits - Faraday's laws of electromagnetic induction – Lenz law - Fleming's rules.

UNIT II AC CIRCUITS

Introduction to AC Circuits – Waveforms and RMS Values - Power and Power factor- R,L,C circuits – Power triangle - Transient response of RL, RC and RLC Circuits for DC and AC input - Resonance – Series and parallel resonance – Phasor diagram - frequency response – Q-factor and Bandwidth

UNIT III DC MACHINES (Qualitative Treatment Only)

Construction, Principle of Operation, Emf Equations, Types, Characteristics, Applications of DC Generators and DC Motors.

UNIT IV TRANSFORMER AND SINGLE PHASE INDUCTION MOTOR

Construction, Principle of Operation, Basic Equations, Types and Applications of Single phase Transformer and Induction Motor

UNIT V AC MACHINES

Construction, Principle of Operation, Basic Equations, and Applications of Three phase induction motors, Synchronous Generator and Synchronous Motor.

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	Mehta, V K	Principles of Electrical Engineering	S.Chand & Company Ltd, New Delhi.	2003

REFERENCES:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Soni, M.L., Gupta, J.C. and Gupta, P.V	A Course in Electrical Circuits and Fields	Dhanpat Rai and Sons, New Delhi	1998
2	Rajput, R.K	Basic Electrical Engineering	Dhanpat Rai and Sons, New Delhi	2007
3	Nagsarkar, T. K. and Sukhija, M. S	Basics of Electrical Engineering	Oxford press	2006
4	Mahmood Nahvi and Joseph A. Edminister	Electric Circuits Schaum Outline Series	McGraw Hill, New Delhi	2006

INTENDED OUTCOMES:

1. To provide exposure to the students with hands on experience on various basic Engineering practices in Civil and Mechanical Engineering
2. To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical and Electronics Engineering.

PART – A (CIVIL & MECHANICAL)**1. WELDING**

- i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING

- i. Simple Turning and Taper turning
- ii. Drilling and Tapping

3. SHEET METAL WORK

- i. Model making – Trays, funnels, etc.

4. DEMONSTRATION ON

- i. Smithy operations
- ii. Foundry operations
- iii. Plumbing Works
- iv. Carpentry Works

PART –B (ELECTRICAL & ELECTRONICS)**5. ELECTRICAL ENGINEERING**

- i. Study of electrical symbols and electrical equipments.
- ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
- iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
- v. Measurement of energy using single phase energy meter.

6. ELECTRONICS ENGINEERING

- i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
- ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- iii. Study of logic gates AND, OR, NOT, NOR and NAND.
- iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapooan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, Vikas Puplishing House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

15BEEEC212 ELECTRON DEVICES LABORATORY 0 0 3 2 100

OBJECTIVES

1. To study experimentally the characteristics of diodes, BJT's and FET's.
2. To verify practically, the response of various special purpose electron devices.

INTENDED OUTCOMES:

- ☐ Familiarize the electronic devices and basic electronic components.
- ☐ Familiar with basic electronic design.
- ☐ Gain in-depth core knowledge in the design of electronic devices
- ☐ Gain knowledge in verifying the characteristics of electronic devices by simulation.

LIST OF EXPERIMENTS

1. Characteristics of PN junction and Zener diode.
2. Input, Output and Transfer characteristics of CE Configuration.
3. Input, Output and Transfer characteristics of CC Configuration
4. Characteristics of LDR, Photo-diode and Photo transistor.
5. Transfer characteristics of JFET.
6. Transfer characteristics of MOSFET (with depletion and enhancement mode)
7. Characteristics of LED with three different wavelengths.
8. Half wave rectifier, Full wave rectifier and Full wave Bridge rectifier with and without Capacitive filter
9. Series voltage Regulator
10. Simulation experiments 1,2,3,5,6 using PSPICE or Multisim.

INTENDED OUTCOMES

To understand the basics of biomolecules, human anatomy and physiology
To have better understanding of advancements in biology

UNIT-I BASICS OF CELL BIOLOGY

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT-II BIOMOLECULES

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins- classification and functions; Nucleic acids-basic structure; Hormones-definition, importance; Vitamins.

UNIT-III HUMAN ANATOMY AND PHYSIOLOGY

Levels of Structural organization, the eleven systems of human body, central nervous system- cardiovascular system and immune system.

UNIT-IV GENETICS AND GENETIC DISORDERS

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information- gene mutation, disorders due to mutant genes.

UNIT-V TECHNOLOGICAL ADVANCES IN BIOLOGY

Biopharmaceuticals, Gene therapy, genetically modified crops, probiotics.

TEXT BOOK

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Verma, P. S., Agarwal, V. K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S. Chand & Company Ltd.,	2006

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Nelson, D. L. and Cox, M. M	Lehninger Principles of Biochemistry 4 th Edition	Freeman, W. H. & Company	2004
2	Tortora, G. J., Derrickson, B	Principles of Anatomy and Physiology, 11 th Edition	John Wiley & Sons	2006

WEBSITE

1. <http://www.biotechnonweb.com/Application-of-biotech-in-Medical.html>

SEMESTER III

15BEEC301

METHODS OF APPLIED MATHEMATICS

3 2 0 4 100

OBJECTIVES:

- ☐ To hone the analytical skills in the minds of Engineers.
- ☐ To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyze Engineering problems.
- ☐ To study the basic principles of different transforms and Partial Differential Equations.

INTENDED OUTCOMES:

- ☐ The students will have a lucid idea about Laplace, Fourier and Z-transforms.
- ☐ The Learners can equip themselves in the transform techniques.
- ☐ Better understanding in problems related to Heat conduction, communication systems, electro optics and electromagnetic theory, using the techniques will be learnt in this course.

UNIT-I LAPLACE TRANSFORM

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions

UNIT-II FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT-III FOURIER TRANSFORM

Fourier integral theorem (Statement Only) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT-IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded)

UNIT-V Z-TRANSFORM AND DIFFERENCE EQUATIONS

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011
2	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2003
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Lax mi Publications Pvt. Ltd.	1986
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hil Publishing Co. Ltd. New Delhi.	2007

WEBSITES:

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. http://www.math.umn.edu/~olver/pdn.html
4. http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx

OBJECTIVES

- ☐ To understand the concept of circuit elements lumped circuits, waveforms, circuit laws and network reduction. To solve the electrical network using mesh and nodal analysis by applying network theorems.
- ☐ To understand the concept of active, reactive and apparent powers, power factor and resonance in series and parallel circuits
- ☐ To know the basic concepts of coupled circuits, three phase loads and power measurement.
- ☐ To analyze the transient response of series and parallel A.C. circuits and to solve problems in time domain using Laplace Transform

INTENDED OUTCOMES:

- | |
|---|
| <ul style="list-style-type: none"> <input type="checkbox"/> To become familiar with various network theorems <input type="checkbox"/> To analyze circuits <input type="checkbox"/> To understand various resonant, coupled circuits and transient response |
|---|

UNIT-I DC CIRCUIT ANALYSIS

Basic components and electric circuits – Charge – Current – Voltage and Power– Voltage and Current Sources – Ohms Law – Voltage and Current laws – Kirchoff's Current Law – Kirchoff's voltage law – The single Node – Pair Circuit – Series and Parallel Connected Independent Sources – Resistors in Series and Parallel – Voltage and Current division – Basic Nodal and Mesh analysis – Nodal analysis – Mesh analysis.

UNIT-II NETWORK THEOREM AND DUALITY

Useful Circuit

Analysis techniques – Linearity and superposition – Thevenin and Norton Equivalent Circuits – Maximum Power Transfer – Delta – Wye Conversion – Duality – Dual circuits.

UNIT-III SINUSOIDAL STEADY STATE ANALYSIS

Sinusoidal Steady –

State analysis – Characteristics of Sinusoids– The Complex Forcing Function– The Phasor– Phasor relationship for R– L – C – impedance and Admittance – Nodal and Mesh Analysis– Phasor Diagrams – AC Circuit Power Analysis – Instantaneous Power – Average Power – apparent Power and Power Factor – Complex Power.

UNIT-IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS

Basic RL and RC

Circuits – The Source – Free RL Circuit – The Source-Free RC Circuit – The Unit- Step Function – Driven RL Circuits – Driven RC Circuits – RLC Circuits – Frequency Response – Parallel Resonance – Series Resonance – Quality Factor.

UNIT- V COUPLED CIRCUITS AND TOPOLOGY

Magnetically

coupled circuits – Mutual inductance – the Linear Transformer – the Ideal Transformer – An introduction to Network Topology – Trees and General Nodal analysis – Links and Loop analysis.

TEXT BOOKS :

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	William .H.Hayt,Jack. Jr , Kemmerly. E, Steven .Durbin .M.	Engineering Circuit Analysis.	Tata McGraw-Hill, New Delhi.	2006
2	David .A. Bell.	Electric Circuits.	PHI, New Delhi.	2006

REFERENCES :

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Nilson,Reidal.	Electric Circuits.	Pearson Education.	2008
2	Charles .K. Alexander & Mathew,N.O.Sadiku.	Fundamentals of Electric Circuits.	McGraw- Hill.	2003
3	Sudhakar and Shyammohan .S. Palli.	Electric Circuits.	Tata Mc Graw – Hill.	2007
4	Cunningham .D.R., Stuller .J.A.	Basic Circuit Analysis.	Jaico Publishing House.	2002
5	David.E.Johnson, Johny .R. Johnson, John.L.Hilburn.	Electric Circuit Analysis.	Prentice-Hall.	2012

OBJECTIVES

- ☐ To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- ☐ To introduce the methods for simplifying Boolean expressions
- ☐ To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- ☐ To introduce the concept of memories and programmable logic devices.
- ☐ To illustrate the concept of synchronous and asynchronous sequential circuits

INTENDED OUTCOMES:

- ☐ Understand number systems and codes
- ☐ Understand basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- ☐ Understand the methods for simplifying Boolean expressions
- ☐ Understand the formal procedures for the analysis and design of combinational circuits and sequential circuits
- ☐ Understand the concept of memories and programmable logic devices.

UNIT-I NUMBER SYSTEMS AND BOOLEAN ALGEBRA

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD-2421-Gray code-Excess 3 code-ASCII – Error detecting code – conversion from one code to another-Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality- Boolean expression – Boolean function- Minimization of Boolean expressions – Sum of Products (SOP) –Product of Sums (POS)-Minterm- Maxterm- Canonical forms – Conversion between canonical forms –Karnaugh map Minimization – Don't care conditions.

UNIT-II LOGIC GATES AND COMBINATIONAL CIRCUITS

LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations –Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

COMBINATIONAL CIRCUITS: Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator- Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX.

UNIT-III SEQUENTIAL CIRCUIT

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Asynchronous / Ripple counters – Synchronous counters –Modulo – n counter –Classification of sequential circuits – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State

assignment- ASM-Excitation table and maps-Circuit implementation - Register – shift registers- Universal shift register – Shift counters – Ring counters.

UNIT-IV ASYNCHRONOUS SEQUENTIAL CIRCUITS

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential –Hazards elimination.

UNIT-V MEMORY DEVICES

Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM – EAPROM –Programmable Logic Devices –Programmable Logic Array (PLA)- Programmable Array Logic (PAL)-Field Programmable Gate Arrays (FPGA). Implementation of combinational logic using ROM, PAL and PLA

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Morris Mano.M	Digital Design	Prentice Hall of India Pvt. Ltd., New Delhi	2003
2	John M .Yarbrough	Digital Logic Applications and Design	Thomson- Vikas publishing house, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Salivahanan.S and Arivazhagan.S	Digital Circuits and Design	Vikas Publishing House Pvt. Ltd, New Delhi	2004
2	Charles H.Roth	Fundamentals of Logic Design	Thomson Publication Company, New Delhi.	2003
3	Donald P.Leach and Albert Paul Malvino	Digital Principles and Applications	Tata McGraw Hill Publishing Company Limited, New Delhi	2003
4	Jain.R.P	Modern Digital Electronics	Tata McGraw–Hill publishing company limited, New Delhi	2003
5	Thomas L. Floyd	Digital Fundamentals	Pearson Education, New Delhi	2003

WEBSITES:

http://www.allaboutcircuits.com/vol_2/chpt_9/2.html
<http://www.educydia.be/electronics/digital.html>

OBJECTIVES

- ☐ Understand the basic concepts of electric field and magnetic field
- ☐ Compare between field and circuit theory
- ☐ Need for impedance matching and different impedance matching techniques
- ☐ Different types of waveguides

INTENDED OUTCOMES:

- ☐ Knowledge on the basic concepts of electric and magnetic fields.
- ☐ Knowledge about Maxwell's equations and Poynting theorem
- ☐ Knowledge about the Wave propagation in between parallel plates.
- ☐ Knowledge about the significance of different types of waveguides.

UNIT I-STATIC ELECTRIC FIELDS

Introduction to co-ordinate system – Rectangular Cylindrical and Spherical – The experimental law of Coulomb. Electric Field Intensity – field of line charge, sheet charge, continuous volume charge distribution – Streamline and sketches of fields - Electric flux density – Gauss Law – Applications of Gauss Law - Some symmetrical charge distributions – Differential volume element – Concept of divergence. Definition of Electric potential, work, Energy potential difference – Potential field of different types of charges – Potential gradient – The dipole and field due to a dipole. Energy density in the electric field.

UNIT II-STEADY MAGNETIC FIELDS

Biot Savart Law – Applications of Biot Savart Law - Ampere's circuital law - Applications circuital law – Curl – Stoke's Theorem - Magnetic flux and magnetic flux density – The scalar and vector magnetic potentials – Derivation of the steady magnetic field laws.

UNIT III-TIME VARYING FIELDS AND MAXWELLS EQUATIONS

Faraday's law – Displacement current – Maxwell's equations in point form and integral form for steady fields and time varying fields – Retarded potentials - Comparison of field and circuit theory - Poynting vector and Poynting Theorem.

UNIT IV-GUIDED WAVES

Waves between parallel planes: Transverse electric waves-Transverse magnetic waves-Characteristic of TE and TM waves-TEM waves. Velocity of propagation-Attenuation in parallel plane guides-Wave impedance

UNIT V-WAVEGUIDE THEORY

Rectangular wave guides: TE waves and TM waves in Rectangular waveguides – Dominant mode – cutoff frequency in wave guides – Impossibility of TEM waves in waveguides.
Circular waveguides: Wave impedance and characteristic impedance – Power flow in wave guides – Attenuation factor and Q of wave guides – Transmission line analogy for waveguides

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	William H. Hayt, Jr and John A. Buck	Engineering Electromagnetics	Tata McGraw-Hill Publishing Ltd, 8 th Edition	2012
2	John. D. Kraus	Electromagnetics	McGraw Hill book Company, New York, Fourth Edition	1991

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Edward Jordan and KG Balmain	Electromagnetic Waves and Radiating Systems	Pearson education, 2 nd Edition	2001
2	Matthew N. O. Sadiku.,	Elements of Electromagnetics	Oxford University Press, 3 rd Edition, First Indian Edition	2006
3	G.S.N.Raju.	Electromagnetic Field Theory and Transmission Lines	Pearson Education, First Indian print	2005

OBJECTIVES

- ☐ To study the properties and representation of discrete and continuous signals.
- ☐ To study the sampling process and analysis of discrete systems using z-transforms.
- ☐ To study the analysis and synthesis of discrete time systems.

INTENDED OUTCOMES:

- ☐ Knowledge about the properties and representation of discrete and continuous signals.
- ☐ Knowledge about the sampling process and analysis of discrete systems using z-transforms
- ☐ Knowledge about the analysis and synthesis of discrete time systems.

UNIT-I REPRESENTATION OF SIGNALS

Classification of Signals – Periodic, aperiodic, even, odd – energy and power signals – Deterministic and random signals – complex exponential and sinusoidal signals – periodicity – unit impulse – unit step impulse functions – Transformation in independent variable of signals: time scaling, time shifting. Determination of Fourier series representation of continuous time and discrete time periodic signals – Explanation of properties of continuous time and discrete time Fourier series.

UNIT-II ANALYSIS OF CONTINUOUS TIME SIGNALS AND SYSTEMS

Continuous time Fourier Transform and Laplace Transform analysis with examples – properties of the Continuous time Fourier Transform and Laplace Transform basic properties, Parseval's relation, and convolution in time and frequency domains. Basic properties of continuous time systems: Linearity, Causality, time invariance, stability of frequency response of LTI systems - Analysis and characterization of LTI systems using Laplace transform: Computation of impulse response and transfer function using Laplace transform.

UNIT-III SAMPLING THEOREM AND Z-TRANSFORMS

Sampling theorem – Reconstruction of a Signal from its samples, aliasing – sampling of band pass signals. Basic principles of z-transform - z-transform definition – Region of Convergence – Properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform using Contour integration - Residue Theorem, Power Series expansion and Partial fraction expansion, Relationship between z-transform and Fourier transform.

UNIT-IV DISCRETE TIME SYSTEMS

Computation of Impulse response & Transfer function using Z Transform. DTFT Properties and examples – LTI-DT systems - Characterization using difference equation – Block diagram representation – Properties of convolution and the interconnection of LTI Systems – Causality and stability of LTI Systems.

UNIT-V FILTER REALIZATION STRUCTURES

Realization structures – Direct Form – I, Direct Form – II, Cascade, Parallel and Transpose forms.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Alan V. Oppenheim, Alan S. Willsky and Hamid Nawab. S	Signals and Systems	Pearson Education, New Delhi	2003
2	Roberts. M. J	Signals and Systems Analysis using Transform method and MATLAB	TMH, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	John G. Proakis and Dimitris G. Manolakis	Digital Signal Processing, Principles, Algorithms and Applications	PHI, New Delhi	2000
2	Simon Haykin and Barry Van Veen	Signals and Systems	John Wiley, New York	2002
3	Lindner. K	Signals and Systems	McGraw Hill International, New York	2001
4	Moman .H. Hays	Digital Signal Processing	Tata McGraw-Hill Co Ltd., New Delhi	2004
5	Ashok Amhardar	Analog and Digital Signal Processing	PHI, New Delhi	2002

WEBSITES:

www.relisoft.com www.astro.berkeley.edu www.dspguide.com
--

LIST OF EXPERIMENTS

1. Verification of Kirchoff's voltage and Current Laws
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem & Norton's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Verification of Tellegen's and Reciprocity Theorem
6. Time domain response of RL Transient Circuit.
7. Time domain response of RC Transient Circuit.
8. Series RLC Resonance Circuits (Frequency response & resonant frequency)
9. Parallel RLC Resonance Circuits (Frequency response & resonant frequency)
10. Simulation experiments using PSPICE or MultiSim.

15BEEEC312 DIGITAL ELECTRONICS LABORATORY 0 0 3 2 100**OBJECTIVES**

- ☐ To verify operation of logic gates and flip-flops.
- ☐ To design and construct digital circuits

LIST OF EXPERIMENTS

1. Study of Gates & Flip-flops.
2. Half Adder and Full Adder.
3. Magnitude Comparator (2-Bit).
4. Encoders and Decoders.
5. Multiplexer and Demultiplexer.
6. Code Converters.
7. Implementation of combinational logic functions using standard ICs
8. Synchronous Counters.
9. Ripple Counter.
10. Mod – N Counter.
11. Shift Registers and Shift Register Counters.
12. Implementation of sequential logic functions using standard ICs.
13. Simulation Experiments using Logisim/PSPICE/multisim

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of separately excited and self excited D.C. generator.
2. Load test on D.C. shunt motor.
3. Load test on D.C. series motor.
4. Swinburne's test and speed control of D.C. shunt motor.
5. Load test on single phase transformer and open circuit and short circuit test on single phase transformer
6. Regulation of three phase alternator by EMF and MMF methods.
7. Load test on three phase induction motor.
8. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
9. Load test on single-phase induction motor.
10. Study of D.C. motor and induction motor starters.

OBJECTIVES

At the end of this course the students will learn and apply

- ☐ Operating point calculations and working of basic amplifiers.
- ☐ Working of different types of feedback amplifiers & oscillators.
- ☐ Frequency response and design of tuned amplifiers.
- ☐ Basic working & design of wave shaping circuits.

INTENDED OUTCOMES:

- ☐ The purpose of this course is to introduce to the students
- ☐ The basics of biasing transistor circuits, feedback amplifiers, large signal amplifiers, tuned amplifiers, oscillators, wave shaping circuits, and to design and analyze various electronic circuits and systems

UNIT I-BIASING CIRCUITS AND SMALL SIGNAL MODELS

Biasing circuits: DC load line and Q point – BJT biasing circuits – FET biasing circuits-Bias Stabilization. **Small-signal models** : AC load line, BJT models and parameters – hybrid equivalent model, Hybrid π model, FET small-signal model and parameters.

UNIT II-SMALL-SIGNAL AMPLIFIERS - ANALYSIS AND FREQUENCY RESPONSE

BJT amplifiers: CE, CB and CC amplifiers – multistage amplifiers -differential amplifier.

Frequency response: low frequency response of BJT and FET amplifiers –Miller effect capacitance – high frequency response of BJT and FET amplifiers.

UNIT III-FEEDBACK AND OSCILLATOR CIRCUITS

Feedback circuits: concept of feedback – effects of negative feedback –Types of negative feedback topologies Oscillator circuits: oscillator principles – LC oscillators – RC oscillators –crystal oscillators.

UNIT IV-POWER AMPLIFIERS AND TUNED AMPLIFIERS

Power amplifiers : Class A amplifier – Class B and Class AB push-pull amplifiers – Class C amplifiers – Amplifier distortions – heat sink .

Tuned amplifiers : need for tuned circuits – single tuned – double tuned –Stagger based circuits– video amplifier (CA3040).

UNIT V-SOLID STATE SWITCHING CIRCUITS

Transistor switching times – multivibrators – astable multivibrator – monostable multivibrator – bistable multivibrator – Schmitt trigger .Oscillator-Sweep generators.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	David A Bell,	Fundamentals of Electronic Devices and Circuits	Oxford University Press	2009
2	Jacob Millman, Christos C Halkias, Satyabrata Jit	Electron Devices and Circuits	Tata McGraw Hill	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas L. Floyd	Electronic Devices	9th edition, Pearson Education,	2011.
2	Albert P. Malvino David J. Bates	Electronic Principles	7th edition, Tata McGraw Hill	2007
3	Robert L. Boylestad and Louis Nashelsky	Electronic Devices and Circuit Theory	Pearson Education, 9 th Edition	2009
4	David A. Bell	Solid State Pulse Circuits	Oxford University Press	2007

OBJECTIVES

- ☐ To understand the open loop and closed loop (feedback) systems
- ☐ To understand time domain and frequency domain analysis of control systems required for stability analysis.
- ☐ To understand the compensation technique that can be used to stabilize control systems

INTENDED OUTCOMES:

- ☐ Understand the open loop and closed loop (feedback) systems
- ☐ Understand time domain and frequency domain analysis of control systems required for stability analysis.
- ☐ Understand the compensation technique that can be used to stabilize control systems

UNIT-I CONTROL SYSTEM MODELLING

System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems.

Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formula – Examples.

UNIT-II TIME DOMAIN ANALYSIS

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalized error co-efficient – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus. Analysis using MATLAB

UNIT-III FREQUENCY DOMAIN ANALYSIS

Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin. , Analysis using MATLAB.

UNIT-IV COMPENSATORS

Realization of basic compensators – cascade compensation in time domain and frequency domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot and Root locus. Introduction to P, PI and PID controllers. Analysis using MATLAB.

UNIT-V CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS

Stepper motors – AC servo motor – DC servo motor – Synchronous – sensors and encoders – DC tachogenerator – AC tachogenerator – Hydraulic controller – Pneumatic controller – Typical application of control system in industry.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Benjamin.C.Kuo	Automatic Control Systems	Prentice Hall of India, New Delhi	2002
2	Nagrath & Gopal	Control System Engineering	New Age International Edition, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Gopal.M	Control Systems	Tata McGraw-Hill, New Delhi	1997
2	Ogata.K	Modern Control Engineering	Prentice Hall of India, New Delhi	2003

WEBSITES:

http://www.tigoe.net/pcomp/code/motors http://www.patentstorm.us/patents/7281372/claims.html http://www.allaboutcircuits.com/vol_2/chpt_13/5.html

OBJECTIVES

- ☐ To introduce the basic building blocks of linear integrated circuits.
- ☐ To teach the linear and non-linear applications of operational amplifiers.
- ☐ To introduce the theory and applications of analog multipliers and PLL.
- ☐ To introduce the concepts of waveform generation and introduce some special function ICs.
- ☐ To teach the theory of ADC and DAC

INTENDED OUTCOMES:

- ☐ Knowledge about the basic building blocks of linear integrated circuits.
- ☐ Knowledge about the linear and non-linear applications of operational amplifiers.
- ☐ Knowledge about the theory and applications of analog multipliers and PLL.
- ☐ Knowledge about the theory of ADC and DAC
- ☐ Knowledge about a few special function integrated circuits

UNIT I-OPERATIONAL AMPLIFIER CHARACTERISTICS

Op-amp symbol, terminals, packages and specifications - Block diagram Representation of op-amp- Ideal op-amp & practical op-amp - Open loop & closed loop configurations – DC & AC performance characteristics of op-amp – Frequency compensation - Noise – Differential amplifiers – General Description, Manufacturer's Specification, Electrical Characteristics and internal schematic of 741 op-amps.

UNIT II-OP-AMP APPLICATIONS

Basic op-amp circuits: Inverting & Non-inverting voltage amplifiers -Voltage follower - Summing, scaling & averaging amplifiers - AC amplifiers. Linear Applications: Instrumentation Amplifiers-V-to-I and I-to-V converters-Differentiators and Integrators.

Non-linear Applications: Precision Rectifiers – Wave Shaping Circuits (Clipper and Clampers) – Log and Antilog Amplifiers – Analog voltage multiplier circuit and its applications – Operational Trans-Conductance Amplifier (OTA) - Comparators and its applications – Sample and Hold circuit.

UNIT III-WAVEFORM GENERATORS AND PLL

Waveform Generators: Sine-wave Generators – Square / Triangle / Sawtooth Wave generators. IC 555 Timer: Monostable operation and its applications, Astable operation and its applications

PLL: Operation of the Basic PLL-Closed loop analysis of PLL-Voltage Controlled Oscillator-PLL applications.

UNIT IV-ACTIVE FILTERS & VOLTAGE REGULATOR

Filters: Comparison between Passive and Active Networks-Active Network Design – Filter Approximations-Design of LPF, HPF, BPF and Band Reject Filters – State Variable Filters – All Pass Filters – Switched Capacitor Filters.

Voltage Regulators: Basics of Voltage Regulator – Linear Voltage Regulators using Op-amp – IC Regulators (78xx, 79xx, LM 317, LM 337, 723)-Switching Regulators.

UNIT V-DATA CONVERSION DEVICES

Digital to Analog Conversion: DAC Specifications – DAC circuits – Weighted Resistor DAC-R-2R Ladder DAC-Inverted R-2R Ladder DAC Monolithic DAC

Analog to Digital conversion:ADC specifications-ADC circuits-Ramp Type ADC-Successive Approximation ADC-Dual Slope ADC-Flash Type ADC-Monolithic ADC.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roy Choudhury and Shail Jain	Linear Integrated Circuits	New Age International Publishers	2003
2	Ramakant A.Gayakwad	Op-Amps and Linear Integrated Circuits	Prentice Hall of India, New Delhi	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Robert F. Coughlin, Frederick F. Driscoll	Operational-Amplifiers and Linear Integrated Circuits	Prentice Hall of India, New Delhi	2001
2	Sergio Franco	Design with operational amplifier and analog integrated circuits	McGraw Hill	2015

OBJECTIVES

- ☐ To become familiar with propagation of signals through lines.
- ☐ Calculation of various line parameters by conventional and graphical methods.
- ☐ Need for impedance matching and different impedance matching techniques.
- ☐ Design of different types of filters, equalizer and attenuators.

INTENDED OUTCOMES:

- ☐ Familiar with propagation of signals through lines.
- ☐ Gain knowledge about calculation of various line parameters by conventional and graphical methods.
- ☐ Gain knowledge about Need for impedance matching and different impedance matching techniques.
- ☐ Ability to design of different types of filters, equalizer and attenuators.

UNIT I-TRANSMISSION LINE THEORY

General theory of Transmission lines - the transmission line – general solution– The infinite line – Wavelength, velocity of propagation – Waveform distortion – the distortionless line - Loading and different methods of loading– Line not terminated in Z_0 – Reflection coefficient – calculation of current, voltage, power delivered and efficiency of transmission – Input and transfer impedance - Open and short circuited lines – reflection factor and reflection loss.

UNIT II-HIGH FREQUENCY TRANSMISSION LINES

Transmission line equations at radio frequencies – Line of Zero dissipation – Voltage and current on the dissipationless line, Standing Waves, Nodes, Standing Wave Ratio – Input impedance of the dissipationless line - Open and short circuited lines – Power and impedance measurement on lines – Reflection losses – Measurement of VSWR and wavelength.

UNIT III-IMPEDANCE MATCHING IN HIGH FREQUENCY LINES

Impedance matching: Quarter wave transformer – Impedance matching by stubs – Single stub and double stub matching – Smith chart – Solutions of problems using Smith chart – Single and double stub matching using Smith chart.

UNIT IV-PASSIVE FILTERS

Characteristic impedance of symmetrical networks – filter fundamentals. Design of filters: Constant K, Low Pass, High Pass, Band Pass, Band Elimination, m-derived sections and composite.

UNIT V-ATTENUATORS AND EQUALIZERS

Attenuators: T, Π , Lattice Attenuators, Bridged – T attenuator, L-Type Attenuator. Equalizers: inverse network, series, full series, shunt, full shunt, constant resistance T, constant resistance Π , constant resistance lattice and bridged T network.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ryder.J.D	Networks , Lines and Fields	PHI, New Delhi.	2009
2	E.G.Jordan & balmain	Electromagnetic Waves and Radiating S ystems, 2nd Edition,	Prentice-Hall of India,	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Umesh Sinha	Transmission Lines and Network	Sat ya Prakashan Publishing Compan y, New Delhi	2012
2	Sudhakar. A, Shyammohan S Palli	Circuits and Networks – Analysis and S ynthesis	Tata McGraw Hill, 4 th Edition	2010

OBJECTIVES

- ☐ To provide various Amplitude modulation and demodulation systems.
- ☐ To provide various Angle modulation and demodulation systems.
- ☐ To provide some depth analysis in noise performance of various receiver.
- ☐ To study some basic information theory with some channel coding theorem.

INTENDED OUTCOMES:

- ☐ Knowledge on various Amplitude modulation and demodulation systems.
- ☐ Knowledge on various Angle modulation and demodulation systems.
- ☐ Knowledge on some depth analysis in noise performance of various receiver.
- ☐ Knowledge on some basic information theory with some channel coding theorem.

UNIT-I AMPLITUDE MODULATION

Generation and demodulation of AM, DSB-SC, SSB-SC, VSB Signals, Filtering of sidebands, Comparison of Amplitude modulation systems, Frequency translation, Frequency Division multiplexing, AM transmitters – Superhetrodyne receiver, AM receiver.

UNIT-II ANGLE MODULATION

Angle modulation, frequency modulation, Narrowband and wideband FM, transmission bandwidth of FM signals, Generation of FM signal – Direct FM – indirect FM, Demodulation of FM signals, FM stereo multiplexing, PLL – Nonlinear model and linear model of PLL, Non-linear effects in FM systems, FM Broadcast receivers, FM stereo receivers.

UNIT-III NOISE PERFORMANCE OF DSB, SSB RECEIVERS

Noise – Shot noise, thermal noise, White noise, Noise equivalent Bandwidth, Narrowband noise, Representation of Narrowband noise in terms of envelope and phase components, Sine wave plus Narrowband Noise, Receiver model, Noise in DSB-SC receiver, Noise in SSB receiver

UNIT-IV NOISE PERFORMANCE OF AM AND FM RECEIVERS

Noise in AM receivers threshold effect, Noise in FM receivers capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and de-emphasis in FM, Comparison of performance of AM and FM systems.

UNIT-V INFORMATION THEORY

Uncertainty, Information and entropy, Source coding theorem, Data compaction, Discrete memory less channels, mutual information, channel capacity, channel coding theorem, differential entropy, and mutual information for continuous ensembles, information capacity theorem, implication of the information capacity theorem, rate distortion theory, Compression of information.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Simon Haykin	Communication Systems	John Wiley & sons, New Jersey.	2001
2	Wayne Tomasi	Electronic Communication theory systems	Pearson Edition, New Jersey	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roddy and Coolen	Electronic communication	PHI, New Delhi.	2003
2	Taub and Schilling	Principles of communication systems	TMH, New Delhi	2008

WEBSITES:

http://williamson-labs.com/480_mod.htm
www.mit.edu
<http://www.sfu.ca/~truax/fmtut.html>

OBJECTIVES

To study experimentally the working of amplifiers, regulators and analyze their behavior by plotting graphs.

LIST OF EXPERIMENTS

1. Series and Shunt feedback amplifiers: Frequency response, Input and output impedance calculation
2. Design of RC Phase shift oscillator: Design Wein Bridge Oscillator
3. Design of Hartley and Colpitts Oscillator
4. Tuned Class C
5. Integrators, Differentiators, Clippers and Clampers
6. Design of Astable, Monostable and Bistable multivibrators

SIMULATION USING PSPICE:

7. Differentiate amplifier
8. Active filter : Butterworth IInd order LPF
9. Astable, Monostable and Bistable multivibrator - Transistor bias
10. D/A and A/D converter (Successive approximation)
11. Analog multiplier
12. CMOS Inverter, NAND and NOR

OBJECTIVES:

- ☐ To introduce the scientific computing, covering some important aspects of solving algebraic equations, IVP, BVP.
- ☐ To implement the methods using the spread sheet in Excel

INTENDED OUTCOMES:

- ☐ To develop analytical skills for solving different engineering problems.
- ☐ To understand the concepts of Matrices, sequences and series.
- ☐ To solve problems by applying Differential Calculus and Differential equations.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
 - i) Runge - Kutta 4th order method
 - ii) Modified Euler's method
 - iii) Milne's method
 - iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
 - i) Laplace Equation
 - ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
 - iii) One dimensional wave equation
Implicit method

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009
2	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014

LIST OF EXPERIMENTS

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Active low pass, high pass and Band pass filter.
5. Astable, Monostable multivibrators and Schmitt Trigger using op-amp.
6. Phase shift and Wien bridge oscillator using op-amp.
7. Astable and Monostable using NE555 Timer.
8. PLL characteristics and Frequency Multiplier using PLL.
9. Design of ADC and DAC using discrete components.
10. Study of DC power supply using LM317 and LM723 and SMPS control IC SG3524/ SG3525.
11. Simulation of Experiments 1,2,3,4,5 using PSpice/MultiSim

15BEEEC451 VALUE ADDED COURSE-Life skills/Technical Seminar

15BEEEC452 VALUE ADDED COURSE- Foreign language(German/Japanese), Hindi

SEMESTER V

15BEEEC501 MICROPROCESSORS AND MICROCONTROLLERS 3 0 0 3 100

OBJECTIVES

- ☐ To introduce the h/w architecture, instruction set and programming of 8086 microprocessor.
- ☐ To introduce the peripheral interfacing of microprocessors.
- ☐ To introduce the h/w architecture of ARM processor
- ☐ To introduce the h/w architecture, instruction set, programming and interfacing of 8051 microcontroller.

INTENDED OUTCOMES:

- ☐ Adequate knowledge about the architecture and programming of 8085 microprocessor.
- ☐ Adequate knowledge about the architecture of ARM processor
- ☐ Adequate knowledge about the architecture and programming of 8086 microprocessor.
- ☐ Adequate knowledge about the architecture, programming and interfacing of 8051 micro controller.

UNIT I-MICROPROCESSOR- 8086

Review of 8085- Introduction to 8086 -Register Organization -Architecture-Signals-Memory Organization-Bus Operation-I/O Addressing-Minimum Mode-Maximum Mode-Timing Diagram-Interrupts - Service Routines – I/O and Memory Interfacing concepts.

UNIT II-OVERVIEW OF ARM PROCESSOR

Review of ARM v7 core and its architecture, Introduction to Advanced ARM CORTEX M4 architecture, Peripherals overview, Advantages of using Cortex M4, Instruction set implementation ,CPU timers introduction.

UNIT III-PROGRAMMING OF 8086

Addressing Modes-Instruction format-Instruction set-Assembly language programs in 8086. RISC architecture – introduction to ARM Programming-register configuration and instruction set – sample program.

UNIT IV-MICROCONTROLLER-8051

Register Set-Architecture of 8051 microcontroller- I/O and memory addressing-Interrupts-Instruction set- Addressing modes. .

UNIT V-PROGRAMMING AND INTERFACING OF 8051

Timer-Serial Communication-Interrupts Programming-Interfacing to External Memory-Interfacing to ADC, LCD, DAC, Keyboard and stepper motor.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	K. Ray and K. M. Bhurchandi,	Advanced Microprocessors and Peripherals – Architectures, Programming and Interfacing	Indian edition. Tata McGraw Hill, New Delhi	2001 Reprint
2	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.MCKinlay	The 8051 Microcontroller and Embedded S ystems	Pearson Education, New Jersy.	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Krishna Kant	Microprocessor and Microcontroller Architecture, programming and s ystem design using 8085, 8086, 8051 and 8096	PHI, New Delhi.	2007
2	Kenneth J.Ayala	The 8051 Microcontroller	Thompson Delmar Learning, New Delhi	2007
3	Ray.A.K, Bhurchandi.K.M	Advanced Microprocessor and Peripherals	Tata McGraw-Hill, New Delhi	2007
4	Barry B.Brey	The Intel Microprocessors Architecture, Programming and Interfacing	Pearson Education, New Delhi	2007
5	Ramesh S.Goankar	Microprocessor Architecture, Programming, and Applications with the 8085	PHI, New Delhi.	2002
6	Douglas V.Hall	Microprocessor and Interfacing, Programming and Hardware	Indian edition. Tata McGraw Hill, New Delhi	2007
7	Jonathan W Valvano	Introduction to Arm(r) Cortex -M Microcontrollers	Create space Independent Publisher	2012

OBJECTIVES

To learn and understand

- ☐ Pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals
- ☐ Base band pulse transmission which deals with the transmission of pulse amplitude modulated signals in their base band form
- ☐ Pass band data transmission methods
- ☐ To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

INTENDED OUTCOMES:

- ☐ Gain knowledge in pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- ☐ Gain adequate knowledge in baseband pulse transmission, which deals with the transmission of pulse-amplitude, modulated signals in their baseband form.
- ☐ Gain adequate knowledge in M-ary signaling and spread spectrum Technique.

UNIT I-SAMPLING AND QUANTIZATION

Sampling Process – Aliasing – Instantaneous sampling – Natural Sampling – Flat Sampling – Quantization of signals – sampling and quantizing effects – channel effects – SNR for quantization pulses – data formatting techniques – Time division multiplexing.

UNIT II-DIGITAL MODULATION SYSTEMS

PCM Systems – Noise Considerations in PCM system – Overall Signal-to-noise ratio for PCM system – Threshold effect – Channel Capacity – Virtues, Limitations & Modification of PCM system – PCM Signal Multiplexing – Differential PCM – Delta Modulation – Noise Considerations in Delta Modulation – SNR Calculations – Comparison of PCM, DPCM & DM.

UNIT III-BASE BAND PULSE TRANSMISSION

Maximum likelihood receiver structure – Matched filter receiver – Probability error of the Matched filter – Intersymbol interference – Nyquist criterion for distortionless baseband transmission – Correlative coding – Eye pattern.

UNIT IV-PASS BAND DATA TRANSMISSION

Pass Band Transmission Model – Generation, Detection, Signal Space Diagram, Probability of Error for BFSK, BPSK, QPSK, DPSK, and Schemes – Comparison.

UNIT V-M-ARY SIGNALING AND INTRODUCTION TO SPREAD SPECTRUM TECHNIQUES

M-ary signaling, vectoral view of MPSK and MFSK signaling, symbol error performance of M-ary systems – Introduction – Discrete Sequence Spread Spectrum technique – Use of Spread Spectrum with CDMA-Ranging Using Discrete Sequence Spread Spectrum – Frequency Hopping Spread Spectrum – Generation & Characteristics of PN Sequence.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Simon Haykins	Communication S ystems	John Wiley PHI, New Delhi	2001
2	Taub & S chilling	Principles of Digital Communication	Tata McGraw- Hill, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sam K.Shanmugam	Analog & Digital Communication	John Wiley Publication, New Delhi	2007
2	John G.Proakis	Digital Communication	McGraw Hill, Inc, 5 th Edition	2008
3	Singh, R.P. & Sapre, S.D	Communication Systems: Analog & Digital	Tata McGraw-Hill, 5 th reprint	2000

- ☐ To study DFT and its computation
- ☐ To study the design techniques for digital filters
- ☐ To study the finite word length effects in signal processing
- ☐ To study the fundamentals of digital signal processors

INTENDED OUTCOMES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> Understand the structures of Discrete time signals and systems<input type="checkbox"/> Understand Frequency response and design of FIR and IIR filters.<input type="checkbox"/> Understand Finite word length effect<input type="checkbox"/> Understand DSP Processor- TMS320C5X. |
|---|

UNIT I-REVIEW OF DISCRETE TIME SIGNALS AND SYSTEMS

Overview of signals and systems – DFT–FFT using DIT and DIF algorithms – Inverse DFT-FFT using DIT and DIF algorithms – Applications – Circular convolution – MATLAB programs for DFT and FFT.

UNIT II-DESIGN AND IMPLEMENTATION OF IIR FILTERS

Design of analog filters using Butterworth and Chebyshev approximations – IIR digital filter design from analog filter using impulse invariance technique and bilinear transformations – Matlab programs for IIR filters.

UNIT III-DESIGN AND IMPLEMENTATION OF FIR FILTERS

Linear phase response – Design techniques for FIR filters – Fourier series method and frequency sampling method –Design of Linear phase FIR filters using windows: Rectangular, Hanning and Hamming windows – Matlab programs for FIR filters.

UNIT IV-FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

Fixed point arithmetic – effect of quantization of the input data due to Finite word length. Product round off – need for scaling – Zero input limit cycle oscillations - Limit cycle oscillations due to overflow of adders – Table look up implementation to avoid multiplications.

UNIT V-PROCESSOR FUNDAMENTALS

Features of DSP processors – DSP processor packaging(Embodiments)– Fixed point Vs floating point DSP processor data paths – Memory architecture of a DSP processor (Von Neumann – Harvard) – Addressing modes – pipelining – TMS320 family of DSPs (architecture of C6x).

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Alan V Oppenheim, Ronald W Schafer, John R Back	Discrete Time Signal processing	PHI, New Delhi.	2000
2	Venkataramani B & M. Bhaskar	Digital Signal Processor Architecture, Programming and Application	TMH, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	John G Proakis, Dimtris G Manolakis	Digital Signal Processing Principles, Algorithms and Application	Pearson Education, Fourth edition.	2007
2	Avtar singh, Srinivasan.S,	DSP Implementation using DSP microprocessor with Examples from TMS32C54XX	Thamson / Brooks cole Publishers, New Delhi	2003
3	M. H. Hayes	Digital Signal Processing	Tata McGraw-Hill, New Delhi	2009
4	Johny R. Johnson	Introduction to Digital Signal Processing	Prentice Hall, New York	2001
5	Sanjit Mitra	Digital Signal Processing- A Computer based approach	Tata McGraw-Hill, New Delhi	2011

WEBSITES:

www.cnx.org www.dspguide.com
<http://mathworld.wolfram.com/Z-Transform.htm> 1

OBJECTIVES

- ☐ To study various antennas, arrays and radiation patterns of antennas.
- ☐ To learn the basic working of antennas
- ☐ To understand various techniques involved in various antenna parameter measurements.
- ☐ To understand the propagation of radio waves in the atmosphere

INTENDED OUTCOMES:

- ☐ Gain knowledge in various antennas, arrays and radiation patterns of antennas.
- ☐ Gain knowledge in the basic working of antennas.
- ☐ Understand various techniques involved in various antenna parameter measurements.
- ☐ Understand the propagation of radio waves in the atmosphere.

UNIT I-ANTENNA FUNDAMENTALS AND RADIATION

Definition and function of antennas – Antenna theorems-Antenna parameters – Radiation Mechanism – Antenna field zones – Radiation from a small current element – Power radiated by a small current element and its radiation resistance – Hertzian dipole – Half wave dipole – Monopole – Current distributions.

UNIT II-ANTENNA ARRAYS AND SYNTHESIS

Linear arrays – Analysis of linear arrays – Phased arrays – Binomial arrays – Pattern multiplication – Method of excitation of antennas – Impedance matching techniques.
Synthesis methods: Schelkunoff polynomial – Fourier transform – Woodward Lawson method.

UNIT III-SPECIAL PURPOSE ANTENNAS

Travelling wave – Loop – small loop – Dipole and Folded dipole antennas – Horn antenna – Reflector antenna – Yagi – Uda antenna – Log periodic antenna – Helical and Micro strip antennas. Introduction to CAD tools used for antenna modeling.

UNIT IV-ANTENNA MEASUREMENTS

Drawbacks in measurements of antenna parameters – Methods to overcome drawbacks in measurements – Measurement ranges – Impedance – Gain – Radiation pattern – Beam width – Radiation resistance – Antenna efficiency – Directivity-Polarization and Phase Measurements.

UNIT V-RADIO WAVE PROPAGATION

Basics of propagation-Ground wave propagation – Space wave propagation- Considerations in space wave propagation – Super refraction – Ionospheric wave propagation – Structure of ionosphere – Mechanism of ionospheric propagation – Effect of earth's Magnetic field on Radio wave propagation – Virtual height – MUF – Skip distance – OMF – Ionosphere abnormalities.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	John D Kraus, Ronald J Marhefka, Ahmad S Khan	Antenna and Wave Propagation	Tata McGraw Hill, 4 th Edition	2010
2	R.E.Collins	Antenna and Wave Propagation	McGraw-Hill,	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Constantine A. Balanis	Antenna Theory: Analysis and Design	Third Edition, John Wiley and Sons	2012
2	G.S.N. Raju	Antennas and wave propagation	1 st Edition, Pearson Education	2012
3	Robert S. Elliott	Antenna Theory and Design	John Wiley and Sons, Revised Edition	2007
4	R.L. Yadava	Antennas and Wave Propagation	PHI	2011

OBJECTIVES

- ☐ To implement the processing techniques using the instructions of TMS320C5X
- ☐ To implement the IIR and FIR filter using MATLAB.

LIST OF EXPERIMENTS

USING TMS320C5X

1. Study of various addressing modes of DSP using simple programming examples
2. Sampling of input signal and display
3. Implementation of FIR filter
4. Calculation of FFT

USING MATLAB

5. Generation of Signals
6. Linear and circular convolution of two sequences
7. Sampling and effect of aliasing
8. Design of FIR filters
9. Design of IIR filters
10. Calculation of FFT of a signal

OBJECTIVES

To understand and gain knowledge about

- ☐ Microprocessor (8085/8086)
- ☐ Microcontroller (8051)
- ☐ Interfacing circuits

LIST OF EXPERIMENTS

Minimum 12 Experiments to be conducted

1. Programs for 8/16 bit Arithmetic operations (Using 8085 and 8086).
2. Programs for Sorting and Searching (Using 8086).
3. Programs for String manipulation operations (Using 8086).
4. Programs for Digital clock and Stop watch (Using 8086).
5. Programs on Subroutines (Using 8086)
6. Interfacing ADC and DAC(Using MSP 430 CONTROLLER).
7. 8255 PPI
8. Transfer data serially between two kits (8253/8251).
9. 8279 Keyboard & display
10. Temperature control.
11. Traffic Control Using MSP 430 CONTROLLER.
12. 8259 Programmable Interrupt Controller.
13. Interfacing and Programming of DC Motor Speed control(Using MSP 430 CONTROLLER)
14. Interfacing and Programming of Stepper Motor and (8051).
15. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051microcontroller.

OBJECTIVES

To carry out experiments on various digital communication modulation schemes using Trainer kits.

LIST OF EXPERIMENTS

- 1 Radiation pattern of Half wave dipole Antenna
2. Radiation pattern of Yagi Antenna
3. Radiation pattern of loop Antenna
4. Characteristics of AM receiver (Selectivity & Sensitivity)
5. Characteristics of FM receiver (Selectivity & Sensitivity)
6. Signal Sampling & Time division multiplexing
7. Pulse modulation and demodulation- PAM / PWM / PPM
8. Pulse code modulation & demodulation
9. Line Coding & Decoding
10. Delta modulation & demodulation
11. Digital modulation & demodulation –ASK, PSK, FSK
12. Simulation of hardware mentioned above using Lsim software

15BEEEC551 VALUE ADDED COURSE – In plant training

15BEEEC552 VALUE ADDED COURSE – Mini Project

SEMESTER VI

15BEEEC601

MICROWAVE ENGINEERING

3 2 0 4 100

OBJECTIVES

- ☐ To study passive microwave components and their S- Parameters.
- ☐ To study Microwave semiconductor devices & applications.
- ☐ To study Microwave sources and amplifiers.

INTENDED OUTCOMES:

- ☐ Gain Knowledge in passive microwave components and their S- Parameters.
- ☐ Gain Knowledge in Microwave semiconductor devices & applications.
- ☐ Gain Knowledge in Microwave sources and amplifiers.

UNIT-I INTRODUCTION

Microwave Frequencies, Microwave Devices, Microwave Systems, Microwave Units of Measure, Microwave Hybrid Circuits, Waveguide Tees, Magic Tees (Hybrid Trees), Hybrid Rings (Rat-Race Circuits), Waveguide Corners, Bends and Twists, Directional Couplers, Two-Hole Directional Couplers, Z & ABCD Parameters- Introduction to S parameters, S Matrix of a Directional Coupler, Hybrid Couplers, Circulators and Isolators, Microwave Circulators, Microwave Isolators.

UNIT-II TRANSFERRED ELECTRON DEVICES (TEDs) and AVALANCHE TRANSIT-TIME DEVICES

Introduction, Gunn-Effect Diodes – GaAs Diode, Background, Gunn Effect, Ridley-Watkins-Hilsum (RWH) Theory, Differential Negative Resistance, Two-Valley Model Theory, High-Field Domain, Modes of Operation, LSA Diodes, InP Diodes, CdTe Diodes, Microwave Generation and Amplification, Microwave Generation, Microwave Amplification, Avalanche Transit-Time Devices, Introduction, Read Diode, Physical Description, Avalanche Multiplication, Carrier Current $I_0(t)$ and External Current $I_e(t)$, Output Power and Quality Factor, IMPATT Diodes, Physical Structures, Negative Resistance, Power Output and Efficiency, TRAPATT Diodes, Physical Structures, Principles of Operation, Power Output and Efficiency, BARITT Diodes, Physical Description, Principles of Operation, Microwave Performance, Parametric Devices, Physical Structures, Nonlinear Reactance and Manley – Rowe Power Relations, Parametric Amplifiers, Applications.

UNIT-III MICROWAVE LINEAR-BEAM TUBES (O TYPE) AND MICROWAVE CROSSED-FIELD TUBES (M-TYPE)

Klystrons, Reentrant Cavities, Velocity-Modulation Process, Bunching Process, Output Power and Beam Loading, State of the Art, Multicavity Klystron Amplifiers, Beam-Current Density, Output Current Output Power of Two-Cavity Klystron, Output Power of Four-Cavity Klystron, Reflex Klystrons, Velocity Modulation, Power Output and Efficiency, Electronic Admittance, Helix Traveling-Wave Tubes (TWTs), Slow-Wave structures, Amplification Process, Convection Current, Axial Electric Field, Wave Modes, Gain Consideration, Microwave Crossed-Field Tubes, Magnetron Oscillators, Cylindrical Magnetron, Coaxial Magnetron, Tunable Magnetron, Rieke diagram.

UNIT-IV STRIP LINES AND MONOLITHIC MICROWAVE INTEGRATED CIRCUITS

Introduction, Microstrip Lines, Characteristic Impedance of Microstrip Lines, Losses in Microstrip Lines, Quality Factor Q of Microstrip Lines, Parallel Strip Lines, Distributed Lines, Characteristic

Impedance, Attenuation Losses, Coplanar Strip Lines, Shielded Strip Lines, References, Problems, Monolithic Microwave Integrated Circuits, Introduction, Materials, Substrate Materials, Conductor Materials, Dielectric Materials, Resistive Materials, Monolithic Microwave Integrated-Circuit Growth, MMIC Fabrication Techniques, Fabrication Example.

UNIT-V MICROWAVE MEASUREMENTS

Slotted line VSWR measurement, VSWR through return loss measurements, power measurement, impedance measurement insertion loss and attenuation measurements- measurement of scattering parameters – Measurement of 1 dB, dielectric constant measurement of a solid using waveguide

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Samuel.Y.Liao	Microwave Devices and Circuits	Prentice Hall of India	2003
2.	Annapurna Das and Sisir K.Das	Microwave Engineering	Tata McGraw-Hill	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Collin.R.E	Foundations for Microwave Engineering	IEEE Press, New Delhi	2002
2.	David M.Pozar	Microwave Engineering	John Wiley & Sons, New York	2003
3.	Rizzi.P.A	Microwave Engineering	PHI, New Delhi	2000

OBJECTIVES

- ☐ To introduce the students the functions of different layers.
- ☐ To introduce IEEE standard employed in computer networking.
- ☐ To make students to get familiarized with different protocols and network components.

INTENDED OUTCOMES:

- | | |
|--------------------------|---|
| <input type="checkbox"/> | Adequate knowledge about the functions of different layers. |
| <input type="checkbox"/> | Adequate knowledge about IEEE standard employed in computer networking. |
| <input type="checkbox"/> | Familiarize with different protocols and network components. |

UNIT I DATA COMMUNICATIONS

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies – Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences-Real time applications.

UNIT II DATA LINK LAYER

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDDI, SONET – Bridges. Real time applications.

UNIT III NETWORK LAYER

Internetworks - Packet Switching and Datagram approach – IP addressing methods – IP4 and IP6 - Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers- Real time applications.

UNIT IV TRANSPORT LAYER

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services- Real time applications.

UNIT V APPLICATION LAYER

Domain Name Space (DNS) – SMTP, FTP, HTTP, WWW, Email, Search engines - POP server – Security – Cryptography- Real time applications.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Behrouz A. Foruzan	Data communication and Networking	Tata McGraw-Hill, New Delhi	2004
2	William Stallings	Data and Computer Communication	Pearson Education, New Delhi	2000

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	James .F. Kurose &.Rouse.W	Computer Networking: A Top down Approach Featuring	Pearson Education, New Jersy	2001
2	Larry L.Peterson & Peter S.Davie	Computer Networks	Harcourt Asia Pvt. Ltd, New Delhi	2000
3	Andrew S. Tannenbaum	Computer Networks	PHI, New Delhi	2003

- ☐ To learn the fundamental cellular radio concepts
- ☐ To learn radio propagation models
- ☐ To provide ideas about analog and digital modulation techniques used in mobile communication
- ☐ To learn various coders and multiple access techniques used in mobile communication
- ☐ To study the architectures of AMPS, GSM, WLL, Bluetooth, DECT, GPRS

INTENDED OUTCOMES:

- | |
|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Gain adequate knowledge in the fundamentals of cellular radio concepts<input type="checkbox"/> Gain adequate knowledge in radio propagation models<input type="checkbox"/> Ability to provide ideas about analog and digital modulation techniques used in mobile communication |
|--|

UNIT-I CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS

Introduction to wireless communication: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT-II MOBILE RADIO PROPAGATION

Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

UNIT-III MODULATION TECHNIQUES AND EQUILISATION

Modulation Techniques: Minimum Shift Keying, Gaussian MSK, M-ary QAM, M-ary FSK, Orthogonal Frequency Division Multiplexing, Performance of Digital Modulation in Slow-Flat Fading Channels and Frequency Selective Mobile Channels. Equalization: Survey of Equalization Techniques, Linear Equalization, Non-linear Equalization, Algorithms for Adaptive Equalization. Diversity Techniques, RAKE receiver.

UNIT-IV CODING AND MULTIPLE ACCESS

Coding:

Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

UNIT V WIRELESS SYSTEMS ANTENNAS AND STANDARDS

AMPS, GSM, WLL, Bluetooth, IS-95 and DECT - RFID antennas – Mobile Antennas - GPRS

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rappaport.T.S	Wireless Communications: Principles and Practice	Pearson Education/ Prentice Hall of India, New Delhi	2003
2	Jochen Schiller	Mobile Communication	PHI, New Delhi.	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Roy Blake	Wireless Communication Technology	Thomson Delmar, New Delhi.	2003
2	Lee.W.C.Y	Mobile Communications Engineering: Theory and applications	McGraw-Hill International, New York	1998
3	Stephen G. Wilson	Digital Modulation and Coding	Pearson Education, New Delhi	2003

15BECC604 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT
3 0 0 3 100

INTENDED OUTCOMES:

- ☐ To know the fundamentals of cost analysis and economics.
- ☐ To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.
- ☐ To make the students to understand capital market, break even point analysis and depreciation

UNIT- I FUNDAMENTALS OF ENGINEERING ECONOMICS

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics- Demand and supply analysis-Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT- II FINANCIAL MANAGEMENT

Objectives and functions of financial management – financial statements, working capital management – factors influencing working capital requirements – estimation of working capital. Capital budgeting - Need for Capital Budgeting – Project Appraisal Methods - Payback Period – ARR – Time Value of Money.

UNIT- III CAPITAL MARKET

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions – Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT- IV NEW ECONOMIC ENVIRONMENT

National Income – concepts – methods of calculating national income - Economic systems, Economic Liberalization – Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT- V COST ANALYSIS AND BREAK EVEN ANALYSIS

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ramachandra Ar yasri .A, and V. V.Ramana Murthy	Engineering Economics & Financial Accounting	Tata McGraw Hill,–,New Delhi	2007
2	Varshney R. L., and K.L Maheshwari	Managerial Economics	Sultan Chand & Sons, New Delhi	2001

REFERENCE BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	M.L.Jhingan	Principles of Economics	Konark Publications	2010
2	Prasanna Chandra	Fundamentals of Financial Management	Tata McGraw Hill, New Delhi.	2007
3	D.M.Mithani	Money, Banking, International Trade & Public Finance	Himalaya Publishing House	2004

WEBSITES:

1. <http://economictimes.indiatimes.com>
2. <http://www.economist.com/>
3. <http://www.managementstudyguide.com/financial-management.htm>

15BEEC6E__ DEPARTMENT ELECTIVE-II

15BEEC6E_ _ DEPARTMENT ELECTIVE-III

OBJECTIVES

To study the communication networks characteristics and to analyze various routing layer Protocols.

LIST OF EXPERIMENTS

1. PC to PC Communication
Parallel Communication using 8 bit parallel cable
Serial communication using RS 232C
2. Ethernet LAN protocol
To create scenario and study the performance of CSMA/CD protocol ethrol simulation
3. Token bus and token ring protocols
To create scenario and study the performance of token bus and token ring protocols through simulation
4. Wireless LAN protocols
To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
5. Implementation and study of stop and wait protocol
6. Implementation and study of Go back-N and selective ret protocols
7. Implementation of distance vector routing algorithm
8. Implementation of Link state routing algorithm
9. Implementation of Data encryption and decryption
10. Transfer of files from PC to PC using Windows / Unix socket processing
11. Simulation of Experiments using NS-2

OBJECTIVES

To have a detailed practical study on microwave equipments

LIST OF EXPERIMENTS

1. VSWR Measurements – Determination of terminated impedance
2. Determination of guide wavelength, frequency measurement.
3. Radiation Pattern of Horns, Paraboloids.
4. Microwave Power Measurement.
5. Characteristics of Gunn diode Oscillator
6. Study of Magic Tee
7. Study of attenuators(fixed and variable)
8. Conduct an experiment using microwave test bench.
9. Study of resonant cavity
10. Simulation using CAD tools.

**15BEEEC651 VALUE ADDED COURSE – Analog system design using ASLK Pro /ARM
Cortex M4/Mixed signal Microcontroller**

15BEEEC652 VALUE ADDED COURSE- Communication skills and development

SEMESTER VII

15BECC701 PROFESSIONAL ETHICS

3 0 0 3 100

INTENDED OUTCOMES:

- ☐ Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations.
- ☐ After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling.
- ☐ To create an awareness and practice through Engineering Ethics and Human Values.

UNIT I ENGINEERING ETHICS

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V GLOBAL ISSUES

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Charles E Harris, Michael S. Protchard and Michael J Rabins	Engineering Ethics – Concepts and Cases	Wadsworth Thompson Learning, New Delhi	2000
2.	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw-Hill, New York	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1	Charles D Fleddermann,	Engineering Ethics	Prentice Hall, New Mexico	1999
2.	John R Boatright	Ethics and the Conduct of Business	Pearson Education	2003
3.	Edmund G Seebauer and Robert L Barry	Fundamentals of Ethics for Scientists and Engineers	Oxford University Press	2001
4.	David Ermann and Michele S Shauf,	Computers, Ethics and Society	Oxford University Press,	2003
5.	Prof. (Col) P S Bajaj and Dr. Raj Agrawal, “	Business Ethics – An Indian Perspective	Biztantra, New Delhi	, 2004.

OBJECTIVES

- ☐ To learn the basic MOS Circuits.
- ☐ To learn the MOS process technology
- ☐ To learn the concepts of modeling a digital system using Hardware Description Language.
- ☐ To learn techniques of chip design using programmable devices.
- ☐ To learn the concepts of designing VLSI subsystems.

INTENDED OUTCOMES:

- ☐ Gain knowledge in the basic MOS Technology.
- ☐ Gain knowledge in the MOS Process Technology and its second order effect.
- ☐ Gain knowledge in the concepts of modeling a digital system using Hardware Description Language.
- ☐ Gain knowledge in basic concept of VLSI implementation strategies based on CMOS and FPGA.

UNIT I-MOS TECHNOLOGY

Chip Design Hierarchy – IC Layers – Photolithography and Pattern Transfers
 – Basic MOS Transistors – CMOS Fabrication: n-well – p-well – twin tub – Latch up and prevention
 - Layout design rules, physical design- basic concepts, CAD tool sets, physical design of logic gates- Inverter, NAND, NOR.

UNIT II-MOS CIRCUIT DESIGN PROCESS

Introduction to MOSFET: Symbols, Enhancement mode-Depletion mode transistor operation – Threshold voltage derivation – body effect – Drain current V_s voltage derivation – channel length modulation. NMOS and CMOS inverter – Determination of pull up to pull down ratio – Stick diagrams – VLSI Circuit Design Flow.

UNIT III-CMOS LOGIC GATES & OTHER COMPLEX GATES

Gate delays – Logical Effort - CMOS Static Logic – Transmission Gate Logic – Tri-State Logic – Pass Transistor Logic – Dynamic CMOS Logic – Domino CMOS Logic, NORA CMOS Logic, True Single Phase Clock (TSPC) Dynamic Logic

UNIT IV-VERILOG HDL

Hierarchical modeling concepts – Basic concepts: Lexical conventions – Data types – Modules and ports. Gate level modeling – Dataflow modeling – Behavioral modeling – Design examples of Combinational and Sequential circuits – Switch level modeling – Functions – UDP concepts.

UNIT V-VLSI IMPLEMENTATION STRATEGIES

Introduction – Design of Adders: carry look ahead-carry select-carry save. Design of multipliers: Array – Braun array – Baugh-Wooley Array. Introduction to FPGA – Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Douglas A. Pucknell	Basic VLSI Systems and Circuits	Prentice Hall of India, 3 rd Edition, reprint	2008
2.	John P. Uyemura,	Introduction to VLSI Circuits and Systems	John Wiley & Sons, Reprint	2009

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Smith.M.J.S	Application Specific integrated circuits	Pearson Education, New York	2008
2.	Weste & Eshraghian,	Principles of CMOS VLSI Design	Addison Wesley, 2nd Edition	2008
3.	John P Uyemura	Chip Design for Submicron VLSI: CMOS layout and simulation	Thomson India Edition	2010
4	Samir Palnitkar,	Verilog HDL – Guide to Digital Design and Synthesis	Pearson Education, 3 rd Edition	2003

OBJECTIVES

- ☐ To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- ☐ To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- ☐ To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- ☐ To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- ☐ To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

INTENDED OUTCOMES:

- ☐ Gain knowledge in basic elements of optical fiber transmission link, fiber modes configurations and structures.
- ☐ Gain knowledge in different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- ☐ Gain knowledge in the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- ☐ Gain knowledge in the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- ☐ Gain knowledge in fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

UNIT-I INTRODUCTION TO OPTICAL FIBERS

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT-II SIGNAL DEGRADATION OPTICAL FIBERS

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination –Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III FIBER OPTICAL SOURCES AND COUPLING

Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fibre –to- Fibre joints, Fibre splicing – Energy efficiency of LASER.

UNIT-IV FIBER OPTICAL RECEIVERS

PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error– Quantum Limit.

UNIT-V DIGITAL TRANSMISSION SYSTEM

Point-to-Point links System considerations –Link Power budget –Rise - time budget –Noise Effects on System Performance-Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Gerd Keiser	Optical Fiber Communication	McGraw Hill International, Singapore	2000
2	Senior.J	Optical Communication Principles and Practice	Prentice Hall of India New Delhi	2001

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Gower.J	Optical Communication System	Prentice Hall of India, New Delhi	2001

WEBSITES:

www.cnx.org
www.dspguide.com

15BEEC7E__ DEPARTMENT ELECTIVE -IV 3 0 0 3 100

15BE__7OE__ OPEN ELECTIVE -I 3 0 0 3 100

OBJECTIVES

To gain expertise in design and development and simulation of digital circuits with VHDL.

LIST OF EXPERIMENTS

All the experiments must be implemented using Cadence tool

1. Study of Simulator tools
2. Study of Synthesis tools
3. Place and Route and Back annotation for FPGAs
4. Study of development tool for FPGAs for schematic entry and verilog
5. Design of traffic light controller using verilog and above tools
6. Design and simulation of pipelined serial and parallel adder to add/ subtract 8 number of size, 13 bits each in 2's complement
7. Design and simulation of back annotated verilog files for multiplying two signed, 8 bit numbers in 2's complement. Design must be pipelined and completely RTL compliant
8. Study of FPGA board and testing on board LEDs and switches using verilog codes
9. Testing the traffic controller design developed in SI NO.5 on the FPGA board
10. Design a Real-time Clock (2 digits, 7 segments LED displays each for HRS., MTS, and SECS.) and demonstrate its working on the FPGA board. An expansion card is required for the displays.

LIST OF EXPERIMENTS

1. DC power supply design using buck – boost converters
Design the buck-boost converter for the given input voltage variation, load current and output voltage. Plot the regulation characteristics.
2. DC power supply design using fly back converter (Isolated type)
Design the fly back converter using ferrite core transformer for the given input voltage variation load current and output voltage.
Plot the regulation characteristics.
3. Design of a 4-20mA transmitter for a bridge type transducer.
Design the Instrumentation amplifier with the bridge type transducer (Thermistor or any resistance variation transducers) and convert the amplified voltage from the instrumentation amplifier to 4 – 20 mA current using op-amp. Plot the variation of the temperature Vs output current.
4. Design of AC/DC voltage regulator using SCR
Design a phase controlled voltage regulator using full wave rectifier and SCR, vary the conduction angle and plot the output voltage.
5. Design of process control timer Design a sequential timer to switch on & off at least 3 relays in a particular sequence using timer IC.
6. Design of AM / FM modulator / demodulator
 - i. Design AM signal using multiplier IC for the given carrier frequency and modulation index and demodulate the AM signal using envelope detector.
 - ii. Design FM signal using VCO IC NE566 for the given carrier frequency and demodulate the same using PLL NE 565.
7. Design of Wireless data modem.
Design a FSK modulator using 555 and convert it to sine wave using filter and transmit the same using IR LED and demodulate the same PLL NE 565.
8. PCB layout design using CAD
Drawing the schematic of simple electronic circuit and design of PCB layout using CAD
9. Microcontroller based systems design
Design of microcontroller based system for simple applications like security systems combination lock etc. using 89c series flash micro controller.
10. DSP based system design
Design a DSP based system for simple applications like echo generation, etc. using TMS 320 DSP kit.

OBJECTIVES

To study the optical devices and to use in the appropriate application

LIST OF EXPERIMENTS

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Mode Characteristics of Fibres – SM Fibres.
3. Study of Coupling Fibers to Semi-Conductor Sources – Connectors & Splices.
4. Fiber optic communication links.
5. LED & Photo Diode Characteristics.
6. Microwave experiments
7. VSWR Measurements – Determination of terminated impedance
8. Determination of guide wavelength, frequency measurement.
9. Radiation Pattern of Horns, Paraboloids.
10. Microwave Power Measurement.
11. Characteristics of Gunn diode Oscillator.
12. Simulation using Globosim /Optnet

15BEEEC751 VALUE ADDED COURSE – Real time controller/VLSI Design using Cadence tool.**VIII SEMESTER**

15BEEEC8E_ _	DEPARTMENT ELECTIVE -V	3 0 0 3 100
---------------------	-------------------------------	--------------------

\		
15BEEEC8E_ _	DEPARTMENT ELECTIVE -VI	3 0 0 3 100

15BEEEC8E_ _	DEPARTMENT ELECTIVE -VII	3 0 0 3 100
---------------------	---------------------------------	--------------------

15BEEEC891	PROJECT WORK – VIVA VOCE	0 0 24 12 300
-------------------	---------------------------------	----------------------

LIST OF ELECTIVES FOR V SEMESTER
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

15BEEC_E01 MEASUREMENTS AND INSTRUMENTATION 3 0 0 3 100

OBJECTIVES

To learn

- ☐ Basic measurement concepts
- ☐ Concepts of electronic measurements
- ☐ Importance of signal generators and signal analysers in measurements
- ☐ Relevance of digital instruments in measurements
- ☐ The need for data acquisition systems
- ☐ Measurement techniques in optical domains.

INTENDED OUTCOMES:

- ☐ Ability to understand the basic measurement concepts
- ☐ Ability to understand the concepts of electronic measurements
- ☐ Gain adequate knowledge in the importance of signal generators and signal analyzers in measurements
- ☐ Ability to understand the need for data acquisition systems
- ☐ Ability to understand measurement techniques in optical domains.

UNIT-I BASIC MEASUREMENT CONCEPTS

Measurement systems – Static and dynamic characteristics – units and standards of measurements – error analysis – moving coil, moving iron meters – multimeters – True RMS meters – Bridge measurements – Max well, Hay, Schering, Anderson and Wien bridge.

UNIT-II BASIC ELECTRONIC MEASUREMENTS

Electronic multimeters – Cathode ray oscilloscopes – block schematic – applications – special oscilloscopes – Q meters – Vector meters – RF voltage and power measurements - Carbon microphone - Loud speaker.

UNIT-III SIGNAL GENERATORS AND ANALYZERS

Function generators – RF signal generators – Sweep generators – Frequency synthesizer – wave analyzer – Harmonic distortion analyzer – spectrum analyzer.

UNIT-IV DIGITAL INSTRUMENTS

Comparison of analog and digital techniques – digital voltmeter – multimeters – frequency counters – measurement of frequency and time interval – extension of frequency range – measurement errors.

UNIT-V DATA ACQUISITION SYSTEMS AND FIBER OPTIC MEASUREMENTS

Elements of a digital data acquisition system – interfacing of transducers – multiplexing – computer controlled instrumentation – IEEE 488 bus – fiber optic measurements for power and system loss – optical time domains reflectometer.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Albert D.Helfrick and William D.Cooper,	Modern Electronic Instrumentation and Measurement Techniques	Prentice Hall of India, New Delhi	2003
2	Joseph J.Carr	Elements of Electronics Instrumentation and Measurement	Pearson education, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Alan S Morris	Principles of Measurements and Instrumentation	Prentice Hall of India, New Delhi	2003
2	Ernest O. Doebelin	Measurement Systems- Application and Design	Tata McGraw-Hill, New Delhi	2004

WEBSITES:

<p>http://mechatronics.mech.northwestern.edu/design_ref/tools/multimeter.html http://www.radio-electronics.com/info/t_and_m/generators/radio-frequency-rf-signal-generator.php www.physics.sc.edu/~hoskins/Demos/CathodeRay.html</p>

OBJECTIVES

- ☐ To study the methods of recording various biopotentials
- ☐ To study how to measure biochemical and various physiological information
- ☐ To understand the working of units which will help to restore normal functioning
- ☐ To understand the use of radiation for diagnostic and therapy
- ☐ To understand the need and technique of electrical safety in Hospitals

INTENDED OUTCOMES:

- | |
|--|
| <input type="checkbox"/> Gain knowledge about the methods of recording various Biopotential
<input type="checkbox"/> Gain knowledge about how to measure biochemical and various physiological information
<input type="checkbox"/> Gain knowledge about the working of units which will help to restore normal functioning
<input type="checkbox"/> Gain knowledge about the use of radiation for diagnostic and therapy
<input type="checkbox"/> Gain knowledge about the need and technique of electrical safety in Hospitals |
|--|

UNIT-I ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING

The origin of Bio-potentials; Biopotential electrodes, biological amplifiers, ECG, EEG, EMG, PCG, EOG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT-II BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT

PH, PO₂, PCO₂, PHCO₃, Electrophoresis, colorimeter, photometer, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, Blood cell counters.

UNIT-III ASSIST DEVICES AND BIO-TELEMETRY

Cardiac pacemakers, DC Defibrillator, Telemetry principles, frequency selection, Bio-telemetry, radio-pill and tele-stimulation.

UNIT-IV RADIOLOGICAL EQUIPMENTS

Ionizing radiation, Diagnostic x-ray equipments, use of Radio Isotope in diagnosis, Radiation Therapy.

UNIT-V RECENT TRENDS IN MEDICAL INSTRUMENTATION

Thermograph, endoscopy unit, Laser in medicine, Diathermy units, Electrical safety in medical equipment.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Leislle Cromwell	Biomedical instrumentation and measurement	Prentice Hall of India, New Delhi.	2002
2.	Khandpur, R.S.	Handbook of Biomedical Instrumentation	Tata McGraw-Hill, New Delhi.	1997

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Joseph J.Carr and John M.Brown	Introduction to Biomedical equipment Technology	John Wiley and Sons, New York	1997

15BEEC_E03 ADVANCED ELECTRONIC SYSTEM DESIGN 3 0 0 3 100
OBJECTIVES

- ☐ To study RF component such as resonator, filter, transmission lines, etc...
- ☐ To learn design of RF amplifiers using transistors.
- ☐ To study modern Power Supplies using SCR and SMPS technology
- ☐ To learn about signal shielding & grounding techniques and study of A/D and D/A Converters.
- ☐ To learn knowledge about fabrication of PCBs using CAD.

INTENDED OUTCOMES:

- ☐ Gain knowledge in RF component such as resonator, filter, transmission lines, etc...
- ☐ Gain knowledge in design of RF amplifiers using transistors.
- ☐ Gain knowledge in Power Supplies using SCR and SMPS technology
- ☐ Gain knowledge about signal shielding & grounding techniques and study of A/D and D/A Converters.
- ☐ Gain knowledge about fabrication of PCBs using CAD.

UNIT-I INTRODUCTION TO RF DESIGN

RF behaviour of passive components, Chip components and circuit board considerations, Review of transmission lines, Impedance and admittance transformation, Parallel and series connection of networks, ABCD and scattering parameters, Analysis of amplifier using scattering parameter. RF filter – Basic resonator and filter configurations – Butterworth and Chebyshev filters. Implementation of microstrip filter design. Band pass filter and cascading of band pass filter elements.

UNIT-II RF TRANSISTOR AMPLIFIER DESIGN

Impedance matching using discrete components. Microstrip line matching networks. Amplifier classes of operation and biasing networks – Amplifier power gain, Unilateral design ($S_{13}=0$) – Simple input and output matching networks – Bilateral design - Stability circle and conditional stability, Simultaneous conjugate matching for unconditionally stable transistors. Broadband amplifiers, High power amplifiers and multistage amplifiers.

UNIT-III DESIGN OF POWER SUPPLIES

DC power supply design using transistors and SCRs, Design of crowbar and foldback protection circuits, Switched mode power supplies, Forward, flyback, buck and boost converters, Design of transformers and control circuits for SMPS.

UNIT-IV DESIGN OF DATA ACQUISITION SYSTEMS

Amplification of Low level signals, Grounding, Shielding and Guarding techniques, Dual slope, quad slope and high speed A/D converters, Microprocessors Compatible A/D converters, Multiplying A/D converters and Logarithmic A/D converters, Sample and Hold, Design of two and four wire transmitters.

UNIT-V DESIGN OF PRINTED CIRCUIT BOARDS

Introduction to technology of printed circuit boards (PCB), General layout and rules and parameters, PCB design rules for Digital, High Frequency, Analog, Power Electronics and Microwave circuits, Computer Aided design of PCBs.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Reinhold Luduig and Pavel Bretchko	RF Circuit Design – Theory and Applications	Pearson Education, New York	2000
2.	Sydney Soclof	Applications of Analog Integrated Circuits	Prentice Hall of India, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Keith H.Billings	Handbook of Switched Mode Supplies	McGraw-Hill Publishing Co, New York	1989
2.	Michael Jaacob	Applications and Design with Analog Integrated Circuits	Prentice Hall of India, New Delhi	2004
3.	Otmar Kigenstein	Switched Mode Power supplies in Practice	John Wiley and Sons, Chennai	1989
4.	Muhammad H.Rashid	Power Electronics – Circuits, Devices and Applications	Prentice Hall of India New Delhi	2004
5.	Walter C.Bosshart	Printed circuit Boards – Design and Technology	TATA McGraw-Hill, New Delhi	2002

15BEEC_E04 DATA STRUCTURES AND ALGORITHMS 3 0 0 3 100
OBJECTIVES

- ☐ To learn the systematic way of solving problems
- ☐ To understand the different methods of organizing large amounts of data
- ☐ To learn to program in C
- ☐ To efficiently implement the different data structures
- ☐ To efficiently implement solutions for specific problems

INTENDED OUTCOMES:

- ☐ Gain adequate knowledge about the systematic way of solving problems
- ☐ Gain adequate knowledge about the different methods of organizing large amounts of data
- ☐ Gain adequate knowledge to program in C
- ☐ Gain adequate knowledge to implement the different data structures
- ☐ Gain adequate knowledge about to implement solutions for specific problems

UNIT-I PROBLEM SOLVING

Problem solving – Top-down Design – Implementation – Verification – Efficiency – analysis – Sample algorithms.

UNIT-II LISTS, STACKS AND QUEUES

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

UNIT-III TREES

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap

UNIT-IV SORTING

Preliminaries – Insertion Sort – Shell sort – Heap sort – Merge sort – Quick sort – External Sorting

UNIT-V GRAPHS

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Applications of Depth-First Search – Undirected Graphs – Bi connectivity – Introduction to NP-Completeness

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Drome y.R.G	How to Solve it by Computer	Prentice-Hall of India, New Delhi.	2002
2	Weiss.M.A	Data Structures and Algorithm Analysis in C	Pearson Education Asia, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Langsam.Y Augenstein.M.J and Tenenbaum.M	Data Structures using C	Pearson Education, Asia, New Delhi	2004
2	Richard.F. Gilberg, Behrouz A and Forouzan.A	Data Structures – A Pseudocode Approach with C	Thomson Brooks / COLE, New York	1998
3	Aho.J.E.Hopcroft and Ullman.J.D	Data Structures and Algorithms	Pearson education, Asia, New Delhi	2007

WEBSITES:

http://www.cs.auckland.ac.nz/software/AlgAnim/trees.html http://www.itl.nist.gov/div897/sqg/dads/HTML/graph.html
--

OBJECTIVES

- ☐ To acquire knowledge about probability and random variables.
- ☐ To gain knowledge on 2-D random variables.
- ☐ To gain knowledge about correlation functions.
- ☐ To learn about the applications of fourier transforms like spectral density and others.
- ☐ To expose the concepts of random process

INTENDED OUTCOMES:

- ☐ Gain knowledge about probability and random variables.
- ☐ Gain knowledge on 2-D random variables.
- ☐ Gain knowledge about correlation functions.
- ☐ Gain knowledge about the applications of fourier transforms like spectral density and others.
- ☐ Gain knowledge about the concepts of random process

UNIT I-PROBABILITY DISTRIBUTIONS

Random Variables - Moments - Moment generating function - Binomial, Poisson, Geometric, Exponential and Normal distributions - Functions of Random Variables.

UNIT II-TWO DIMENSIONAL RANDOM VARIABLES

Two dimensional Random Variables - Marginal and conditional distributions – Transformation of Random Variables - central limit theorem - simple problems.

UNIT III-RANDOM PROCESSES

Classification of Random processes - Stationarity - WSS and SSS processes - Poisson Random process - Renewal Process - Markov Chain and transition probabilities.

UNIT IV-CORRELATION FUNCTIONS

Autocorrelation function and its properties - Cross Correlation function and its properties - Linear System with Random inputs - Ergodicity.

UNIT V-SPECTRAL DENSITY

Power spectral Density Function - Properties - System in the form of convolution - Unit Impulse Response of the System - Einstein - Wiener- Khinchine Relationship - Cross Power Density Spectrum - Properties.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan,T.	Probability, Statistics and Random processes	3 rd Edition, Tata McGraw Hill Publications, New Delhi	2008

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sivaramakrishna Das P. and Vijayakumari.C.	A text book of Engineering Mathematics- III	Viji's Academy	,2010.
2	Trivedi K S	Probability and Statistics with reliability, Queueing and Computer Science Applications	Prentice Hall of India, 2nd revised edition,, New Delhi	2002

WEBSITES :

1. www.cut-the-knot.org/probability.shtml
2. www.ece.uah.edu/courses/ee420-500
3. [http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT %20Guwahati/probabilityrp/index. htm](http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/probabilityrp/index.htm)
4. www.mhhe.com/engcs/electrical/popoulis
5. http://hmdc.harvard.edu/projects/SPSS_Tutorial/spsstut.shtml

OBJECTIVES

- ☐ To introduce the concepts of Frequency and Time division multiplexing.
- ☐ To introduce digital multiplexing and digital hierarchy namely SONET / SDH
- ☐ To introduce the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
- ☐ To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- ☐ To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- ☐ To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
- ☐ To characterize blocking probability holding service time distributions for in speech and data networks.

INTENDED OUTCOMES:

- ☐ Knowledge about the concepts of Frequency and Time division multiplexing.
- ☐ Knowledge about digital multiplexing and digital hierarchy namely SONET / SDH
- ☐ Knowledge about the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
- ☐ Knowledge about the need for network synchronization and study synchronization issues. To outline network control and management issues.
- ☐ Knowledge about the enhanced local loop systems in digital environment. Knowledge about ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- ☐ Knowledge about statistical modeling of telephone traffic. Knowledge about blocking system characteristics and queuing system characteristics.
- ☐ Knowledge about characterize blocking probability holding service time distributions for in speech and data networks.

UNIT-I MULTIPLEXING

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Biphase, Differential Encoding, Time Division Multiplexing, Time Division Multiplex Loops and Rings.

SONET/SDH: SONET Multiplexing Overview, SONET Frame Formats, SONET Operations, Administration and Maintenance, Payload Framing and Frequency Justification, Virtual Tributaries, DS3 Payload Mapping, E4 Payload Mapping, SONET Optical Standards, SONET Networks. SONET Rings: Unidirectional Path-Switched Ring, Bidirectional Line-Switched Ring.

UNIT-II DIGITAL SWITCHING

Switching Functions, Space Division Switching, Time Division Switching, two-dimensional Switching: STS Switching, TST Switching, No.4 ESS Toll Switch, Digital Cross-Connect Systems, Digital Switching in an Analog Environment. Elements of SSN07 signaling.

UNIT-III NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT

Timing: Timing Recovery: Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT-IV DIGITAL SUBSCRIBER ACCESS

ISDN: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. High-Data-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

UNIT-V TRAFFIC ANALYSIS

Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Bellamy John	Digital Telephony	John Wiley & Sons, Inc Chennai	2000
2.	Viswanathan.T	Telecommunication Switching System and Networks	Prentice Hall of India Ltd, New Delhi	1994

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	P.Gnanasivam	Telecommunication Switching System and Networks	New Age International	2007

LIST OF ELECTIVES FOR VI SEMESTER
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

15BEEC_E07
OBJECTIVES

REMOTE SENSING

3 0 0 3 100

- ☐ To understand the basic concepts of Remote Sensing
- ☐ To understand the concepts of optical and microwave remote sensing
- ☐ To understand the concepts of geometric information systems

INTENDED OUTCOMES:

- ☐ Understand the basic concepts of Remote Sensing
- ☐ Understand the concepts of geometric information systems

UNIT-I REMOTE SENSING

Definition – Components of Remote Sensing – Energy, Sensor, Interacting Body - Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Receptivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation - Planck's law – Stefan-Boltzman law.

UNIT-II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Materials – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces- Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT-III OPTICAL AND MICROWAVE REMOTE SENSING

Satellites - Classification – Based on Orbits and Purpose – Satellite Sensors - Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Landsat, SPOT, IRS series – Current Satellites - Radar – Speckle - Back Scattering – Side Looking Airborne Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT-IV GEOGRAPHIC INFORMATION SYSTEM

GIS – Components of GIS – Hardware, Software and Organizational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection - Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparison of Raster and Vector data structure – Analysis using Raster and Vector data – Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters

UNIT-V MISCELLANEOUS TOPICS

Visual Interpretation of Satellite Images – Elements of Interpretation - Interpretation Keys
Characteristics of Digital Satellite Image – Image enhancement – Filtering – Classification - Integration
of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications-
Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources –
Urban Analysis – Watershed Management – Resources Information Systems. Global positioning
system – an introduction.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Srinivas.M.G.	Remote Sensing Applications	Narosa Publishing House, New Delhi	2001
2.	Anji Reddy	Remote Sensing and Geographical Information Systems	BS Publications, New Delhi	2001

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Jensen, J.R	Remote sensing of the environment	Prentice Hall	2000
2.	Kang-Tsung Chang	Introduction to Geographical Information Systems	TMH.	2002
3.	Lillesand T.M. and Kiefer R.W	Remote Sensing and Image Interpretation	John Wiley and Sons, Inc, New York	1987
4.	Burrough P A, "Principle of GIS for land resource assessment", Oxford Mischael Hord	Remote Sensing Methods and Applications	John Wiley & Sons, New York	1986.
5.	Singal	Remote Sensing	Tata McGraw-Hill, New Delhi	1990

WEBSITES:

<http://www.research.umbc.edu/>
<http://rst.gsfc.nasa.gov/st art.html>

IEEE Transactions on Geo-science and Remote sensing.

Manual of Remote Sensing – American society of photogrammetry & remote sensing, 1993.

OBJECTIVES

- ☐ To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
- ☐ To study the principles of Monochrome Television Transmitter and Receiver systems.
- ☐ To study the various Color Television systems with a greater emphasis on PAL system.
- ☐ To study the advanced topics in Television systems and Video Engineering

INTENDED OUTCOMES:

- ☐ Gain adequate knowledge about the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
- ☐ Gain adequate knowledge about the principles of Monochrome Television Transmitter and Receiver systems.
- ☐ Gain adequate knowledge about the various Color Television systems with a greater emphasis on PAL system.
- ☐ Gain adequate knowledge about the advanced topics in Television systems and Video Engineering

UNIT-I FUNDAMENTALS OF TELEVISION

Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension-horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.

UNIT-II MONOCHROME TELEVISION TRANSMITTER AND RECEIVER

TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT-III ESSENTIALS OF COLOUR TELEVISION

Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes-delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT-IV COLOUR TELEVISION SYSTEMS

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL – D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator –

ACC amplifier- Reference Oscillator- Ident and colour killer circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT-V ADVANCED TELEVISION SYSTEMS

Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver– Stereo sound in TV – 3D TV – EDTV – Digital equipments for TV studios.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Gulati,R.R.	Monochrome Television Practice, Principles, Technology and servicing	New age International Publishes, New Delhi	2004
2.	R.R.Gulati	Monochrome and colour television	New age International Publisher, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dhake .A.M.	Television and Video Engineering	TMH, New Delhi	2003
2.	S.P.Bali	Colour Television, Theory and Practice	TMH ,New Delhi	1994

- ☐ To have a thorough understanding of the basic structure and operation of a digital computer.
- ☐ To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- ☐ To study in detail the different types of control and the concept of pipelining.
- ☐ To study the hierarchical memory system including cache memories and virtual memory.
- ☐ To study the different ways of communicating with I/O devices and standard I/O interfaces.

INTENDED OUTCOMES:

- ☐ Thorough knowledge about the basic structure and operation of a digital computer.
- ☐ Understand the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- ☐ Detailed exposure about the different types of control and the concept of pipelining.
- ☐ Detailed exposure about the hierarchical memory system including cache memories and virtual memory.
- ☐ Detailed exposure about the different ways of communicating with I/O devices and standard I/O interfaces.

UNIT-I ARCHITECTURE OF COMPUTING SYSTEMS

Functional units - Basic Operational Concepts, Bus Structures, Software Performance – Memory locations & addresses – Memory operations – Instruction and instruction sequencing – addressing modes – assembly language – Basic I/O operations – stacks and queues.

UNIT-II ARITHMETIC UNIT

Addition and subtraction of signed numbers – Design of fast adders – multiplication of positive numbers- signed operand multiplication and fast multiplication – Integer division – floating point numbers and operations.

UNIT-III BASIC PROCESSING UNIT

Fundamental concepts – Execution of a complete Instruction – Multiple bus organization – Hardwired control – microprogrammed control. Pipelining – Basic concepts – data hazards – instruction hazards – influence on Instruction sets – Data path and control consideration – Superscalar operation.

UNIT-IV MEMORY SYSTEM

Basic concepts – semiconductor RAMs, ROMs – Speed, size and cost – cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.

UNIT-V I/O ORGANIZATION

Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface Circuits – Standard I/O Interfaces (PCI, SCSI, USB).

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Carl Hamacher, Zvonko Vranesic and Safwat Zak y	Computer Organization	McGraw Hill	2002
2	William Stallings	Computer Organization & Architecture – Designing for Performance	Pearson Education, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	David A.Patterson and John L.Henness y	Computer Organization & Design, the hardware / software interface	Morgan Kaufmann, New York.	2002
2	John P.Hayes	Computer Architecture & Organization	McGraw-Hill, New York	1998

WEBSITES:

www.webopedia.com/quick_ref/OS I_Layers.asp www.yale.edu/pclt/COMM/TCP IP.HTM
--

15BEEC_E10 ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY

3 0 0 3 100

OBJECTIVES

- ☐ To understand EMI Sources, EMI problems and their solution methods in PCB level / Subsystem and system level design.
- ☐ To measure the emission, immunity level from different systems to couple with the prescribed EMC standards

INTENDED OUTCOMES:

- ☐ Thorough knowledge about EMI Sources, EMI problems and their solution methods in PCB level / Subsystem and system level design.
- ☐ Thorough knowledge to measure the emission, immunity level from different systems to couple with the prescribed EMC standards

UNIT-I BASIC CONCEPTS

Definition of EMI and EMC with examples, Classification of EM/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT-II EMI MEASUREMENTS

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection technique open area site, shielded anechoic chamber, TEM cell.

UNIT-III EMC STANDARD AND REGULATIONS

National and International standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENELEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT-IV EMI CONTROL METHODS AND FIXES

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT-V EMC DESIGN AND INTERCONNECTION TECHNIQUES

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Prasad Kodali. V.	Engineering Electromagnetic Compatibility	S.Chand&Co , New Delhi	2000
2.	Clayton R.Paul	Introduction to Electromagnetic compatibility	Wiley & Sons , New Delhi	1992

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Bernhard E. Keiser	Principles of Electromagnetic Compatibility	Artech House	1994

OBJECTIVES

- ☐ To have an overview of components of an operating systems
- ☐ To have a thorough knowledge of Process management, Storage management, I/O and File Management.
- ☐ To have an understanding of a distributed operating systems.

INTENDED OUTCOMES:

- ☐ Understand the overview of components of an operating systems
- ☐ Gain thorough knowledge of Process management, Storage management, I/O and File Management.
- ☐ Understand the distributed operating systems.

UNIT-I OPERATING SYSTEMS – AN OVERVIEW

Introduction to OS - Mainframe systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real Time Systems – Handheld Systems. Computer-System Operation – I/O Structure – Storage Structure – Storage Hierarchy – Hardware Protection – Network Structure. System Components – Operating-System Services – System Calls – System Programs – System Structure – Virtual Machines – System Design and Implementation – System Generation.

UNIT-II PROCESS MANAGEMENT

Process Concept – Process Scheduling – Operations on Processes – Cooperating Process – Interprocess Communication – Communication in client-server systems. Threads – Overview – Multithreading models – Threading issues- CPU Scheduling – Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple-Processor Scheduling – Real Time Scheduling – Process Scheduling Models. The Critical-Section Problem – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Critical regions – Monitors – Atomic transactions. System Model – Deadlock Characterization – Methods for handling Deadlocks -Deadlock Prevention – Deadlock avoidance – Deadlock detection – Recovery from Deadlock.

UNIT-III STORAGE MANAGEMENT

Storage Management – Background – Swapping – Contiguous Memory allocation – Paging – Segmentation – Segmentation with Paging. Virtual Memory – Background – Demand Paging – Process creation – Page Replacement – Allocation of frames – Thrashing. File System Implementation – File Concept – Access Methods – Directory Structure – File – System Mounting – File Sharing – Production. File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management – Efficiency and Performance – Recovery.

UNIT-IV I/O SYSTEMS

I/O Hardware – Application I/O Interface – Kernel I/O Subsystem – Transforming I/O to Hardware Operations – Streams – Performance. Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management – RAID Structure – Disk Attachment – Stable – Storage Implementation – Tertiary Storage Structure.

UNIT-V DISTRIBUTED SYSTEMS

Background – Topology – Network Types – Communication – Communication Protocols – Robustness – Design Issues. Naming and Transparency – Remote File Access – Stateful Versus Stateless Service – File Replication. Event Ordering – Mutual Exclusion – Atomicity – Concurrency Control – Deadlock Handling – Election Algorithms – Reaching Agreement.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne	Operating System Concepts, Windows XP Update	John Wiley & Sons (ASIA) Pvt. LTD, New Delhi	2003
2.	Harvey M. Deitel	Operating Systems	Pearson Education Pvt. Ltd, New Delhi	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Andrew S. Tanenbaum	Modern Operating Systems	Prentice Hall of India Pvt. LTD, New Delhi	2003
2.	William Stallings	Operating System	Prentice Hall of India, New Delhi	2003

OBJECTIVES

- ☐ To introduce the concepts in internal programming model of Intel family of microprocessors.
- ☐ To introduce the programming techniques using MASM, DOS and BIOS function calls.
- ☐ To introduce the basic architecture of Pentium family of processors.
- ☐ To introduce the architecture programming and interfacing of 16 bit microcontrollers.
- ☐ To introduce the concepts and architecture of RISC processor and ARM.

INTENDED OUTCOMES:

- ☐ Gain knowledge about the concepts in internal programming model of Intel family of microprocessors.
- ☐ Gain knowledge about the programming techniques using MASM, DOS and BIOS function calls.
- ☐ Gain knowledge about the basic architecture of Pentium family of processors.
- ☐ Gain knowledge about the architecture programming and interfacing of 16 bit microcontrollers.
- ☐ Gain knowledge about the concepts and architecture of RISC processor and ARM.

UNIT-I ADVANCED MICROPROCESSOR ARCHITECTURE

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addressing –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

UNIT-II MODULAR PROGRAMMING AND ITS CONCEPTS

Modular programming –Using keyboard and Video display –Data Conversions- Disk files- Interrupt hooks- using assembly languages with C/ C++

UNIT-III PENTIUM PROCESSORS

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor

UNIT-IV 16-BIT MICRO CONTROLLER

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts –A/D converter-Watch dog timer –Power down feature –Instruction set- External memory Interfacing –External I/O interfacing.

UNIT-V RISC PROCESSORS AND ARM

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Barry B.Brey	The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing	Prentice Hall of India Private Limited, New Delhi,.	2003
2.	John Peatman	Design with Microcontroller	McGraw Hill Publishing Co Ltd, New Delhi	1997

REFERENCE

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Rajkamal	The concepts and feature of micro controllers 68HC11, 8051 and 8096	S Chand Publishers, New Delhi.	2000
2.	Alan Clements	The principles of computer Hardware	Oxford University Press, Oxford.	2003

OBJECTIVES

- ☐ To describe the features of system-level design options
- ☐ To describe basic structures and features of cell-based ASICs, gate array ASICs, programmable logic devices (PLDs), field-programmable gate arrays (FPGAs), Complex PLD (CPLDs)
- ☐ To understand how to model combinational circuits and sequential circuits using PLDs, Complex PLDs
- ☐ To understand how to model combinational circuits and sequential circuits using VHDL

INTENDED OUTCOMES:

<input type="checkbox"/>	Gain knowledge about the features of system-level design options
<input type="checkbox"/>	Gain knowledge about the basic structures and features of cell-based ASICs, gate array ASICs, programmable logic devices (PLDs), field-programmable gate arrays (FPGAs), Complex PLD (CPLDs)
<input type="checkbox"/>	Gain knowledge about how to model combinational circuits and sequential circuits using PLDs, Complex PLDs
<input type="checkbox"/>	Gain knowledge about how to model combinational circuits and sequential circuits using VHDL

UNIT I-ADVANCED TOPICS IN BOOLEAN ALGEBRA

Shannon's Expansion theorem and its application, Consensus theorem, ReedMuller Expansion technique, Multiplexer logic as function generators, Implementation of Multiple output logic functions, Static and Dynamic hazards, Design of static hazard-free and dynamic hazard-free logic circuits.

UNIT II-Sequential Circuit Design

Mealy and Moore machines, clocked synchronous sequential circuit design procedure-state diagrams-state table-state reduction-state assignment, Incompletely Specified Sequential Machines.

UNIT III-Design with Programmable Logic Devices

Basic concepts, PROM as PLD, Programmable Array Logic (PAL), Programmable Logic Array (PLA), Design of combinational and sequential circuits using PLD's, Complex PLD (CPLD), Introduction to Field Programmable Gate Arrays (FPGA), Xilinx FPGAs-Xilinx 3000 series and 4000 series FPGA.

UNIT IV-Introduction to VHDL

VHDL Description of combination circuits, VHDL Modules- entity and architecture description, Sequential statements and VHDL processes, VHDL Data types and Operators, Concurrent and Sequential Assignment Statements(All types), Different types of Modeling in VHDL – Behavioral, dataflow and structural modeling, Variables, Signals and Constants in VHDL, Package in VHDL.

UNIT V-Digital Design with VHDL

Combinational Circuit Design using Structural, behavioral and data flow modeling (Circuits like Arithmetic circuits, decoders, encoders, multiplexers, demultiplexers, code converters, 4-bit binary adders, BCD adder, comparator, ALU etc.), Design of Sequential Elements, Registers, Counters and Synchronous Sequential Circuits using VHDL.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Charles. H. Roth, Jr	Digital Systems Design using VHDL	CENGAGE Learning, Third Indian Reprint	2010
2.	Zwolinski	Digital System Design With VHDL	Pearson Education India	2004

REFERENCE

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Ian Grout	Digital Systems Design with FPGAs and CPLDs	Newness	2011

OBJECTIVES

- ☐ To study basic concepts of various sensors and transducers.
- ☐ To develop knowledge in selection of suitable sensor based on requirement and application.

INTENDED OUTCOMES:

- ☐ Understand basic concepts of various sensors and transducers.
- ☐ Gain thorough knowledge in selection of suitable sensor based on requirement and application.

UNIT I-INTRODUCTION

Definition, classification, static and dynamic parameters, Characterization – Electrical, mechanical, thermal, optical, biological and chemical, Classification of errors – Error analysis, Static and dynamic characteristics of transducers, Performance measures of sensors.

UNIT II-MECHANICAL AND ELECTROMECHANICAL SENSORS

Resistive Potentiometer, strain gauge, Inductive sensors and transducer, capacitive sensors, ultrasonic sensors.

UNIT III-THERMAL AND RADIATION SENSOR

Thermal Sensors: Gas thermometric sensors, acoustic temperature sensors, magnetic thermometer, resistance change -type thermometric sensors, thermo emf sensors, junction semiconductor types, Thermal radiation sensors, spectroscopic thermometry

Radiation Sensors: Photo detectors, photovoltaic and photo junction cells, photo sensitive cell, photo FETs and other devices.

UNIT IV-MAGNETIC AND ELECTROANALYTICAL SENSOR

Magnetic Sensors: Force and displacement measurement, magneto resistive sensors, Hall Effect sensor, Inductance and eddy current sensors, Angular/rotary movement transducer, Electro magnetic flow meter, squid sensor.

Electro analytical Sensors: Electro chemical cell, cell potential, sensor electrodes, electro ceramics in gas media, chemFET.

UNIT V-SENSORS AND THEIR APPLICATIONS

Automobile sensor, Home appliance sensor, Aerospace sensors, sensors for manufacturing, medical diagnostic sensors, environmental monitoring.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Patranabis D	Sensor and Actuators	Prentice Hall of India (Pvt)Ltd	2006

2	Ian Sinclair	Sensor and Transducers	Elsevier India Pvt Ltd, 3 rd Edition	2011
---	--------------	------------------------	--	------

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	A.K. Sawhney, Puneeth sawhney	A Course in Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai Publications	2012
2	Ernest O. Doebelin	Measurement System, Application and Design	Tata McGraw Hill Publishing Company Ltd., 5 th Edition	2008

LIST OF ELECTIVES FOR VII SEMESTER
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

15BEEC_E15 VIRTUAL INSTRUMENTATION USING LAB VIEW 3 0 0 3 100

OBJECTIVES

- ☐ To understand the basic needs of VI.
- ☐ To learn Lab VIEW software basics.
- ☐ To understand data acquisition techniques.
- ☐ To learn different interfacing techniques.
- ☐ To design some real time application using Lab VIEW software.

INTENDED OUTCOMES:

- ☐ The students will be able to familiarize the basics and need of VI.
- ☐ The students will be able to learn LabVIEW software basics.
- ☐ To get better understanding of data acquisition techniques.
- ☐ The students can have an exposure to different interfacing techniques.
- ☐ The students can able to design some real time application using LabVIEW software.

UNIT I-VIRTUAL INSTRUMENTATION

Historical perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.

UNIT II-VI PROGRAMMING TECHNIQUES

VIS and sub-VIS, loops & charts, arrays, clusters, graphs, case & sequence structures, formula modes, local and global variable, string & file input.

UNIT III-DATA ACQUISITION BASICS

Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, DIO, Counters & timers, PC Hardware structure, timing, interrupts, DMA, Software and Hardware Installation, Simple applications using NI MyDAQ and NI ELVIS.

UNIT IV-LabVIEW IN SIGNAL PROCESSING

Waveform Generation, Sampling, Quantization, Aliasing, Signal Reconstruction. Fourier transforms, Power spectrum, Correlation methods, windowing & filtering. Digital Filter Design, IIR/FIR Filtering system Design, Adaptive Filter design.

UNIT V-FREQUENCY DOMAIN PROCESSING

Discrete Fourier Transform and Fast Fourier Transform, STFT, Wavelet Transform, Signal Processing applications.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sumathi & P.Surekha	LabVIEW based Advanced Instrumentation	Springer	2007
2	Jovitha Jerome	Virtual Instrumentation Using LabVIEW	PHI Learning Pvt. Ltd	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Sanjay Gupta, Joseph John	Virtual Instrumentation using LabVIEW	2nd Edition, Tata McGraw Hill Education Private Limited	2010
2	Gary W. Johnson, Richard Jennings	LabVIEW Graphical Programming	Fourth Edition, McGraw-Hill publications	2006

OBJECTIVES

- ☐ To understand physical as wireless MAC layer alternatives techniques.
- ☐ To learn planning and operation of wireless networks.
- ☐ To study various wireless LAN and WAN concepts.
- ☐ To understand WPAN and geo-location systems.

INTENDED OUTCOMES:

- ☐ Gain knowledge about physical as wireless MAC layer alternatives techniques.
- ☐ Gain knowledge about planning and operation of wireless networks.
- ☐ Gain knowledge about various wireless LAN and WAN concepts.
- ☐ Gain knowledge about WPAN and geo-location systems.

UNIT-I PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES

Wired transmission techniques: design of wireless modems, power efficiency, out of band radiation, applied wireless transmission techniques, short distance base band transmission, VWB pulse transmission, broad Modems for higher speeds, diversity and smart receiving techniques, random access for data oriented networks, integration of voice and data traffic.

UNIT-II WIRELESS NETWORK PLANNING AND OPERATION

Wireless networks topologies, cellular topology, cell fundamentals signal to interference ratio calculation, capacity expansion techniques, cell splitting, use of directional antennas for cell sectoring, micro cell method, overload cells, channels allocation techniques and capacity expansion FCA, channel borrowing techniques, DCA, mobility management, radio resources and power management securities in wireless networks.

UNIT-III WIRELESS WAN

Mechanism to support a mobile environment, communication in the infrastructure, IS-95 CDMA forward channel, IS – 95 CDMA reverse channel, packet and frame formats in IS – 95, IMT – 2000; forward channel in W-CDMA and CDMA 2000, reverse channels in W-CDMA and CDMA-2000, GPRS and higher data rates, short messaging service in GPRS mobile application protocols.

UNIT-IV WIRELESS LAN

Historical overviews of the LAN industry, evolution of the WLAN industry, wireless home networking, IEEE 802.11. The PHY Layer, MAC Layer, wireless ATM, HYPER LAN, HYPER LAN – 2.

UNIT-V WPAN AND GEOLOCATION SYSTEMS

IEEE 802.15 WPAN, Home RF, Bluetooth, interface between Bluetooth and 802.11, wireless geolocation technologies for wireless geolocation, geolocation standards for E.911 service.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Kaveh Pahlavan, Prashant Krishnamoorthy	Principles of Wireless Networks	Pearson Education, New Delhi	2002
2.	Jochen Schiller	Mobile Communications	Person Education, New Delhi	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Wang.Xand Poor.H.V	Wireless Communication Systems	Pearson education, New Delhi	2004
2.	Mallick.M	Mobile and Wireless design essentials	Wiley Publishing Inc, New Delhi	2003
3.	Nicopolitidis.P, Obaidat.M.S, Papadimitria.G.I, Pomportsis.A.S	Wireless Networks	John Wiley & Sons, New Jersy	2003

**15BEEC_E17
OBJECTIVES**

OPTO ELECTRONIC DEVICES

3 0 0 3 100

- ☐ To know the basics of solid state physics and understand the nature and characteristics of light.
- ☐ To understand different methods of luminescence, display devices and laser types and their applications.
- ☐ To learn the principle of optical detection mechanism in different detection devices.
- ☐ To understand different light modulation techniques and the concepts and applications of optical switching.
- ☐ To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.

INTENDED OUTCOMES:

- ☐ Thorough knowledge in the basics of solid state physics and characteristics of light.
- ☐ Knowledge in different methods of luminescence, display devices and laser types and their applications.
- ☐ Adequate knowledge about the principle of optical detection mechanism in different detection devices.
- ☐ Adequate knowledge about different light modulation techniques and the concepts and applications of optical switching.
- ☐ Adequate knowledge about the integration process and application of opto electronic integrated circuits in transmitters and receivers.

UNIT-I ELEMENTS OF LIGHT AND SOLID STATE PHYSICS

Wave nature of light, Polarization, Interference, Diffraction, Light Source, review of Quantum Mechanical concept, Review of Solid State Physics, Review of Semiconductor Physics and Semiconductor Junction Device.

UNIT-II DISPLAY DEVICES AND LASERS

Introduction, Photo Luminescence, Cathode Luminescence, Electro Luminescence, Injection Luminescence, LED, Plasma Display, Liquid Crystal Displays, Numeric Displays, Laser Emission, Absorption, Radiation, Population Inversion, Optical Feedback, Threshold condition, Laser Modes, Classes of Lasers, Mode Locking, laser applications.

UNIT-III OPTICAL DETECTION DEVICES

Photo detector, Thermal detector, Photo Devices, Photo Conductors, Photo diodes, Detector Performance.

UNIT-IV OPTOELECTRONIC MODULATOR

Introduction, Analog and Digital Modulation, Electro-optic modulators, Magneto Optic Devices, Acoustoptic devices, Optical, Switching and Logic Devices.

UNIT-V OPTOELECTRONIC INTEGRATED CIRCUITS

Introduction, hybrid and Monolithic Integration, Application of Opto Electronic Integrated Circuits, Integrated transmitters and Receivers, Guided wave devices.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Wilson.J, and Haukes.J	Opto Electronics – An Introduction	Prentice Hall of India Pvt. Ltd., New Delhi	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Bhattacharya	Semiconductor Opto Electronic Devices	Prentice Hall of India Pvt., Ltd, New Delhi	1996
2.	Jasprit Singh	Opto Electronics – As Introduction to materials and devices	McGraw-Hill International Edition, New York	1998

15BEEC_E18 TELECOMMUNICATION SYSTEM MODELING AND SIMULATION

3 0 0 3 100

OBJECTIVES

- ☐ To learn simulation of random variables and random process
- ☐ To learn modeling of radio communication channels
- ☐ To understand various simulation techniques
- ☐ To understand simulation methodologies and performance evaluation
- ☐ To analyze some digital communication optical communication and satellite communication techniques as case studies through simulation.

INTENDED OUTCOMES:

- ☐ Gain knowledge in simulation of random variables and random process
- ☐ Gain knowledge in modeling of radio communication channels
- ☐ Gain knowledge in various simulation techniques
- ☐ Gain knowledge in simulation methodologies and performance evaluation
- ☐ Gain knowledge to analyze some digital communication optical communication and satellite communication techniques as case studies through simulation.

UNIT-I SIMULATION OF RANDOM VARIABLES RANDOM PROCESS

Generation of random numbers and sequence, Gaussian and uniform random numbers Correlated random sequences, Testing of random numbers generators, Stationary and uncorrelated noise, Goodness of fit test.

UNIT-II MODELING OF COMMUNICATION SYSTEMS

Radio frequency and optical sources, Analog and Digital signals, Communication channel and models, Free space channels, Multipath channel and discrete channel noise and interference.

UNIT-III ESTIMATION OF PERFORMANCE MEASURE FOR SIMULATION

Quality of estimator, Estimation of SNR, Probability density function and bit error rate, Monte Carlo method, Importance sampling method, Extreme value theory.

UNIT-IV SIMULATION AND MODELING METHODOLOGY

Simulation environment, Modeling considerations, Performance evaluation techniques, error source simulation, Validation.

UNIT-V CASE STUDIES

Simulations of QAM digital radio link in environment, Light wave communication link and satellite system.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Jeruchim.M.C, Balaban.P and Sam K. Shanmugam	Simulation of communication Systems: Modeling, Methodology and Techniques	Plenum press, New York	2001

2.	Averill.M.Law and.David Kelton.W	Simulation Modeling and Analysis	McGraw-Hill Inc, New York	2000
----	--	-------------------------------------	------------------------------	------

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Geoffrey Gorden	System Simulation	Prentice Hall of India New Delhi	1992
2.	Turin.W	Performance Anal ysis of Digital Communication Systems	Computer Science Press, New York	1990
3.	Jerry banks and John S.Carson	Discrete Event System Simulation	Prentice Hall of India, New Delhi	1984

15BEEC_E19
OBJECTIVES

SPEECH PROCESSING

3 0 0 3 100

- ☐ To introduce the models for speech production
- ☐ To develop time and frequency domain techniques for estimating speech parameters
- ☐ To introduce a predictive technique for speech compression
- ☐ To understand speech recognition, synthesis and speaker identification.

INTENDED OUTCOMES:

- ☐ Gain knowledge about the models for speech production
- ☐ Gain knowledge about time and frequency domain techniques for estimating speech parameters
- ☐ Gain knowledge about predictive technique for speech compression
- ☐ Gain knowledge about speech recognition, synthesis and speaker identification.

UNIT-I NATURE OF SPEECH SIGNAL

Speech production mechanism, Classification of speech, sounds, nature of speech signal, models of speech production.

Speech signal processing: purpose of speech processing, digital models for speech signal, Digital processing of speech signals, Significance, short time analysis.

UNIT-II TIME DOMAIN METHODS FOR SPEECH PROCESSING

Time domain parameters of speech, methods for extracting the parameters, Zero crossings, Auto correlation function, pitch estimation.

UNIT-III FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING Short time Fourier analysis, filter bank analysis, spectrographic analysis, Formant extraction, pitch extraction, Analysis - synthesis systems.

UNIT-IV LINEAR PREDICTIVE CODING OF SPEECH

Formulation of linear prediction problem in time domain, solution of normal equations, Interpretation of linear prediction in auto correlation and spectral domains.

UNIT-V HOMOMORPHIC SPEECH ANALYSIS

Central analysis of speech, formant and pitch estimation, Applications of speech processing - Speech recognition, Speech synthesis and speaker verification.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Rabiner.L.R and Schafer.R.E	Digital processing of speech signals	Prentice Hall, New Delhi	1978
2.	Flanagan.J.L	Speech Analysis Synthesis and Perception	Sprenger Vertag, New York	1972

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Witten.IH	Principles of Computer Speech	Academic press, New Delhi	1983

- ☐ Overview of satellite systems in relation to other terrestrial systems.
- ☐ Study of satellite orbits and launching.
- ☐ Study of earth segment and space segment components
- ☐ Study of satellite access by various users.
- ☐ Study of DTH and compression standards.

INTENDED OUTCOMES:

- ☐ Gain knowledge in the overview of satellite systems in relation to other terrestrial systems.
- ☐ Gain adequate knowledge in satellite orbits and launching.
- ☐ Gain adequate knowledge in earth segment and space segment components
- ☐ Gain adequate knowledge in satellite access by various users.
- ☐ Gain adequate knowledge in DTH and compression standards.

UNIT-I OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS

Introduction – Frequency Allocations for Satellite Services – Intelsat – U.S.Domsats – Polar Orbiting Satellites – Problems – Kepler’s First Law – Kepler’s Second Law – Kepler’s Third Law – Definitions of Terms for Earth-orbiting Satellites – Orbital Elements – Apogee and Perigee Heights – Orbital Perturbations – Effects of a Nonspherical Earth – Atmospheric Drag – Inclined Orbits – Calendars – Universal Time – Julian Dates – Sidereal Time – The Orbital Plane – The Geocentric-Equatorial Coordinate System – Earth Station Referred to the IJK Frame – The Top centric-Horizon Co-ordinate System – The Sub-satellite Point – Predicting Satellite Position.

UNIT-II GEOSTATIONARY ORBIT & SPACE SEGMENT

Introduction – Antenna Look Angels – The Polar Mount Antenna – Limits of Visibility – Near Geostationary Orbits – Earth Eclipse of Satellite – Sun Transit Outage – Launching Orbits – Problems – Power Supply – Attitude Control – Spinning Satellite Stabilization – Momentum Wheel Stabilization – Station Keeping – Thermal Control – TT&C Subsystem – Transponders – Wideband Receiver – Input Demultiplexer – Power Amplifier – Antenna Subsystem – Morelos – Anik-E – Advanced Tiros-N Spacecraft

UNIT-III EARTH SEGMENT & SPACE LINK

Introduction – Receive-Only Home TV Systems – Outdoor Unit – Indoor Unit for Analog (FM) TV – Master Antenna TV System – Community Antenna TV System – Transmit-Receive Earth Stations – Problems – Equivalent Isotropic Radiated Power – Transmission Losses – Free-Space Transmission – Feeder Losses – Antenna Misalignment Losses – Fixed Atmospheric and Ionospheric Losses – Link Power Budget Equation – System Noise – Antenna Noise – Amplifier Noise Temperature – Amplifiers in Cascade – Noise Factor – Noise Temperature of Absorptive Networks – Overall System Noise Temperature – Carrier-to-Noise Ratio – Uplink – Saturation Flux Density – Input Back Off – The Earth Station HPA – Downlink – Output Back off – Satellite TWTA Output – Effects of Rain – Uplink rain-fade margin – Downlink rain-fade margin – Combined Uplink and Downlink C/N Ratio – Intermodulation Noise.

UNIT-IV SATELLITE ACCESS

Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth-limited a Power-limited TWT amplifier operation, FDMA downlink analysis.

TDMA : Reference Burst; Preamble and Postamble, Carrier recovery, Network synchronization, unique word detection, Traffic Data, Frame Efficiency and Channel capacity, Preassigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission. Companion of uplink Power requirements for FDMA & TDMA. On-board signal Processing for TDMA / FDMA operation, Satellite switched TDMA. Code-Division Multiple Access – Direct-Sequence spread spectrum – code signal $c(t)$ – autocorrelation function for $c(t)$ – Acquisition and tracking – Spectrum spreading and despreading – CDMA throughput – Problems – Network Layers – TCP Link – Satellite Links and TCP – Enhancing TCP Over Satellite Channels Using Standard Mechanisms (RFC-2488) – Requests for comments – Split TCP connections – Asymmetric Channels – Proposed Systems.

UNIT-V DIRECT BROADCAST SATELLITE SERVICES

Introduction – Orbital Spacings – Power Rating and Number of Transponders – Frequencies and Polarization – Transponder Capacity – Bit Rates for Digital Television – MPEG Compression Standards – Forward Error Correction – Home Receiver Outdoor Unit (ODU) – Home Receiver Indoor Unit (IDU) – Downlink Analysis – Uplink-Problems - Satellite Mobile Services – VSATs – Radarsat – Global Positioning Satellite System – Orbcomm.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Dennis Roddy	Satellite Communications	McGraw-Hill Publication, New York.	2001
2	Timothy Pratt – Charles Bostian & Jeremy Allmuti	Satellite Communications	John Willy & Sons (Asia) Pvt. Ltd	2004

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Wilbur L. Pritchards Henri G. Snyder Robert A. Nelson	Satellite Communication Systems Engineering	Pearson Education Ltd.,	2003
2	M. Richharia	Satellite Communication Systems - Design Principles	Macmillan Press Ltd.	2003

OBJECTIVES

- ☐ To study RADAR theory.
- ☐ To study and learn different types of RADAR and their working principle.
- ☐ To study RADAR signal detection methods.
- ☐ To study an overview of RADAR Navigation.
- ☐ To learn about RADAR systems and components.

INTENDED OUTCOMES:

- ☐ Gain adequate knowledge about RADAR theory.
- ☐ Gain adequate knowledge about different types of RADAR and their working principle.
- ☐ Gain adequate knowledge about RADAR signal detection methods.
- ☐ Gain adequate knowledge about RADAR Navigation.
- ☐ Gain adequate knowledge about RADAR systems and components.

UNIT I-RADAR EQUATIONS

RADAR Block Diagram & operation – RADAR Frequencies – RADAR Equation – Detection of signals in Noise – RADAR cross section of targets – RADAR cross section fluctuations – transmitter power – pulse repetition frequency – system losses and propagation effects.

UNIT II-MTI AND PULSE DOPPLER RADAR

Introduction to Doppler & MTI RADAR – Delay Line canceller – Moving Target Detector – Pulse Doppler RADAR – Non-Coherent MTI – CW RADAR – FMCW RADAR – Tracking RADAR – Monopulse Tracking – Conical Scan and Sequential Lobing.

UNIT III-RADAR SIGNAL DETECTION AND PROPAGATION ON WAVES

Detection criteria – automatic detection – constant false alarm rate receiver – Ambiguity diagram – pulse compression – introduction to clutter – surface clutter RADAR equation – anomalous propagation and diffraction.

UNIT IV-RADIO NAVIGATION

Adcock directional finder – automatic directional finder – Decca Navigation System – Tactical Air Navigation – Instrument Landing System – Ground Controlled Approach.

UNIT V-RADAR TRANSMITTER AND RECEIVER

Linear beam power tubes – Solid state RF power sources – solid state devices used in RADAR – Magnetron- crossed field amplifiers – other aspects of radar transmitter – RADAR Receiver – Receiver noise figure – super heterodyne receiver – dynamic range – RADAR Displays.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Merrill I. Skolnik	Introduction to Radar Systems	Tata McGraw-Hill, New Delhi	2003
2.	N.S. Nagaraja	Elements of Electronic Navigation	Tata Mc-Graw Hill, 2 nd Edition	1993

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Nadav Levanon	RADAR Principles	John Wiley and Sons	1989
2.	Brookner	RADAR Technology	Artech House	1986
3.	Mark, A. Richards	Fundamentals of radar signal processing	Mc- Graw Hill, Electronic Engineering, 1 st Edition	2005
4.	V.S.Bagad	Radar Systems	Technical publications, 1 st edition	2008

OBJECTIVES

- ☐ To introduce students to the embedded systems, its hardware and software.
- ☐ To introduce devices and buses used for embedded networking.
- ☐ To develop knowledge on ARM v7 core and ARM CORTEX M4 architecture.
- ☐ To develop knowledge on Floating Point Unit
- ☐ To develop knowledge on Motion Control

INTENDED OUTCOMES:

- ☐ Gain adequate knowledge about devices and buses used for embedded networking.
- ☐ Gain adequate knowledge about ARM v7 core and ARM CORTEX M4 architecture.
- ☐ Gain adequate knowledge about Floating Point Unit
- ☐ Gain adequate knowledge about Motion Control

UNIT-I INTRODUCTION TO EMBEDDED SYSTEMS

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits

UNIT-II DEVICES AND BUSES FOR DEVICES NETWORK

I/O Devices - Device I/O Types and Examples – Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices - Examples of Internal Serial-Communication Devices - UART and HDLC - Parallel Port Devices - Sophisticated interfacing features in Devices/Ports- Timer and Counting Devices - 'I2C', 'USB', 'CAN' and advanced I/O Serial high speed buses.

UNIT-III Overview of Architecture

Review of ARM v7 core and its architecture, Introduction to Advanced ARM CORTEX M4 architecture, Peripherals overview, Advantages of using Cortex M4, Instruction set implementation, CPU timers introduction.

UNIT-IV Floating Point Unit

Introduction to Floating Point Architecture, Advantages of FPU, Need for FPU, IEEE Standards for implementing FPU, Various FPU Modules in Cortex M4 Processors, Software flow for FPU implementation.

UNIT-V Motion Control

Introduction to motion control, advantages for using motion control modules, Implantation of motion control overview, introduction to PWM Modules, PWM Concepts for Motion Control, Configuration of PWM Modules, Introduction to encoders, types of encoders, QEP Module.

TEXTBOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Rajkamal	Embedded Systems Architecture, Programming and Design	TATA McGraw-Hill, First reprint, New York	2013

2.	Jonathan W Valvano	Introduction to Arm(r) Cortex –M3 Microcontrollers	Createspace Independent Publisher	2012
----	-----------------------	--	---	------

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Andrew Sloss, Dominic Symes, Chris Wright	ARM S ystem Developer's Guide	Elsevier/ Morgan Kaufman	2004

INTENDED OUTCOMES:

- ☐ To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- ☐ To understand the statistical approach for quality control.
- ☐ To create an awareness about the ISO and QS certification process and its need for the industries.

UNIT 1 INTRODUCTION

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT 2 TQM PRINCIPLES

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDCA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT 3 STATISTICAL PROCESS CONTROL (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT 4 TQM TOOLS

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT 5 QUALITY SYSTEMS

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TEXT BOOKS :

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Dale H.Besterfield	Total Quality Management	Pearson Education	2003
2.	James R.Evans & William M.Lindsay	The Management and Control of Quality	South-Western (Thomson Learning)	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Feigenbaum.A.V.	Total Quality Management	McGraw Hill	1991
2.	Oakland.J.S	Total Quality Management	Butterworth – Hcinemann Ltd., Ox ford	1989
3.	Narayana V. and Sreenivasan, N.S	Quality Management – Concepts and Tasks	New Age International	1996

LIST OF ELECTIVES FOR VII SEMESTER
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

15BEEC_E24 CELLULAR MOBILE COMMUNICATION 3 0 0 3 100

OBJECTIVES

- ☐ To learn the fundamental cellular radio concepts
- ☐ To learn about mobility management
- ☐ To learn about GSM architecture
- ☐ To learn about WAP

INTENDED OUTCOMES:

- | |
|--|
| <ul style="list-style-type: none"><input type="checkbox"/> Gain knowledge about the fundamental cellular radio concepts<input type="checkbox"/> Gain knowledge about mobility management<input type="checkbox"/> Gain knowledge about GSM architecture<input type="checkbox"/> Gain knowledge about WAP, Bluetooth, WLL |
|--|

UNIT I INTRODUCTION

The cellular concept – Frequency reuse – Interference and system capacity – Trunking and Grade of service – Improving coverage and capacity in cellular systems Advanced Mobile Phone service-Global system for mobile communication-EIA/TIA IS136 Digital cellular system - EIA/TIA IS-95 Digital cellular system - cordless telephony and low tier TCS - Third generation wireless system

UNIT-II MOBILITY MANAGEMENT

Handoff - Roaming management - Handoff detection – channel Assignment techniques - Radio link transfer IS-41 Network signaling – Intersystem handoff and Authentication - PACS Network Signaling - cellular digital packet data

UNIT-III GSM

GSM Network signaling - GSM Mobility management GSM short message service - International roaming for GSM - GSM operation, Administration and maintenance Mobile number- Mobile number portability's, VoIP service for Mobile networks.

UNIT-IV WIRELESS APPLICATION PROTOCOL

WAP model - WAP Gateway - WAP Protocol, WAP UAPProf and caching - Wireless bearer for WAP - WAP developer tool kits – Mobile station application execution environment.

UNIT-V SPECIAL TOPICS

Third generation mobile services - Wireless local loop – Wireless enterprise networks - Bluetooth technology.

TEXT BOOKS :

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Yi-Bing Lin and Imrich chlantae	Wireless and Mobile Network Architecture	John Wiley	2006
2.	T. S. Rappaport	Wireless and Mobile Communication	Pearson Education	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Kauch Pahlavan and Prahant Krishna moorthy	Principles of Wireless Networks	PHI Learning	2007

OBJECTIVES

- ☐ To give basic knowledge of ASIC internals.
- ☐ To impart knowledge on ASIC types.
- ☐ To give basic understanding of tools used.

INTENDED OUTCOMES:

- ☐ Understand basic knowledge of ASIC internals.
- ☐ Gain knowledge on types of ASIC.
- ☐ Gain knowledge about the tools used in ASIC design

UNIT I-INTRODUCTION TO ASICS

Introduction to ASICs : Full-custom and Semi -custom ASIC – CMOS logic – ASIC library design.

UNIT II-PROGRAMMABLE ASICS

Programmable ASICs – Anti fuse – static RAM – EPROM and technology – Actel ACT – Xilinx LCA – Altera flex – Altera MAX Logic cells – I/O cells – Interconnects – Low level design entry: Schematic entry.

UNIT III-SIMULATION AND SYNTHESIS

Logic synthesis: A comparator MUX, Inside a logic synthesizer, VHDL and logic synthesis, FSM synthesis, memory synthesis – Simulation: Types of simulation – logic systems – how logic simulation works.

UNIT IV-ASIC TESTING

Boundary scan test – Faults – Fault simulation – Automatic test pattern generation algorithm: D-algorithm, PODEM – Built in self test.

UNIT V-ASIC CONSTRUCTION

System partitioning – power dissipation – partitioning methods – floor planning and placement:– Routing: Global routing, detailed routing, special routing – Introduction to SOC.

TEXT BOOKS :

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	M.J.S.Smith	Application Specific Integrated Circuits	Pearson Education Reprint	2006
2.	Wolf Wayne	FPGA based system design	Pearson Education	2005

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	M. Sarafzadeh and C.K. Wong	An Introduction to VLSI Physical Design	McGraw Hill	1996
2.	Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic	Digital Integrated Circuits	Prentice-Hall Publication	2002

OBJECTIVES

To learn the basics of designing intelligent agents that can solve general purpose problems, represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences

INTENDED OUTCOMES:

- Gain knowledge about the basics of designing intelligent agents that solves general purpose problems, represent and process knowledge, plan and act, reason under uncertainty

UNIT I PROBLEM SOLVING

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

UNIT II LOGICAL REASONING

Logical agents – propositional logic – inferences – first-order logic – inferences in first order logic – forward chaining – backward chaining – unification – resolution

UNIT III PLANNING

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world

UNIT IV UNCERTAIN KNOWLEDGE AND REASONING

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models

UNIT V LEARNING

Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning

TEXT BOOK

1. S. Russel and P. Norvig, “Artificial Intelligence – A Modern Approach”, Second Edition, Pearson Education, 2002

REFERENCES

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.

- ☐ To understand the six elements of disaster management.
- ☐ To understand the "relief system" and the "disaster victim."
- ☐ To understand traditional patterns of foreign assistance
- ☐ To understand the tools of post-disaster management

To gain knowledge about the organizations that are involved in natural disaster assistance

INTENDED OUTCOMES:

- ☐ Understand the six elements of disaster management.
- ☐ Understand the "relief system" and the "disaster victim."
- ☐ Understand traditional patterns of foreign assistance
- ☐ Understand the tools of post-disaster management
- ☐ Gain knowledge about the organizations that are involved in natural disaster assistance

UNIT I: INTRODUCTION

Introduction – Disaster preparedness – Goals and objectives of ISDR Programme- Risk identification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach – disaster-development linkages -Principle of risk partnership

UNIT II: APPLICATION OF TECHNOLOGY IN DISASTER RISK REDUCTION

Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems – Intranets and extranets – video teleconferencing. Trigger mechanism – Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

UNIT III: AWARENESS OF RISK REDUCTION

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness

UNIT IV: DEVELOPMENT PLANNING ON DISASTER

Implication of development planning – financial arrangements – areas of improvement – disaster preparedness – community based disaster management – emergency response.

UNIT V: SEISMICITY

Seismic waves – Earthquakes and faults – measures of an earthquake, magnitude and intensity – ground damage – Tsunamis and earthquakes

TEXTBOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Amita sinvhal	Understanding earthquake disasters	TMH	2010
2	Pardeep Sahni, Madhavi malalgoda and ari yabandu	Disaster risk reduction in south asia	PHI	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Pardeep sahani, Alka Dhameja and Uma medury	Disaster mitigation: Experiences and reflections	PHI	2004

- ☐ To study about power electronic circuits for voltage and current control and protection.
- ☐ To learn the switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- ☐ To learn controlled rectification AC supplies.
- ☐ To study of converters and inverters.
- ☐ To learn about motor control, charges, SMPS and UPS.

INTENDED OUTCOMES:

- ☐ Gain knowledge about power electronic circuits for voltage and current control and protection.
- ☐ Gain knowledge about switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- ☐ Gain knowledge about controlled rectification AC supplies.
- ☐ Gain knowledge about converters and inverters.
- ☐ Gain knowledge about motor control, charges, SMPS and UPS.

UNIT-I POWER ELECTRONICS DEVICES

Characteristics of power devices – characteristics of SCR, diac, triac, SCS, GTO, PUJT – power transistors – power FETs – LASCR – two transistor model of SCR – Protection of thyristors against over voltage – over current, dv/dt and di/dt .

UNIT-II TRIGGERING TECHNIQUES

Turn on circuits for SCR – triggering with single pulse and train of pulses – synchronizing with supply – triggering with microprocessor – forced commutation – different techniques – series and parallel operations of SCRs.

UNIT-III CONTROLLED RECTIFIERS

Converters – single phase – three phase – half controlled and fully controlled rectifiers – Waveforms of load voltage and line current under constant load current – effect of transformer leakage inductance – dual converter.

UNIT-IV INVERTERS

Voltage and current source inverters, resonant, Series inverter, PWM inverter. AC and DC choppers – DC to DC converters – Buck, boost and buck – boost.

UNIT-V INDUSTRIAL APPLICATIONS

DC motor drives – Induction and synchronous motor drives – switched reluctance and brushless motor drives – Battery charger – SMPS – UPS – induction and dielectric heating.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Muhammed H.Rashid	Power Electronics Circuits, Devices and Applications	PHI, New Delhi	2004
2.	M.D. Singh, K.B. Khanchandani	Power Electronics	TMH, New Delhi	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	P.C. Sen	Power Electronics	TMH, New Delhi	1987
2.	Gopal K. Dubey	Thyristorised power controllers	Wiley Eastern, New York	1986
3.	Joseph Vithayathil	Power Electronics – Principles and applications	McGraw-Hill, New York	1995
4.	Cyril W. Lander	Power Electronics	McGraw-Hill, New York	1994

OBJECTIVES

- ☐ To understand the Fundamentals of image processing.
- ☐ To learn Various transforms used in image processing.
- ☐ To learn the Image processing techniques like image enhancement, reconstruction, compression and segmentation.

INTENDED OUTCOMES:

- ☐ Understand the Fundamentals of image processing.
- ☐ Knowledge about various transforms used in image processing.
- ☐ Knowledge about the Image processing techniques like image enhancement, reconstruction, compression and segmentation.

UNIT I-DIGITAL IMAGE FUNDAMENTALS

Introduction-Elements of Digital Image Processing system- elements of visual perception – image sensing and acquisition – Image sampling and quantization - image representation -Some basic relationship between pixels.

UNIT II-IMAGE TRANSFORMS

Introduction - 2D Discrete Fourier Transform – Properties- Importance of Phase -Walsh – Hadamard – Discrete Cosine Transform, Haar, –KL transforms –Singular Value Decomposition.

UNIT III-IMAGE ENHANCEMENT

Enhancement through point operation- Histogram manipulation – Gray level transformation- Neighbourhood operation – Median filter - Image Sharpening- Bit plane slicing - Homomorphic Filtering – Zooming operation.

UNIT IV-IMAGE RESTORATION

Model of Image Degradation/restoration process –Inverse filtering -Least mean square (Wiener) filtering – Constrained least mean square restoration – Singular value decomposition-Recursive filtering.

UNIT V-IMAGE COMPRESSION AND SEGMENTATION

Image compression schemes – Information theory – Run length, Huffman and arithmetic coding – Vector quantization - JPEG. Image Segmentation – Classification – Thresholding – edge based segmentation – Hough transform – Active contour.

EXT BOOKS :

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	Rafael C Gonzalez and Richard E Woods,	Digital Image Processing	Pearson Education, 3rd Edition	2003
2.	S. Jayarman, S. Esakkirajan and T. Veerakumar,	Digital Image Processing	Tata McGraw Hill	2010

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of the publication
1.	William K Pratt	Digital Image Processing	John Willey	2001
2.	Millman Sonka, Vaclav Hlavac, Roger Boyle, and Broos Colic	Image Processing Analysis and Machine Vision	Thompson learning	1999
3.	A.K. Jain	Fundamentals of Digital Image Processing	Pearson Education	1989

OBJECTIVES

- ☐ To introduce issues related to CPU and memory.
- ☐ To understand the components on the motherboard
- ☐ To understand different storage media
- ☐ To introduce the features of different I/O peripheral devices and their interfaces

INTENDED OUTCOMES:

- ☐ Knowledge about issues related to CPU and memory.
- ☐ Understand the components on the motherboard
- ☐ Understand different storage media
- ☐ Knowledge about the features of different I/O peripheral devices and their interfaces.

UNIT-I CPU AND MEMORY

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules – logical memory organizations – memory considerations – memory types – memory techniques – selecting and installing memory.

UNIT-II MOTHERBOARDS

Active motherboards – sockets and slots – Intel D850GB – Pentium4 mother board – expansion slots – form factor – upgrading a mother board – chipsets – north bridge – south bridge – CMOS – CMOS optimization tactics – configuring the standard CMOS setup – motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT-III STORAGE DEVICES

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout – IDE drive standard and features – Hard drive electronics – CD-ROM drive – construction – CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT-IV I/O PERIPHERALS

Parallel port – signals and timing diagram – IEEE1384 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues – DirectX – mice – modems – keyboards – sound boards – audio bench .

UNIT-V BUS ARCHITECTURE

Busess – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Stephen J.Bigelow	Trouble Shooting, maintaining and Repairing PCs.	Tata McGraw-Hill, New Delhi.	2001
2.	B.Govindarajulu	PC and Clones hardware trouble shooting and maintenance	Tata McGraw-Hill, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Craig Zacker & John Rourke.	The complete reference: PC hardware.	Tata McGraw- Hill, New Delhi.	2001
2.	Mike Meyers.	Introduction to PC Hardware and Trouble shooting	Tata McGraw- Hill, New Delhi.	2003

- ☐ To introduce about ATM and Frame relay.
- ☐ Overview of an up-to-date survey of developments in High Speed Networks.
- ☐ To know techniques involved to support real-time traffic and congestion control.
- ☐ To learn different levels of quality of service (Q.S) to different applications.

INTENDED OUTCOMES:

- ☐ Knowledge about ATM and Frame relay.
- ☐ Knowledge on up-to-date survey of developments in High Speed Networks.
- ☐ Enable the students to know techniques involved to support real-time traffic and congestion control.
- ☐ Understand different levels of quality of service (Q.S) to different applications.

UNIT-I HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL

High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements – Architecture of 802.11

UNIT-II CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT-III TCP AND ATM CONGESTION CONTROL

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO back off – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Framework, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

UNIT-IV INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT-V PROTOCOLS FOR QOS SUPPORT

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	William Stallings	High Speed Networks And Internet	Pearson Education, New Delhi.	2002
2.	Irvan Pepelnjk, Jim Guichard and Jeff Apcar	MPLS and VPN architecture	CiscoPress, New york.	2003

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Warland & Pravin Varai ya	High Performance Communication Networks	Jean Harcourt Asia Pvt. Ltd	2001

OBJECTIVES

- ☐ To study the parametric methods for power spectrum estimation.
- ☐ To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- ☐ To study multirate signal processing fundamentals.
- ☐ To study the analysis of speech signals.
- ☐ To introduce the student to wavelet transforms.

INTENDED OUTCOMES:

- ☐ Understand the parametric methods for power spectrum estimation.
- ☐ Knowledge about adaptive filtering techniques using LMS algorithm and the applications of adaptive filtering.
- ☐ Knowledge about multirate signal processing fundamentals.
- ☐ Knowledge about the analysis of speech signals.

UNIT-I PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION

Relationship between the auto correlation and the model parameters – The Yule – Walker method for the AR Model Parameters – The Burg Method for the AR Model parameters – unconstrained least-squares method for the AR Model parameters – sequential estimation methods for the AR Model parameters – selection of AR Model order.

UNIT-II ADAPTIVE SIGNAL PROCESSING

FIR adaptive filters – steepest descent adaptive filter – LMS algorithm – convergence of LMS algorithms – Application: noise cancellation – channel equalization – adaptive recursive filters – recursive least squares.

UNIT-III MULTIRATE SIGNAL PROCESSING

Decimation by a factor D – Interpolation by a factor I – Filter Design and implementation for sampling rate conversion: Direct form FIR filter structures – Polyphase filter structure.

UNIT-IV SPEECH SIGNAL PROCESSING

Digital models for speech signal : Mechanism of speech production – model for vocal tract, radiation and excitation – complete model – time domain processing of speech signal:- Pitch period estimation – using autocorrelation function – Linear predictive Coding: Basic Principles – autocorrelation method – Durbin recursive solution.

UNIT-V WAVELET TRANSFORMS

Fourier Transform : Its power and Limitations – Short Time Fourier Transform – The Gabor Transform - Discrete Time Fourier Transform and filter banks – Continuous Wavelet Transform – Wavelet Transform Ideal Case – Perfect Reconstruction Filter Banks and wavelets – Recursive multi-resolution decomposition – Haar Wavelet – Daubechies Wavelet.

TEXT BOOKS:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	John G.Proakis, Dimitris. G.Manobakis	Digital Signal Processing, Principles, Algorithms and Applications	PHI, New Delhi.	2000
2.	Monson H.Ha yes.	Statistical Digital Signal Processing and Modeling.	Wiley, New Delhi.	2002

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	L.R.Rabiner and R.W.Schaber.	Digital Processing of Speech Signals.	Pearson Education, New York.	1979.
2.	Roberto Crist.	Modern Digital Signal Processing.	Thomson Brooks/Cole, New Delhi.	2004.
3.	Raghuveer. M. Rao, Ajit S.Bopardikar.	Wavelet Transforms, Introduction to Theor y and applications.	Pearson Education, Asia, New Delhi.	2004.

- ☐ To study about Nature of light and the production of EM radiation for photonics application
- ☐ To study about the production of EM radiation for photonics application
- ☐ To study about applications & Trends and new directions in photonic applications

INTENDED OUTCOMES:

- ☐ Knowledge about Nature of light and the production of EM radiation for photonics application
- ☐ Knowledge about the production of EM radiation for photonics application
- ☐ Knowledge about applications & Trends and new directions in photonic applications

UNIT-I NATURE OF LIGHT AND THE PRODUCTION OF EM RADIATION FOR PHOTONICS APPLICATION

Wave descriptions (spectrum, superposition, interference effects), photon effects (photoelectric effect, momentum, interaction with matter). Sources of light: thermal, discharge lamps, lasers, solid-state sources (such as LED's and laser diodes).

UNIT-II THE PRODUCTION OF EM RADIATION FOR PHOTONICS APPLICATION

Characteristics of light (polarization, coherence, monochromaticity), ways to define these mathematically (Stokes parameters, Jones vectors & matrices) and how to determine these characteristics

UNIT-III TRANSMISSION & DETECTION OF LIGHT RADIATION

Ray optics ABCD matrix methods for transmission of light. Stability of a cavity. The q-parameter of a laser beam. Light detectors: photomultiplier tubes, Photo-diodes, thermal detectors, Bolometers, CCD's, single photon detectors. Generic system issues: sources of noise and signal-to-noise ratio, limitations on temporal response and effective bandwidth.

UNIT-IV IMPARTING INFORMATION ONTO EM RADIATION & COMMUNICATION TECHNIQUES

Acousto-optic and electro-optic techniques, LED switching, analogue and digital techniques using lasers, AM, FM, phase modulation techniques Delivery methods. Basics of optical fibre techniques: step index fibre; acceptance angles, single and multimode fibres, dispersion limitations, transmission characteristics.

UNIT-V APPLICATIONS

Spectroscopy using etalons, spectrometers, interferometers Display systems (LCD's, plasmas etc) Range-finding systems and applications (LIDAR etc) .More exotic applications (laser trapping, laser tweezing, different forms of measurements)
Trends and new directions in photonic applications :Laser safety, practical tips on experimental techniques, different forms of laser systems used in research.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Smith, F.G. and King.T.A,	Optics and Photonics	Wiley & Sons, Chichester,	2000
2	Wilson, J. and Hawkes, J.F.B.	Optoelectronics : An introduction	Prentice-Hall, New York	1983

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Harry J. R. Dutton	Understanding Optical Communications	Prentice Hall Series in Networking, New Delhi	1998
2.	Shoichi Sudo, Katsunari Okamoto	New photonics technologies for the information age	Technology & Engineering, New Delhi	2004

OBJECTIVES

- ☐ To learn the various architectures of building an ANN and its applications
- ☐ Advanced methods of representing information in ANN like self organizing networks , associative and competitive learning
- ☐ To learn architecture of Neocognitron

INTENDED OUTCOMES:

- ☐ Gain adequate knowledge about the various architectures of building an ANN and its applications
- ☐ Gain adequate knowledge about advanced methods of representing information in ANN like self organizing networks , associative and competitive learning
- ☐ Gain adequate knowledge about the architecture of Neocognitron

UNIT I INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS

Neuro-physiology - General Processing Element - ADALINE - LMS learning rule - MADALINE - MR2 training algorithm.

UNIT II BPN AND BAM

Back Propagation Network - updating of output and hidden layer weights -application of BPN – associative memory - Bi-directional Associative Memory - Hopfield memory - traveling sales man problem.

UNIT III SIMULATED ANNEALING AND CPN

Annealing, Boltzmann machine - learning - application - Counter Propagation network - architecture - training - Applications.

UNIT IV SOM AND ART

Self organizing map - learning algorithm - feature map classifier - applications - architecture of Adaptive Resonance Theory - pattern matching in ART network.

UNIT V NEOCOGNITRON

Architecture of Neocognitron - Data processing and performance of architecture of spacio - temporal networks for speech recognition.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	J.A. Freeman and B.M.Skapura	Neural Networks, Algorithms Applications and Programming Techniques	Wiley & Sons, Chichester,	2003
2	Laurene Fausett	Fundamentals of Neural Networks: Architecture, Algorithms and Applications	Prentice Hall	1994

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	S.N.Sivanandham Paulraj.M.P	Introduction to artificial neural networks	Vikas Publishers	2003

OBJECTIVES

- ☐ To Provide an understanding of FPGA life cycle
- ☐ To understand the concept of selecting a FPGA based on project specifications
- ☐ To enable the student to understand the floor planning, place and route optimization techniques.
- ☐ To introduce the lower power reduction techniques to analyze and design FPGA.

INTENDED OUTCOMES:

- ☐ Ability to understand FPGA life cycle
- ☐ Understand the concept of selecting a FPGA based on project specifications
- ☐ Understand the floor planning, place and route optimization techniques.
- ☐ Knowledge on lower power reduction techniques to analyze and design FPGA.

UNIT 1 Introduction to Gate Array and CMOS Logic

Types of gate array – Design flow- CMOS logic - Combinational – Sequential – Data path – Transistor as resistor – Capacitance- Hardware description language.

UNIT 2 Field Programmable Gate Array

FPGA Architecture- Altera FPGA technologies- Xilinx FPGA technologies – Lattice FPGA technologies- Actel FPGA technologies.

UNIT 3 FPGA Implementation Issues

Look up tables – Memory availability- Fixed coefficient design technique – Distributed arithmetic.

UNIT 4 Floor Planning, Place and Route Optimization

Design partitioning- Optimal floor planning – Relationship between placement and routing – Logical replications- I/O registers – Register ordering- Placement seed.

UNIT 5 Low Power FPGA Implementation

Sources of power consumption- Power consumption reduction techniques- Voltage scaling FPGA's – Data reordering- Pipelining.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Steve Kilts	Advanced FPGA Design	Wiley Inter-Science,	2003
2	Roger Woods, John McAllister, Dr. Ying Yi, Gaye Lightbod	FPGA-based Implementation of Signal Processing Systems	Wiley	2008

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	M.J.S.Smith	Application Specific Integrated Circuits	Pearson	2003

OBJECTIVES

- ☐ To learn Internetworking with TCP/IP.
- ☐ To learn routing for high speed multimedia traffic
- ☐ To learn the fundamentals in WWW, HTML and XML.
- ☐ To learn Java for Networking application
- ☐ To understand the basic concepts in E-com, Network operating system and Web design.

INTENDED OUTCOMES:

- ☐ Thorough knowledge in Internetworking with TCP/IP.
- ☐ Thorough knowledge about routing for high speed multimedia traffic
- ☐ Thorough knowledge in WWW, HTML and XML.
- ☐ Thorough knowledge in Java for Networking application
- ☐ Understand the basic concepts in E-com, Network operating system and Web design.

UNIT-I INTERNETWORKING WITH TCP / IP

Review of network technologies, Internet addressing, Address resolution protocols (ARP / RARP), Routing IP datagram's, Reliable stream transport service (TCP) TCP / IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.

UNIT-II INTERNET ROUTING

Concepts of graph theory, Routing protocols, Distance vector protocols (RIP), Link state protocol (OSPP), Path vector protocols (BGP and IDRP), Routing for high speed multimedia traffic, Multicasting, Resource reservation (RSVP), IP switching.

UNIT-III WORLD WIDE WEB

HTTP protocol, Web browsers netscape, Internet explorer, Web site and Web page design, HTML, XML, Dynamic HTML, CGI

UNIT-IV JAVA PROGRAMMING

Language features, Classes, Object and methods, Subclassing and dynamic binding, Multithreading, Overview of class library, Object method serialization, Remote method invocation, Java script.

UNIT-V MISCELLANEOUS TOPICS

E-Commerce, Network operating systems, Web Design case studies.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dauglas E.Comer.	Internetworking with TCP/IP", Vol. I:	Prentice Hall of India, New Delhi.	1999
2.	William Stallings.	High Speed Networks.	Prentice Hall Inc, New Delhi.	1998

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Eric Ladd and Jim O'Donnell.	Using HTML 4, XML and Java 1.2, Que Platinum edition.	Prentice Hall of India, New Delhi.	1999

OBJECTIVES

To learn and understand basic and advance concepts of nanoelectronics.

INTENDED OUTCOMES:

- | |
|--|
| <input type="checkbox"/> The students should be able to understand basic and advanced concepts of nanoelectronic devices, sensors and transducers and their applications in nanotechnology |
|--|

UNIT I :BASICS OF NANOELECTRONICS

Capabilities of nanoelectronics – physical fundamentals of nanoelectronics – basics of information theory – the tools for micro and nano fabrication – basics of lithographic techniques for nanoelectronics.

UNIT II :QUANTUM ELECTRON DEVICES

From classical to quantum physics: upcoming electronic devices – electrons in mesoscopic structure – short channel MOS transistor – split gate transistor – Electron wave transistor – Electron spin transistor – quantum cellular automate – quantum dot array – Principles of Single Electron Transistor (SET) – SET circuit design – comparison between FET and SET circuit design.

UNIT III: NANOELECTRONICS WITH TUNNELING DEVICES AND SUPERCONDUCTING DEVICES

Tunneling element technology - RTD: circuit design – Defect tolerant circuits - Molecular electronics – elementary circuits – flux quantum devices – application of Superconducting devices – Nanotubes based sensors, fluid flow, gas, temperature, Strain – oxide nanowire, gas sensing (ZnO, TiO, SnO, WO), LPG sensor (SnO powder)- Nano 2 2 3 2 designs and Nanocontacts - metallic nanostructures.

UNIT IV :A SURVEY ABOUT THE LIMITS

Replacement Technologies – Energy and Heat dissipation – Parameter spread as Limiting Effect – Limits due to thermal particle motion – Reliability as limiting factor – Physical limits – Final objectives of integrated chip and systems.

UNIT V :MEMORY DEVICES AND SENSORS

Nano ferroelectrics – Ferroelectric random access memory – Fe-RAM circuit design – ferroelectric thin film properties and integration – calorimetric sensors – electrochemical cells – surface and bulk acoustic devices – gas sensitive FETs – resistive semiconductor gas sensors –electronic noses – identification of hazardous solvents and gases – semiconductor sensor array.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	K.Goser, P.Glosekotter & J.Dienstuhl,	From Transistors to Molecular Quantum Devices	Springer	2004

2.	Rainer Waser	Nanoelectronics and Information Technology: Advanced Electronic Materials Novel and Devices	Wiley VCH	2005
----	--------------	---	-----------	------

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Mick Wilson, Kamali Kannangara, Geoff smith	Nanotechnology: Basic Science and Emerging Technologies: Materials, Devices, Measurement Techniques	Springer	2010
2.	Branda Paz,	A Handbook on Nanoelectronics	Vedams books	2008

OPEN ELECTIVES

15BEEC_OE01

REAL TIME EMBEDDED SYSTEMS

3 0 0 3 100

OBJECTIVES

- ☐ To introduce students to the embedded systems, its hardware and software.
- ☐ To introduce devices and buses used for embedded networking.
- ☐ To study about task management
- ☐ To learn about semaphore management and message passing
- ☐ To study about memory management

INTENDED OUTCOMES:

- ☐ Ability to understand embedded systems, its hardware and software.
- ☐ Gain knowledge about devices and buses used for embedded networking.
- ☐ Gain knowledge about task management
- ☐ Gain knowledge about semaphore management and message passing
- ☐ Gain knowledge about memory management

UNIT - I INTRODUCTION TO EMBEDDED SYSTEM

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT - II OPERATING SYSTEM OVERVIEW

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT - III TASK MANAGEMENT

Introduction - ¶ C/OS-II Features - Goals of ¶ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under ¶ C/OS-II – Clock Tick - ¶ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT - IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT - V MEMORY MANAGEMENT

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with µ C/OS-II– Installing µ C/OS-II – Porting µ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with µ C/OS-II - µ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of µ C/OS-II.

REFERENCES

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM S ystem-on-Chip Architecture,	Addison-Wesley Professional, California	2000

OBJECTIVES

- ☐ To study about various speakers and microphone
- ☐ To learn the fundamental of television systems and standards
- ☐ To learn the process of audio recording and reproduction
- ☐ To study the various telephone networks

INTENDED OUTCOMES:

- ☐ Gain knowledge about various speakers and microphone
- ☐ Gain knowledge about the fundamental of television systems and standards
- ☐ Gain knowledge about the process of audio recording and reproduction
- ☐ Gain knowledge about the various telephone networks

UNIT I LOUDSPEAKERS AND MICROPHONES

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT – II TELEVISION STANDARDS AND SYSTEMS

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT – III OPTICAL RECORDING AND REPRODUCTION

Audio Disc – Processing of the Audio signal – read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT – IV TELECOMMUNICATION SYSTEMS

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT – V HOME APPLIANCES

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Text Book:

1. S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.

OBJECTIVES

- ☐ To familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application
- ☐ To have a solid understanding of Nanotechnology concepts.
- ☐ To introduce the basic concepts of Nanotechnology and its applications in various domain
- ☐ To understand the molecular structure of carbon nano tube
- ☐ To educate how to use Nanotechnology to solve real-world problems
- ☐ To familiar with the structure and application of carbon nano tube

INTENDED OUTCOMES:

- ☐ Understand the basic concepts of Nanotechnology and its applications in various domain
- ☐ Ability to develop how to use Nanotechnology to solve real- world problems
- ☐ Understand solid understanding of Nanotechnology concepts
- ☐ Understand the important concepts applicable to small electronic devices, their fabrication, characterization and application
- ☐ Understand the molecular structure of carbon nano tube
- ☐ Familiar with the structure and application of carbon nano tube

UNIT I-LIMITATIONS OF CMOS

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – **Structures of MOS devices:** SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.

UNIT II-MICRO AND NANO FABRICATION

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.

UNIT III-CHARACTERIZATION EQUIPMENTS

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV-NANO DEVICES – I

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V-NANO DEVICES – II

Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3 rd Edition	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzl	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

OBJECTIVES

- ☐ To study the image fundamentals and mathematical transforms necessary for image processing.
- ☐ To study the image enhancement techniques
- ☐ To study the image compression procedures.
- ☐ To study the image segmentation and representation techniques.
- ☐ To study the video processing fundamentals
- ☐ To know the concepts of motion estimation

INTENDED OUTCOMES:

- ☐ Understand the image fundamentals and mathematical transforms necessary for image processing.
- ☐ Understand the image enhancement techniques
- ☐ Understand the image compression procedures.
- ☐ Understand the image segmentation and representation techniques.
- ☐ Understand the video processing fundamentals
- ☐ Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TEXTBOOKS

1. Gonzalez and Woods , "Digital Image Processing " , 3rd edition Pearson
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, "Video processing and communication " , 1st edition PHI

REFERENCE BOOKS

1. M. Tekalp , "Digital video Processing" , Prentice ll International
2. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms" , JohnWiley & Sons
3. Chris Solomon, Toby Breckon , "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab" , John Wiley & Sons,

OBJECTIVES

- ☐ To learn the processing steps in fabrication of VLSI devices.
- ☐ To learn the concepts of assembling and packaging for VLSI devices.
- ☐ To impart a good knowledge in reactive plasma etching techniques and equipment.
- ☐ To familiarize the students with the NMOS and CMOS IC technology.
- ☐ To make the student acquire reactive Plasma Etching techniques and Equipment.
- ☐ To acquaint the student with the VLSI assembly technology and package fabrication technology

INTENDED OUTCOMES

- ☐ List out various fabrication techniques
- ☐ Understand the etching principle in IC fabrication
- ☐ Gain knowledge on deposition and diffusion methods
- ☐ Understand the process simulation and integration.
- ☐ Assembling and packing techniques
- ☐ various technologies used for fabricating VLSI devices

UNIT 1

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds} - V_{ds} relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II:

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III:

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IV:

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V:

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOC and Embedded CPUs, Architecture testing.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A.Pucknell, 2005, PHI
2. Modern VLSI Design - Wayne Wolf, 3rd ed., 1997, Pearson Education.

REFERENCES:

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Addison Wesley.

OBJECTIVES

- ☐ To study materials used for MEMS and its working
- ☐ To study the fabrication process used for MEMS
- ☐ To study the packaging process used for MEMS
- ☐ To familiarize the students with various micro actuators and micro sensors.
- ☐ To learn the survey of materials central to micro engineering.
- ☐ To impart good knowledge in micro system packaging materials

INTENDED OUTCOMES:

- ☐ Appreciate the underlying working principles of MEMS devices.
- ☐ Understand the working of Micro sensors and actuators
- ☐ Explain the IC fabrication processes
- ☐ Gain knowledge on bulk manufacturing
- ☐ Understand the Design of Micro systems.
- ☐ Design and model MEMS devices.

UNIT I-INTRODUCTION TO MEMS AND MICRO FABRICATION

History of MEMS Development, Characteristics of MEMS-Miniaturization - Micro electronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II-ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending-deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III-ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors-Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV-PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS AND ACTUATOR

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V-POLYMER AND OPTICAL MEMS

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP) - PDMS – PMMA – Polyethylene -

Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive
MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Gabriel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K. Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

OBJECTIVES

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

INTENDED OUTCOMES:

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

Course Objectives**Course Outcomes**

At the end of the course the students will be able to

UNIT I: INTRODUCTION TO NEURAL NETWORKS

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks

UNIT II LEARNING PROCESS

Error – correction learning – memory based learning - hebbian learning-competitive learning- Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm- Learning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm

UNIT IV ATTRACTOR NEURAL NETWORK AND ART

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain- Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP

UNIT V SELF ORGANIZATION

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements

REFERENCES:

1. Simon Haykin, "Neural Networks and Learning Machines" -3/E - Pearson/Prentice Hall 2009
2. Satish Kumar- "Neural Networks : A Classroom Approach"-TMH-2008
3. Freeman J.A., Skapura D.M."Neural networks, algorithms, applications, and programming techniques"-Addison Wesley, 2005.
4. Laurene Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications"
- Pearson/Prentice Hall
5. Robert J Schalkoff-"Artificial Neural Networks, McGraw Hill"-1997

OBJECTIVES

- ☐ To introduce the basic concepts of Fuzzy logic and its applications in various domain
- ☐ To educate how to use Fuzzy computation to solve real-world problems
- ☐ To have a solid understanding of Basic fuzzy models.
- ☐ Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- ☐ To learn about applications on Fuzzy based systems
- ☐ To familiarize with fuzzy fiction and de fuzzy fiction procedures

INTENDED OUTCOMES:

- ☐ Understand the basic concepts of Fuzzy logic and its applications in various domain
- ☐ Gain knowledge on theory of Reasoning
- ☐ Develop fuzzy controllers
- ☐ Understand concepts of adaptive fuzzy control
- ☐ Ability to develop how to use Fuzzy computation to solve real- world problems
- ☐ Design fuzzy based model for any application

Course Objectives**Course Outcomes**

At the end of the course the students will be able to

UNIT - I

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT – II

Theory Of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT - III

Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzz yfication and defuzz yfication procedures – Design of Fuzzy Logic Controller

UNIT - IV

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V**FUZZY BASED SYSTEMS**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TEXT BOOKS:

1. An Introduction to Fuzzy Control- D. Diankar, H. Hellendoom and M. Reinfrank- Narosa Publishers India, 1996.
2. Fuzzy Sets Uncertainty and Information- G. J. Klir and T. A. Folger- PHIIEEE, 1995.

**OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)**

15BESH0E01 **SCIENCE AND HUMANITIES**
INDUSTRIAL MATHEMATICS – I **3 0 0 3 100**

OBJECTIVES:

<input type="checkbox"/>	To develop analytical skills for solving engineering problems
<input type="checkbox"/>	To teach the students the basic concepts of LPP, Transportation and Assignment problems
<input type="checkbox"/>	To make the students to study about the Integer Programming and Network Analysis

INTENDED OUTCOMES:

<input type="checkbox"/>	Be able to solve problems in different environments and develop critical thinking
<input type="checkbox"/>	Be able to build and solve Transportation Models, Assignment Models, integer programming and Non linear programming

UNIT I LINEAR PROGRAMMING PROBLEM

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method .

UNIT II TRANSPORTATION PROBLEM

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2008

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education,	2003
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004

WEBSITES:

- | |
|--|
| <ol style="list-style-type: none">1. www.mathcentre.ac.uk2. www.mathworld. Wolfram.com3. www.mit.edu |
|--|

OBJECTIVES:

<input type="checkbox"/>	To kindle analytical skills for solving engineering problems
<input type="checkbox"/>	To impact the knowledge about inventory models, replacement models and simulation models
<input type="checkbox"/>	To provide techniques for effective methods to solve non linear programming and decision making

INTENDED OUTCOMES:

The students will
<input type="checkbox"/> be able to solve simple models in Inventory problems, Simulation problems and Replacement problems.
<input type="checkbox"/> be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
<input type="checkbox"/> understand how to model and solve problems using non integer programming.

UNIT – I INVENTORY MODELS

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT – II NON LINEAR PROGRAMMING

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT – III SIMULATION MODELS

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT -IV DECISION MODELS

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT -V REPLACEMENT MODELS

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time- Replacement of items that fail suddenly and completely.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2008

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education,	2003
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.mit.edu

OBJECTIVES:

- ☐ To gain knowledge in measures of central tendency.
- ☐ To provide necessary basic concepts in probability and random processes.

INTENDED OUTCOMES:

- ☐ Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- ☐ The students will have an exposure of various distribution functions, correlation and spectral densities.

UNIT-I MEASURES OF CENTRAL TENDENCY AND PROBABILITY

Measures of central tendency – Mean, Median, Mode - Standard Deviation

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.

UNIT -III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT- IV CLASSIFICATION OF RANDOM PROCESS

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT -V CORRELATION AND SPECTRAL DENSITIES

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002
2	Ochi, M.K	Applied Probability and Stochastic Process	John Wiley & Sons, New York	1990
3	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2002
4	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2007
5	Veerarajan, T.	Probability, Statistics and Random process	Tata McGraw-Hill Publications, Second Edition, New Delhi	2002

WEBSITES:

1. www.cut-the-knot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.wolfram.com

15BESHOE04

PROBABILITY AND STATISTICAL METHODS

3 0 0 3 100

OBJECTIVES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> To gain knowledge in measures of central tendency and probability.<input type="checkbox"/> To introduce the concept of random variable and functions of random variables.<input type="checkbox"/> To understand the knowledge of testing hypotheses. |
|---|

INTENDED OUTCOMES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> The student gain the knowledge in measures of central tendency and probability<input type="checkbox"/> They acquire skills in handling situations involving more than one random variable and functions of random variables |
|---|

UNIT- I MEASURES OF CENTRAL TENDENCY AND PROBABILITY

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration.

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye’s theorem - Probability mass function - Probability density functions.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT- IV TESTING OF HYPOTHESIS

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT- V DESIGN OF EXPERIMENTS

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

Note: Use of approved statistical tables permitted in the examination.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2007

2	Athanasios Papoulis and S Pillai	Probability Random variables and Stochastic Processes	McGraw-Hill Publications, New Delhi.	2002
---	--	---	--------------------------------------	------

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Walpole, R.E., Myers, R.H., Myers, R.S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearsons Education, Delhi.	2002
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education, Delhi (Chapters 2 to 8). New Delhi	2002
4	Johnson, R.A	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi (Chapters 7, 8, 9, 12	2000

WEBSITES:

<ol style="list-style-type: none"> 1. www.cut-the-knot.org/probability.shtml 2. www.mathcentre.ac.uk 3. www.mathworld. Wolfram.com
--

OBJECTIVES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> To understand the fundamental knowledge of probability theory.<input type="checkbox"/> To acquire skills in handling situations involving more than one random variable and functions of random variables.<input type="checkbox"/> To introduce the concepts of random processes and Markov chain<input type="checkbox"/> To understand the different Queuing models and solve problems |
|---|

INTENDED OUTCOMES:

- | |
|---|
| <ul style="list-style-type: none"><input type="checkbox"/> The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.<input type="checkbox"/> They will be able to solve the Queuing models |
|---|

UNIT-I PROBABILITY AND RANDOM VARIABLE

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT -IV RANDOM PROCESS AND MARKOV CHAINS

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT-V QUEUEING THEORY

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ross,S	A first course in probability	Pearson Education, Delhi	2002
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2009

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2 nd Edition, New Delhi.	2003
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross,D. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons, New York.	1998
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2002

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.mit.edu

OBJECTIVES:

- ☐ To know the fundamentals of fuzzy Algebra.
- ☐ To know the basic definitions of fuzzy theory
- ☐ To know the applications of fuzzy Technology.

INTENDED OUTCOME:

- ☐ The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – Fuzzy functions - Zadeh's Extension Principle

UNIT II

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall NJ	1995

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.J. Zimmermann	Fuzzy Set Theory and its Applications	Allied Publishers New Delhi	1991
2	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman	1998
3	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer Verlag, Heidelberg	2008

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.doc.ic.ac.uk
4. www.calvin.edu/~priebeiro/othrlnks/Fuzzy/fuzzysets.htm

OBJECTIVES:

- ☐ To know the fundamentals of Tensors.
- ☐ To know the series solutions to differential equations.
- ☐ To introduce the concepts of special functions.
- ☐ To study about Calculus of variations and integral equations

INTENDED OUTCOME:

- ☐ The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS

Series Solution : Classification of singularities of an ordinary differential equation - Series solution- Method of Frobenius - indicial equation - examples

UNIT III SPECIAL FUNCTIONS

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre, Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations – integro-differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	40 th edition, , Khanna Publishers	2011
2	Stephenson, G, Radmore, P.M	Advanced Mathematical Methods for Engineering and Science students	Cambridge University Press	1999
3	Andrews, Larry C.	Special Function for Engineers and Applied Mathematicians	Macmillan, New York	1985
4	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEBSITES:

1. http://www.doitpoms.ac.uk/
2. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
3. http://www.math.umn.edu/~olver/pdn.html
4. http://tutorial.math.lamar.edu/classes/DE.aspx

OBJECTIVES:

- ☐ To introduce the concepts of special functions.
- ☐ To find the solutions to partial differential equations and their applications
- ☐ To study about mathematical physics and perturbation techniques

INTENDED OUTCOMES:

- ☐ Students know the concepts of improper integrals, Beta and Gamma functions.
- ☐ The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
- ☐ Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT – III PERTURBATION TECHNIQUES

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT -IV SIMULATION MODELS

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT V DECISION MODELS

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig, E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2007
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	1997
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	1997
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES:

1. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
2. www.maths.manchester.ac.uk/~bl/teaching/math34011/
3. pubsonline.informs.org/journal/opre

OBJECTIVES:

- ☐ To know the fundamentals of linear Algebra.
- ☐ To study about the linear transformations
- ☐ To introduce the concepts of inner product spaces

INTENDED OUTCOMES:

The student will be able to

- ☐ Recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- ☐ Visualize linear transformations as matrix form
- ☐ Articulate the importance of Linear Algebra and its applications in branches of Mathematics

UNIT I VECTOR SPACES

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space,

UNIT II EIGEN VALUES AND EIGEN VECTORS

Eigen values and Eigen vectors - diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2007

2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition	2010
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill	2009

WEBSITES:

1. www.sosmath.com
2. www.linear.ups.edu
3. www.mathworld.wolfram.com
4. www.tutorial.math.lamar.edu

TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS (ONLY FOR BE CSE STUDENTS)

OBJECTIVES:

- ☐ To hone the analytical skills in the minds of Engineers.
- ☐ To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyze Engineering problems.
- ☐ To study the basic principles of different transforms and Partial Differential Equations.

INTENDED OUTCOMES:

- ☐ The students will have a lucid idea about Fourier and Z-transforms.
- ☐ The Learners can equip themselves in the transform techniques.
- ☐ Better understanding in problems related to Heat conduction, communication systems, electro optics and electromagnetic theory, using the techniques will be learnt in this course.

UNIT-I FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT -II FOURIER TRANSFORM

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT- III PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT- IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011
2	Kandasamy, P., Thilagavathy, K. and Gunavathy, K.	Engineering Mathematics Volume III.	S. Chand & Company Ltd., New Delhi.	1996

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2003
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Lax mi Publications Pvt. Ltd.	1986
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2007

WEBSITES:

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. http://www.math.umn.edu/~olver/pdn.html
4. http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx

PURPOSE:

It provides techniques of writing and also trains the students to write without their influence of mother tongue. In addition to honing their skills as professional writers, students will develop technical vocabularies that will aid writing research articles and discussing articles produces by their peers.

INTENDED OUTCOMES:

- ☐ Develop abilities to write technically and expressively,
- ☐ Recognize writing as a constructive, meaningful process,
- ☐ Practise using reading strategies for effective writing.

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT – 2 PARAGRAPHS AND ESSAYS

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT – 3 LETTERS, MEMOS AND EMAIL

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT – 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT – 5 REPORTS AND RESEARCH ARTICLES

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIO
1	<u>V.N. Arora & Lakshmi Chandra</u>	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing	Collins; First edition	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2008

- ☐ To enrich the understanding of the solar system, earth structure, Earthquake and the Physical Oceanography .

INTENDED OUTCOME:

- ☐ The students will have the knowledge on the solar system, earth structure, Earthquake, Physical Oceanography and that knowledge will be used by them in different engineering and technology applications

UNIT I ORIGIN OF EARTH

A brief history of the development of Earth Sciences and of Geophysics in particular, An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition

UNIT II STRUCTURE OF EARTH

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle

UNIT IV SEISMOLOGY

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its historical perspective and essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, trenches and island arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A. Jacobs, R.D. Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES:

1. www.ocw.mit.edu 2. www.physicsclassroom.com 3. www.nptel.ac.in 4. www.physics.org
--

OBJECTIVES:

- ☐ To provide mathematical basis for acoustics waves and the characteristic behaviour of sound in pipes, resonators and filters.
- ☐ To introduce the properties of hearing and speech

INTENDED OUTCOME:

- ☐ The students will have the knowledge on acoustics waves, the characteristic behaviour of sound in pipes, resonators and filters and that knowledge will be used by them in different engineering and technology applications

UNIT I INTRODUCTION

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves -Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS

Sound in enclosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION

Transducer as an electrical network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lawerence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	4ht edition, John Wiley & Sons	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	L. Beranek	Acoustics	Academic Press	2012

WEBSITES:

1. www.acousticalsociety.org 2. www.acoustics-engineering.com 3. www.nptel.ac.in 4. www.ocw.mit.edu
--

OBJECTIVES:

- ☐ To understand about the fuel
- ☐ To study about the alcohols and its importance in engine
- ☐ To gain knowledge on the fuel gas and oils
- ☐ To get the information on fuel cell

INTENDED OUTCOMES:

- ☐ Students will know about the basic concepts of alternate fuels and they can enrich their knowledge about the alternate fuels and energy systems

UNIT I INTRODUCTION

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications

UNIT IV VEGETABLE OILS

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Richard.L.Bechfold	Alternative Fuels Guide Book	SAE International Warren dale	1997
2.	Jain, P.C. and Monika Jain	Engineering Chemistr y.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Nagpal	Power Plant Engineering	Khanna Publishers	1991
2.	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2 nd edition.	Gulf Professional Publisher, USA	2012

WEBSITES:

- 1.www.fao.org/docrep/t4470e/t4470e08.htm
- 2.<http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
- 3.<http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

OBJECTIVES:

- ☐ To understand about the solid waste
- ☐ To study about the waste treatment
- ☐ To gain knowledge on the disposal of waste and waste management.
- ☐ To get the information on energy conservation.

INTENDED OUTCOME:

- ☐ The students will know solid waste and energy conservation. They will understand the methodologies to disposal of solid waste and its management. _

UNIT I SOLID WASTE

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTE TREATMENT

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTE DISPOSAL

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV HAZARDOUS WASTE MANAGEMENT

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, energy recovery systems. Biological & chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dara.S.S,Mishra.D.D	A Text book of Environmental chemistry and pollution control	S.Chand and company Ltd	2011

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Nagpal H.Theisen, S. Vigil	Integrated Solid Waste management- Engg. Principles and management issues	George Tchobanoglous, McGraw Hill	1993
2.	Parker, Colin, & Roberts	Energy from Waste – An Evaluation of Conversion Technologies	Elsevier Applied Science, London	1985
3.	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall	1999

WEBSITES:

- 1.www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
- 2.<http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
- 3.www.alternative-energy-news.info/technology/garbage-energy/
- 4.nzic.org.nz/ChemProcesses/environment/

OBJECTIVES:

- ☐ To understand about the green chemistry
- ☐ To study the atom efficient process and synthesis elaborately.
- ☐ To gain knowledge on the green technology and renewable energy resources.
- ☐ To get the information on catalysis

INTENDED OUTCOMES:

- ☐ Students will know the chemistry and application of green technology for energy sources. They will understand the role of green catalyst in industries.

UNIT I

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker's synthesis

UNIT III BIOTECHNOLOGY AND GREEN CHEMISTRY

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion

UNIT V CATALYSIS IN GREEN CHEMISTRY

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	V. K. Ahluwalia and M.Kidwai	New Trends in Green Chemistry	Anamaya publishers.New delhi. Second Edition	2007
2.	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press	2011

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	K. R. Desai	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
2.	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons	2012
3.	A. S.Matlack	Introduction to Green Chemistry	Marcel Dekker: New York	2001
4.	Mukesh Doble	Green Chemistry and Engineering, 1st edition	Academic Press	2007

WEBSITES:

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>
5. <http://www.amazon.in/Green-Chemistry-Catalogue>

OBJECTIVES:

- ☐ To get the information on electrochemical material.
- ☐ To study about the conducting polymers
- ☐ To understand about the fuel
- ☐ To gain knowledge on the batteries and power sources.

INTENDED OUTCOMES:

- ☐ Students will understand about the fuel. They will get knowledge on the batteries and power sources.

UNIT I METAL FINISHING

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electroless plating of nickel- anodizing – Electroforming – Electro winning

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS

Electropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990
2.	A.T.Khun	Industrial Electrochemistry	Elsevier Publishers	1972

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	M.M.Baizer	Organic electrochemistry	Dekker Inc. New York	1983
2.	M. Barak	Electrochemical power sources	IEEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
3.	K.L Chopra and I. Kaur	Thin film devices and their application	Plenum Press, New York.	1983
4.	Bruno Scrosati	Applications of Electroactive polymers	Chapman & Hall, London	1993

WEBSITES:

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/startinventions/a/solar_cell.htm

OBJECTIVES:

- ☐ To understand about the fuel
- ☐ To study about the abrasives and lubricants.
- ☐ To gain knowledge on inorganic chemicals and explosive materials.
- ☐ To get the information on agriculture chemicals.

INTENDED OUTCOMES:

- ☐ The student will acquire basic knowledge on cement. The student will understand the interaction of engineering materials and their utilization in industries.

UNIT I CEMENT AND LIME

Manufacture of Portland cement – setting and hardening of Portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement
Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses.
Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS

Common salt and soda ash – Manufacture – Different grades – products – alkalis – Na_2CO_3 , Caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage.
Hydrochloric acid – manufacture – absorption – uses, Sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut	2000
2.	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	B.N.Chakrabart y	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
1.	R.N. Sherve	Chemical process industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
2.	James A. Kent	Hand Book of Industrial Chemistry, 9th edition	New York, Van Nostrand Reinhold.	1992
3.	S.D. Shukla and G.N. Pandey	A text book of chemical technology	Vikas publishing house pvt. Ltd, New Delhi.	1979

WEBSITES:

- | |
|---|
| <ol style="list-style-type: none">1. http://en.wikipedia.org/wiki/Cement2. http://www.hon.ch/HONselect/Selection/D01.html3. http://fas.org/man/dod-101/navy/docs/fun/part12.htm4. http://toxics.usgs.gov/topics/agchemicals.html |
|---|

15BEC SOE01	COMPUTER SCIENCE ENGINEERING	L	T	P	C
	Python Programming	3	0	0	3

Course Objectives:

- ☐ To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings.
- ☐ To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs.
- ☐ To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs.

UNIT I Fundamentals 9

The Universal Machine-Program power- What is Computer Science? -Hardware Basics- Programming Languages-Python- Inside Python program-Software Development Process- Example program- Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II Decision Structures and Loops 9

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III Functions 9

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV Sequences 9

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V Objects and Graphics 9

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

Total Hours: 45

References:

1. John Zelle, “ Python Programming: An Introduction to Computer Science”, 2nd Edition, Franklin & Associates, 2009
2. Mark Lutz, “Learning Python”, OReily, 2013
3. David Beazly & Brian K. Jones, “Python Cookbook”, OReily, 2013

Course Objectives:

- ☐ To introduce the Java programming language and explore its current strengths and weaknesses
- ☐ To study the way that object-oriented concepts are implemented in the Java programming language
- ☐ To write working Java code to demonstrate the use of applets for client side programming
- ☐ To study the way that exceptions are detected and handled in the Java programming language
- ☐ To write working Java code that demonstrates multiple threads of execution

UNIT I Introduction**9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/ IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML**9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, IFrame, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL**9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV Client-Server programming**9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony**9**

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Metadata, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

References:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

Course Objectives:

- ☐ To study the graphics techniques and algorithms.
- ☐ To study the multimedia concepts and various I/O technologies.
- ☐ To enable the students to develop their creativity
- ☐ To impart the fundamental concepts of Computer Animation and Multimedia.

UNIT I Introduction**9**

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II Creating Animation in Flash**9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D Animation & its Concepts**9**

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption**9**

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V Concept Development**9**

Story Developing – Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45**References:**

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Computer Graphics, Multimedia and Animation-Malay K. Pakhira, PHI Learning Pvt Ltd, 2010
4. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

Course Objectives:

- ☐ Assemble/setup and upgrade personal computer systems
- ☐ Perform installation, configuration, and upgrading of microcomputer hardware and software.
- ☐ Install/connect associated peripherals.
- ☐ Diagnose and troubleshoot microcomputer systems hardware and software, and other peripheral equipment.

UNIT I Introduction**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

Total Hours: 45

References:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.
2. Peter Abel, Ni yaz Nizamuddin, "IMB PC Assembly Language and Programming", Pearson Education, 2007
3. Scott Mueller, "Repairing PC's", PHI, 1992

Course Objectives:

- ☐ To understand the basic history and genres of games
- ☐ To demonstrate an understanding of the overall game design process
- ☐ To explain the design tradeoffs inherent in game design
- ☐ To design and implement basic levels, models, and scripts for games
- ☐ To describe the mathematics and algorithms needed for game programming
- ☐ To design and implement a complete three-dimensional video game

UNIT I Introduction 9

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II Safecracker Project 9

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III Match Game Project 9

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV Pizza Delivery Project 9

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V Moon Landing Project 9

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

Total Hours: 45**References:**

1. Philip Conrod, Lou Tylee, "Programming Games with Java",2013
2. Timothy M.Right, "Fundamental 2D Game Programming with Java",Cengage Learning PTR,2015
3. Wayne Holder,Doug Bell, "Java Game Programming for Dummies",

**OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)**

ELECTRICAL AND ELECTRONICS ENGINEERING

15BEEEOE01

ELECTRIC HYBRID VEHICLE

L T P C 3 0 0 3

INTENDED OUTCOMES

- ☐ To understand the basic concepts of electric hybrid vehicle.
- ☐ To gain the knowledge about electric propulsion unit.
- ☐ To understand and gain the knowledge about various energy storage devices.

UNIT I INTRODUCTION

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2004
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2003

15BEEEOE02 ENERGY MANAGEMENT AND ENERGY AUDITING L T P C 3 0 0 3

INTENDED OUTCOMES

- ☐ To gain the knowledge about energy management.
- ☐ To understand the basic concepts in economic analysis in energy management.
- ☐ To understand the basic principles of energy audit.

UNIT I ENERGY MANAGEMENT

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

Text Book

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butterworth	<i>Energy Management</i>	<i>Heinemann Publications</i>	2007

Reference Books

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons, 7th Edition	2009
3	Paul o’ Callagham	Energy Management	Mc-Graw Hill Book Company – 1st edition	1998

INTENDED OUTCOMES

- ☐ To gain the knowledge about various types of Sensors & Transducers and their working principle.
- ☐ To understand the concepts of Resistive, Capacitive and Inductive transducers.
- ☐ To gain knowledge about characteristics of transducers.

UNIT I INTRODUCTION OF TRANSDUCERS

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS

Potentiometer – Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER

Self inductive transducer – Mutual inductive transducers – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLEANEOUS TRANSDUCERS

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2000
2	Patranabis. D	Sensors and Transducers	Prentice Hall of India	1999
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2000
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2001

INTENDED OUTCOMES

- ☐ To understand the basic principles of PLC systems.
- ☐ To gain the knowledge about data handling functions.
- ☐ To understand the principles of PID.
- ☐

UNIT I INTRODUCTION

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2006

WEBSITE

[http://www.mikroe.com/old/books/plc book/chapter1/chapter1.htm](http://www.mikroe.com/old/books/plc%20book/chapter1/chapter1.htm), - Introduction to programmable Logic controller

15BEEEOE05 RENEWABLE ENERGY SOURCES L T P C 3 0 0 3
INTENDED OUTCOMES

- ☐ To gain the knowledge about environmental aspects of energy utilization.
- ☐ To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- ☐ To understand the basic principles fuel cell, Geo thermal power plants.
- ☐ To gain the knowledge about hydro energy.

UNIT I INTRODUCTION

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY

Introduction – Basic principles of wind energy conversion-components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers, Fourth edition	2010
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Fourth edition	2005

2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2006
4	Mittal K.M	Non-Conventional Energy Systems	Wheeler Publishing Co. Ltd	1997

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

INTENDED OUTCOMES

- ☐ To understand the concept of state variable analysis.
- ☐ To understand time domain and frequency domain analysis of control systems required for stability analysis.
- ☐ To understand the concept of optimal control.

UNIT 1 STATE VARIABLE ANALYSIS

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement – State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press	1992
4	George J. Thaler	Automatic Control Systems'	Jaico Publishers	1993

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J. Thaler	Automatic Control Systems	Jaico Publishers	1993
2	M.Gopal	Modern control system	New Age International	2002

		theory	Publishers	
3	Gene F. Franklin, J. David Powell and Abbasemami- Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
4	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

**OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)
BIO TECHNOLOGY**

15BTBTOE01

BIOREACTOR DESIGN

3 0 0 3 100

INTENDED OUTCOMES

- ☐ To understand the basic design of bioreactors
- ☐ To understand the principle of heat transfer inside a bioreactor
- ☐ To understand the principle of mass transfer inside a bioreactor
- ☐ To design bioreactors for various operations

UNIT I ENGINEERING PROPERTIES AND STORAGE TANK (9)

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II REACTOR DESIGN (9)

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III HEAT TRANSFER EQUIPMENTS (9)

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV MASS TRANSFER EQUIPMENTS (9)

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V SEPERATION EQUIPMENTS (9)

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker cr ystallizer.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw-Hill	2007
2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw- Hill Companies	2008

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

INTENDED OUTCOMES

The students are exposed to

- ☐ Properties of food material
- ☐ Various methods used for preserving fruits and vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING (9)

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS (9)

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS (9)

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING (9)

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES (9)

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000

3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin	1995
---	-------------------------	--------------------------------	------------------------------------	------

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

INTENDED OUTCOMES

- ☐ To learn various forcefields, simulation methods in molecular modeling
- ☐ To have better understanding on molecular docking and ligand based drug design methods

UNIT-I MOLECULAR MODELLING**(9)**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima

UNIT-II QUANTUM MECHANICS**(9)**

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semi empirical methods.

UNIT-III MOLECULAR MECHANICS**(9)**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non – bonded interactions; force field parameterization and transferability, energy minimization; derivative and non–derivative methods, applications of energy minimization.

UNIT-IV MOLECULAR DYNAMICS**(9)**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamic simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT-V MODELLING AND DRUG DESIGN**(9)**

Macromolecular modeling, design of ligands for known macro molecular target sites, Drug-receptor interaction, classical SAR/QSAR studies and their implications to the 3D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Yvonne C. Martin, editor, Peter Willett	Designing bioactive molecules : three- dimension techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; H	1998

INTENDED OUTCOMES

- ☐ To understand the consequences of pollution
- ☐ To study the various techniques and methods used for bioremediation

UNIT-I OVERVIEW OF BIOREMEDIATION (9)

Pollution : Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT-II BIOFILM PROCESSES (9)

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes

UNIT-III BIOREMEDIATION FOR SOIL ENVIRONMENT (9)

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination

UNIT-IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMEN (9)

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream- Biofiltration, Biotrickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters

UNIT-V BIOREMEDIATION OF METALS (9)

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Biobenification, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann, B.E., and McCart y, P.L.,	Environmental Biotechnology : Principles and Applications.	McGraw Hill,	2001

2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill Education	1995
---	--------------	--	------------------------------	------

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Prescott, L. M., Harley, and Klein, D. A	Microbiology	McGraw- Hill Higher Education	2008

INTENDED OUTCOMES

- ☐ To gain structural knowledge of biological systems.
- ☐ To understand transport and dynamic properties of biological systems.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS (9)

Intramolecular bonds – covalent – ionic and hydrogen bonds – biological structures – general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS (9)

Primary structure – the bases – sugars and the phosphodiester bonds- double helical structure – A, B and Z forms – properties of circular DNA – topology – polymorphism and flexibility of DNA – structure of ribonucleic acids – hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS (9)

Conformation of the peptide bond – secondary structures – ramachandran plots – use of potential functions – tertiary structure – folding – hydration of proteins – hydrophobicity index.

UNIT IV ENERGY & DYNAMICS OF BIOLOGICAL SYSTEMS (9)

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bi molecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES (9)

Techniques for the study of biological structure & function: Size and shape of macromolecules – methods of direct visualization macromolecules as hydrodynamic particles – macromolecules diffusion – ultra centrifugation – viscometry x-ray crystallography determination of molecular structures, X-ray fibre diffraction electron microscopy neutron scattering – light scattering.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Roland Glaser	Biophysics	Springer Science & Business Media	2001
2	Michel Daune	Molecular Biophysics: Structures in Motion	Oxford University Press	1999

3	Charles R. Cantor	Biophysical Chemistry Part 2: Techniques for Study of Biological Structure and Function	W. H. Freeman and Company	1980
---	-------------------	--	------------------------------	------

INTENDED OUTCOMES

- ☐ To enable the students to get aware of available tools and databases for performing research in bioinformatics.
- ☐ To provide the thorough understanding of protein structure in detail..

UNIT I OVERVIEW OF BIOINFORMATICS**(9)**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**(9)**

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**(9)**

Phylogenetics, cladistics & ontology, building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**(9)**

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS**(9)**

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharmainformatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TEXTBOOK

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayne	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCE BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

INTENDED OUTCOMES

- ☐ To develop skills of the students in the field of nano biotechnology and its applications in various fields.
- ☐ The course will serve as an effective course to understand Socio-economic issues of nanobiotechnology.

UNIT I INTRODUCTION**(9)**

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANO PARTICLES**(9)**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS**(9)**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**(9)**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinal chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**(9)**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology. With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer- Verlag Berli Heidelberg	2004
3	FreitasJr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

**MECHANICAL ENGINEERING
OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)**

15BEMEOE01

INTRODUCTION TO MEMS

3 0 0 3 100

INTENDED OUTCOMES

1. Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.
2. Ability to understand and analyse, linear and digital electronic circuits.

UNIT I INTRODUCTION

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistraction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TEXT BOOKS

1. Chang Liu, "Foundations of MEMS", Pearson Education Inc., 2006.
2. Stephen D Senturia, "Microsystem Design", Springer Publication, 2000.
3. Tai Ran Hsu, "MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002.

REFERENCES

1. Nadim Maluf,“ An Introduction to Micro Electro Mechanical System Design”, Artech House,2000.
2. Mohamed Gad-el-Hak, editor, “ The MEMS Handbook”, CRC press Boca Raton, 2000
3. Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, "Micro Sensors MEMS and Smart Devices", John Wiley & Son LTD,2002
4. James J.Allen, "Micro Electro Mechanical System Design", CRC Press Publisher, 2010
5. Thomas M.Adams and Richard A.Layton, “Introduction MEMS, Fabrication and Application,”Springer 2012.

INTENDED OUTCOMES

1. Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics

UNIT I FUNDAMENTALS OF ROBOT

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS

Robot programming languages – VAL programming – Motion Commands, Sensors commands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD, CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TEXT BOOKS

1. Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”, Prentice Hall, 2003.
2. Groover M.P., “Industrial Robotics -Technology Programming and Applications”, McGraw Hill, 2001.

REFERENCES

1. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
2. Deb S.R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 1994.
3. Koren Y., “Robotics for Engineers”, Mc Graw Hill Book Co., 1992.
4. Fu.K.S., Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.
5. Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.
6. Rajput R.K., “Robotics and Industrial Automation”, S.Chand and Company, 2008.
7. Surender Kumar, “Industrial Robots and Computer Integrated Manufacturing”, Oxford and IBH Publishing Co. Pvt. Ltd., 1991.

INTENDED OUTCOMES

1. Upon completion of this course, the students can able to understand the role of logistics and understand the phases of supply chain

UNIT I INTRODUCTION TO LOGISTICS

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TEXT BOOKS

1. Shari.P.B and Lassen.T.S, "Managing the global supply chain", Viva books, New Delhi, 2000.
2. Ayers.J.B, "Hand book of supply chain management", The St. Lencie press, 2000.

REFERENCES

1. Nicolas.J.N, "Competitive manufacturing management - continuous improvement", Lean production, customer focused quality, McGrawHill, New York, 1998.
2. Steudel.H.J and Desruelle.P, "Manufacturing in the nineteen - How to become a mean, lean and world class competitor", Van No strand Reinhold, New York, 1992.

INTENDED OUTCOMES

1. Upon completion of this course, the students can able to understand the relationship between free energy, entropy, internal energy, and enthalpy

UNIT I INTRODUCTION AND BASIC CONCEPTS

General overview of transport phenomena including various applications, Transport of momentum, heat and mass, Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non-Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometries in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. <https://laulima.hawaii.edu/portal>

INTENDED OUTCOMES

1. Biomechanics provides key information on the most effective and safest movement patterns, equipment, and relevant exercises to improve human movement.

UNIT I INTRODUCTION

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

REFERENCES

1. Duane Knudson, “Fundamentals of Biomechanics”, Springer Science+ Business Media, LLC, 2007
2. C. Ross Ethier Craig A. Simmons, “Introductory Biomechanics”, Cambridge University Press, 2007

**OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)**

15BEAE0E01	AUTOMOBILE ENGINEERING AUTOMOBILE ENGINEERING	3 0 0 3 100
-------------------	--	--------------------

INTENDED OUTCOMES:

- ☐ This course enables the students to know about all the main and auxiliary systems of automobile with its basic construction and working.

UNIT-I ENGINE AND FUEL FEED SYSTEMS

Classification of Engine, construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT –II TRANSMISSION SYSTEMS

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT -III SUSPENSION SYSTEM

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT-IV BRAKES

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory. Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment”, 3 rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

INTENDED OUTCOMES:

- ☐ The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.

UNIT I INTRODUCTION

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS

2 stoke and 4 stoke S I engines and C I engines design criteria– design of c ylinders, c ylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Batter y coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

INTENDED OUTCOMES:

- ☐ The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

15BEAEOE04 INTRODUCTION TO MODERN VEHICLE TECHNOLOGY

3 0 0 3 100

INTENDED OUTCOMES:

- ☐ This course enables the students to have a knowledge about the recent technologies that is in use in automobile.

UNIT I TRENDS IN POWER PLANTS

Hybrid vehicles - Stratified charged / lean burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V TELEMATICS

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICAT ION
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems – Progress in Technology	Automotive Electronics Series,SAE, USA.	1998

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William B Riddens	“Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3.	Robert Bosch,	“Automotive HandBook”, 5 th Edition	SAE	2000

**OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)**

CIVIL ENGINEERING

15BECEO01 HOUSING, PLAN AND MANAGEMENT 3 0 0 3 100

INTENDED OUTCOMES

At the end of the this course the students should have learnt the basic terms of housing programmes, planning and designing of housing projects, construction techniques and cost effective materials and housing finance and project appraisal techniques.

UNIT I INTRODUCTION TO HOUSING

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units
(Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.
3. National Housing Policy, 1994, Government of India.

INTENDED OUTCOMES

At the end of this course the students should have learnt various machineries of construction, electrical systems in building, design and principle of illumination, refrigeration principle application and various fire safety installations.

UNIT I MACHINERIES

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Plans of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire fighting pump and water storage – Dry and wet risers – Automatic sprinklers

TEXT BOOKS

1. E.R.Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 1968.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 1964.
2. R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.
3. William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.
4. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 1980.
5. National Building Code.

INTENDED OUTCOMES

At the end of this courses the students should have learnt the different land forms of coastal zone, wave dynamics, methods of wave forecasting, coastal process and harbour maintenance

UNIT I COASTAL ZONE

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVE DYNAMICS

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TEXT BOOKS

1. Richard Sylvester, "Coastal Engineering, Volume I and II", Elseiner Scientific Publishing Co., 1999
2. Quinn, A.D., "Design & Construction of Ports and Marine Structures", McGraw-Hill Book Co., 1999

REFERENCES

1. Ed. A.T. Ippen, "Coastline Hydrodynamics", McGraw-Hill Inc., New York, 1993
2. Dwivedi, S.N., Natarajan, R and Ramachandran, S., "Coastal Zone Management in Tamilnadu"

15BECEO04 EXPERIMENTAL METHODS AND MODEL ANALYSIS 3 0 0 3 100

INTENDED OUTCOMES

At the end of this course the students should have learnt the concept of measurement, gauging, recording devices, non destructive testing techniques and laws of similitude

UNIT I MEASUREMENTS

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire's techniques.

UNIT IV NONDESTRUCTIVE TESTING TECHNIQUES

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TEXT BOOKS

1. Dally J W and Riley W.F, Experimental stress Analysis, McGraw-Hill, Inc. New York, 1991.
2. Srinath L S et al, Experimental Stress Analysis, Tata McGraw-Hill Publishing co., Ltd., New Delhi, 1984.

REFERENCE BOOKS

1. Rangan C S et al., Instrumentation – Devices and Systems, Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 1983.
2. Sadhu Singh, Experimental Stress Analysis, Khanna Publishers, New Delhi, 1996.

15BECEO05 MANAGEMENT OF IRRIGATION SYSTEMS 3 0 0 3 100

INTENDED OUTCOMES

At the end of this course the students should have learnt the irrigation system requirements, irrigation scheduling, strategies in water use management, canal operation places and involvement of stake holder

UNIT I. IRRIGATION SYSTEM REQUIREMENTS

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II. IRRIGATION SCHEDULING

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III. MANAGEMENT

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV. OPERATION

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V. INVOLVEMENT OF STAKE HOLDERS

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Sage Publication, New Delhi, India, 1994

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the fundamentals of CAD, computer graphics, fundamentals of finite elements analysis, design and optimization and expert systems.

UNIT I INTRODUCTION

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards -Drafting packages

UNIT III STRUCTURAL ANALYSIS

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V EXPERT SYSTEMS

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

TEXT BOOKS

1. Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer Aided Design and Manufacturing”, Prentice Hall of India Ltd, New Delhi, 1993.
2. Krishnamoorthy C.S.Rajeev S., “Computer Aided Design”, Narosa Publishing House, New Delhi, 1993

REFERENCES

1. Harrison H.B., “Structural Analysis and Design”, Part I and II Pergamon Press, Oxford, 1990.
2. Rao S.S., “Optimisation Theory and Applications”, Wiley Eastern Limited, New Delhi, 1977.
3. Richard Forsyth (Ed), “Expert System Principles and Case Studies”, Chapman and Hall, London, 1989.

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the pavement types, design of flexible & rigid pavements, performance evaluation and maintenance and stabilization of highway and rural roads.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

Introduction - Pavement as layered structure - Pavement types - rigid and flexible - Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS

Stabilisation with special reference to highway pavements - Choice of stabilisers - Testing and field control – Stabilisation for rural roads in India - use of Geosynthetics (geotextiles & geogrids) in roads.

TEXT BOOKS

1. Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna tech. Publications, New Delhi, 1989.
2. Croney, D., Design and Performance of Road Pavements, HMO Stationary Office, 1979.
3. Wright, P.H., “Highway Engineers”, John Wiley & Sons, Inc., New York, 1996
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 1975.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-1998, The Indian Roads Congress, New Delhi.

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the classification of rock masses and index properties, rock strength and failure criteria, estimation of engineering and rock bolt system.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TEXT BOOKS

1. Goodman P.E., “Introduction to Rock Mechanics”, John Wiley and Sons, 1999.
2. Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 1996.

REFERENCES

1. Brow E.T., “Rock Characterisation Testing and Monitoring”, Pergaman Press, 1991.
2. Arogyaswamy R.N.P., “Geotechnical Application in Civil Engineering”, Oxford and IBH, 1991.
3. Hock E. and Bray J., “Rock Slope Engineering, Institute of Mining and Metallurgy”, 1991.

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and prestressed concrete water tanks

UNIT I STEEL WATER TANKS

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

UNIT II CONCRETE WATER TANKS

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TEXT BOOKS

1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the terminology of wind data, effect of wind in structures, chimneys, towers, bridges, application to design and introduction to wind tunnel.

UNIT I INTRODUCTION

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TEXT BOOKS

1. Peter Sachs, “Wind Forces in Engineering, Pergamon Press, New York, 1992.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottawa, 1990.
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 1995.

15BECEOE11 ADVANCED CONSTRUCTION TECHNOLOGY 3 0 0 3 100

INTENDED OUTCOMES:

At the end of this course, the students should have learnt the modern construction methods, methods for special structures, modern equipments used for excavation, conveyance etc and principles and practices of temporary structures.

UNIT I MODERN CONSTRUCTION METHODS

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT III MODERN CONSTRUCTION EQUIPEMENTS -I

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS -II

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TEXT BOOKS

1. Peurifoy, R. L., Ledbetter, W.B., Construction Planning , Equipment and Methods, Mc Graw Hill Co., 1985
2. Antill J.M., PWD, Civil Engineering Construction, Mc Graw Hill Book Co., 1982

REFERENCE

1. Varma, M Construction Equipment and its Planning & Applications, Metropolitan Book Co., 1979
2. Nunnally, S.W., Construction Methods and Management , Prentice – Hall, 1987
3. Ataev, S.S., Construction Technology, MIR , Pub. 1985

B. E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABI 2015

(REGULAR PROGRAMME)

Department of Electrical and Electronics Engineering

FACULTY OF ENGINEERING



KARPAGAM ACADEMY OF HIGHER EDUCATION

**(Deemed University Established Under Section 3 of
UGC Act 1956) Pollachi Main Road, Eachanari Post,
Coimbatore- 641 021,India.**

B. E. ELECTRICAL AND ELECTRONICSENGINEERING

COURSE OF STUDY AND SCHEME OFEXAMINATIONS

(2015 and onwards)

SEMESTER - I

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL CONTACT HOURS /WEEK	
THEORY:											
15BECC101	Communicative English – I	2	i,j,l	3	0	0	3	40	60	100	3
15BECC102	Engineering Mathematics - I	2	a,b,e,l	3	2	0	4	40	60	100	5
15BECC103	Engineering Physics	1,2	a,b,c,e,g,l	3	0	0	3	40	60	100	3
15BECC104	Engineering Chemistry	1,2	a,b,c,e,g,l	3	0	0	3	40	60	100	3
15BEEE105	Computer Fundamentals and C Programming	1	a,b,c,d,e,l	3	0	0	3	40	60	100	3
PRACTICAL:											
15BECC111	Engineering Physics and Chemistry Laboratory	1,2	a,b	0	0	3	2	40	60	100	4
15BEEE112	Computer Practice and programming Laboratory	1,2	a,c,d, e,f,j	0	0	3	2	40	60	100	4
15BEEE113	Engineering Graphics	1,2	c,d	1	0	4	3	40	60	100	5
TOTAL				16	2	10	23	320	480	800	30

VALUE ADDED COURSE

15BECC151*	Human Values	1,2	c,d,e,f	1	0	0	-	100*	-	-	1
Total Contact Hours/Week = 31 Hours											

SEMESTER - II

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BECC201	Communicative English – II	1,2	i,j,l	3	0	0	3	40	60	100
15BECC202	Engineering Mathematics - II	2	a,b,c,e,l	3	2	0	4	40	60	100
15BECC203	Materials Science	1,2	a,b,e,l	3	0	0	3	40	60	100
15BECC204	Environmental Studies	1	a,c,e,f,g,h,l	3	0	0	3	40	60	100
15BEEE205	Analysis of Electric Circuits	1	a,b,c,d,e,l	3	2	0	4	40	60	100
15BEEE206	Basic Mechanical Engineering	1,2	d,f	3	0	0	3	40	60	100

PRACTICAL :											
15BEEE211	Engineering Practice Laboratory	1,2	a,c,d,e,f,j	0	0	4	2	40	60	100	
15BEEE212	Electric Circuits Laboratory	2	a,c,d,e,f,j,l	0	0	3	2	40	60	100	
TOTAL				16	4	10	24	320	480	800	

VALUE ADDED COURSE

15BECC251*	Elementary Biology	1,2		1	0	0	-	100*	-	-	1
Total Contact Hours/Week =30 Hours											

SEMESTER III

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE301	Methods of Applied Mathematics	1,2	a,b,c,e,l	3	2	0	4	40	60	100
15BEEE302	Electrical Machines - I	1	a,b,c,d,e,j	3	1	0	4	40	60	100
15BEEE303	Electromagnetic Theory	1	a,b,c,d,e,j	3	1	0	4	40	60	100
15BEEE304	Electronic Devices and Circuits	2	a,b,c,d,e,l	3	0	0	3	40	60	100
15BEEE305	Renewable Energy Sources	1	a,b,c,d,e,g,l	3	0	0	3	40	60	100

PRACTICAL :

15BEEE311	Electrical Machines – I Laboratory	1	a,d,e,k,l	0	0	3	2	40	60	100
15BEEE312	Electronic Devices and Circuits Laboratory	2	a,d,e,k,l	0	0	3	2	40	60	100
15BEEE313	Introduction to Electrical System Software Laboratory	1	a,d,e,j,k,l	0	0	3	2	40	60	100
TOTAL				15	4	9	24	320	480	800

VALUE ADDED COURSE

15BEEE351*	YOGA/NSS	1,2	a,e,l	1	1	0	1	100	0	100
------------	----------	-----	-------	---	---	---	---	-----	---	-----

SEMESTER IV

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE401	Electrical Machines - II	1	a,b,c,d,e,g,l	3	1	0	4	40	60	100
15BEEE402	Transmission and Distribution Systems	1	a,b,c,d,e,g,l	3	1	0	4	40	60	100
15BEEE403	Control System Engineering	1	a,b,c,d,e,l	3	1	0	4	40	60	100
15BEEE404	Digital Logic Circuits	2	a,b,c,e	3	0	0	3	40	60	100
15BEEE405	Measurements and Instrumentation	1	a,b,c,d,e,l	3	0	0	3	40	60	100
PRACTICAL:										
15BEEE411	Electrical Machines Laboratory – II	1	a,b,c,d,e,l	0	0	3	2	40	60	100
15BEEE412	Scientific Computing Laboratory	2	a,b,c,e	2	0	2	3	40	60	100
15BEEE413	Control System Engineering Laboratory	1	c,d,e,f,i,j	0	0	3	2	40	60	100
TOTAL				17	3	8	25	320	480	800

VALUE ADDED COURSE

15BEEE451*	Technical seminar/English communication skill development	1,2	a,b,c,d,l	1	1	0	1	100	0	100
15BEEE452*	Foreign Language (German,Japanese)/Hindi	1,2	-	1	1	0	1	100	0	100
Total Contact Hours/Week = 32 Hours										

SEMESTER V

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE501	Power Electronics	2	a,b,c,d,e,g	3	1	0	4	40	60	100
15BEEE502	Power System Analysis	2	a,d,e	3	1	0	4	40	60	100
15BEEE503	Linear Integrated Circuits	1	a,b,c,e	3	0	0	3	40	60	100
15BEEE504	Micro Processor and Micro Controller	1	a,b,c,e,h,k,l	3	0	0	3	40	60	100
15BEEE5E_ _	Department Elective-I	-	-	3	0	0	3	40	60	100
PRACTICAL :										
15BEEE511	Power Electronics and Drives Laboratory	2	a,c,d,j,k,l	0	0	3	2	40	60	100
15BEEE512	Analog and Digital Laboratory	2	a,d,e,k,l	0	0	3	2	40	60	100
15BEEE513	Measurement and Instrumentation Laboratory	1	a,d,e,j,k,l	0	0	3	2	40	60	100
TOTAL				15	2	9	23	320	480	800

VALUE ADDED COURSE

15BEEE551*	In plant Training	-	-	0	0	0	1	100	0	100
15BEEE552*	Mini project	1,2	-	0	0	2	1	100	0	100
Total Contact Hours/Week = 28 Hours										

SEMESTER VI

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE601	Solid State Drives	2	a,b,c,d,e,g	3	1	0	4	40	60	100
15BEEE602	Power System Operation and Control	2	a,b,c,d,e,g,l	3	1	0	4	40	60	100
15BEEE603	Energy Management, Utilization and Auditing	2	b,e,f,g,h,i,j	3	0	0	3	40	60	100
15BEEE604	Engineering Economics and Financial Management	1	a,c,d,g,l	3	0	0	3	40	60	100
15BEEE6E_ _	Department Elective-II	-	-	3	0	0	3	40	60	100
15BEEE6E_ _	Department Elective-III	-	-	3	0	0	3	40	60	100
PRACTICAL :										
15BEEE611	Micro Processor and Micro Controller Laboratory	2	a,c,d,j,k,l	0	0	3	2	40	60	100
15BEEE612	Power System Simulation Laboratory	1	a,c,d,j,k,l	0	0	3	2	40	60	100
TOTAL				18	2	6	24	320	480	800

VALUE ADDED COURSE

15BEEE651*	PCB Design	1,2	a,b,d,e,l	1	1	0	1	100	0	100
15BEEE652*	Mobile Servicing	1,2	a,b,d,l	1	1	0	1	100	0	100
Total Contact Hours/Week = 30 Hours										

SEMESTER VII

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE701	Professional Ethics	1	a,b,d,e,f,g,i	3	0	0	3	40	60	100
15BEEE702	Power System Protection and Switchgear	2	a,b,c,d,e,g,l	3	0	0	3	40	60	100
15BEEE703	Design of Electrical Apparatus	1	a,c,d,g,l	3	1	0	4	40	60	100
15BEEE7E_ _	Department Elective-IV	-	-	3	0	0	3	40	60	100
15BE_ _7OE_ _	Open Elective	-	-	3	0	0	3	40	60	100
PRACTICAL :										
15BEEE711	Control and Maintenance Laboratory	1	a,c,d,j,k,l	0	0	3	2	40	60	100
15BEEE712	Electrical Estimation and Rewinding Laboratory	1,2	a,c,d,e,f,g	0	0	3	2	40	60	100
15BEEE713	Electrical Drives Laboratory	1,2	a,c,e	0	0	3	2	40	60	100
TOTAL				15	1	9	22	320	480	800

VALUE ADDED COURSE

15BEEE751*	Programmable Logic Controller(PLC)	1,2	a,b,d,e,l	1	1	0	1	100	0	100
15BEEE752*	ETAP and PSCAD	1,2	a,b,d,e,l	1	1	0	1	100	0	100
Total Contact Hours/Week = 29 Hours										

SEMESTER VIII

COURSE CODE	COURSE TITLE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEEE8E_ _	Department Elective-VI	-	-	3	0	0	3	40	60	100
15BEEE8E_ _	Department Elective-VII	-	-	3	0	0	3	40	60	100
15BEEE8E_ _	Department Elective-VIII	-	-	3	0	0	3	40	60	100
PRACTICAL :										
15BEEE891	Project work and Viva-Voce	1,2	-	0	0	24	12	120	180	300
TOTAL				9	0	24	21	240	360	600
Total Contact Hours/Week = 33 Hours										

L: Lecture Hour T: Tutorial Hour CIA:
P: Practical Hour C: No. of Credits ESE: End
Semester Examination V A C: Value Added Course

Total Credits earned: 23+24+22+22+23+22+21+22=179
 against the specified range –[175-190 Credits]

* Credits for **Mandatory Courses (MC)** are not counted for computation of CGPA. The passing minimum for **Mandatory Courses (MC)** is 50 marks out of 100 Marks. There will be two tests, of which one will be class test covering 50% of syllabus for 50 marks and other class test covering next 50% of syllabus for 50 marks. [Total 50+50=100 Marks]. Interested students can opt one self study course in the Seventh semester from open electives which will be reflected in the mark sheets, only if he/she passes in the course.

ELECTIVE-I V SEMESTER

S. No	SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
1	15BEEE5E01	Network Analysis and Synthesis	2	a,d,e	3	0	0	3	40	60	100
2	15BEEE5E02	Advanced Control System	2	b,c,h,i	3	0	0	3	40	60	100
3	15BEEE5E03	Power Plant Engineering	2	c,d,e,g,h,i	3	0	0	3	40	60	100
4	15BEEE5E04	Communication Engineering	1	-	3	0	0	3	40	60	100
5	15BEEE5E05	Introduction to Neural Networks	1	a,c,e,g,l	3	0	0	3	40	60	100

ELECTIVE-II AND ELECTIVE-III VI SEMESTER

6	15BEEE6E01	Computer Architecture	1	a,c,e	3	0	0	3	40	60	100
7	15BEEE6E02	Fuzzy Logic and its applications	1	a,c,e,n	3	0	0	3	40	60	100
8	15BEEE6E03	Distributed Generation	2	c,d,e,g,h,i	3	0	0	3	40	60	100
9	15BEEE6E04	Computer Organization and Architecture	1	a,c,e	3	0	0	3	40	60	100
10	15BEEE6E05	Embedded System	1	-	3	0	0	3	40	60	100
11	15BEEE6E06	Programmable Logic Controller and its Application	1,2	a,b,d,e,l	3	0	0	3	40	60	100
12	15BEEE6E07	Digital Signal Processing	1	a,b,c,d,e,g,l,m	3	0	0	3	40	60	100
13	15BEEE6E08	High Voltage Engineering	2	a,b,c,d,e,g,l	3	0	0	3	40	60	100
14	15BEEE6E09	Special Electrical Machines	2	a,c,d,e,h	3	0	0	3	40	60	100
15	15BEEE6E10	Fibre Optics and Laser Instruments	1	a,b,e,k,l,m	3	0	0	3	40	60	100

ELECTIVE-IV AND ELECTIVE-V VII SEMESTER

16	15BEEE7E01	Computer Networks	1	a,c,e	3	0	0	3	40	60	100
17	15BEEE7E02	Mobile Communication	1	a,b,d,e	3	0	0	3	40	60	100
18	15BEEE7E03	Artificial Intelligence and Expert Systems	2	a,c,e	3	0	0	3	40	60	100
19	15BEEE7E04	Power System Transients	2	b,d,e	3	0	0	3	40	60	100
20	15BEEE7E05	Sensor and Transducer	1	a,b,c,e,i	3	0	0	3	40	60	100
21	15BEEE7E06	HVDC and EHVAC	2	a,b,c,h,i,l	3	0	0	3	40	60	100
22	15BEEE7E07	Switched Mode Power Conversion	2	a,c,e	3	0	0	3	40	60	100
23	15BEEE7E08	Power System Restructure	2	a,c,e,j,k,l	3	0	0	3	40	60	100
24	15BEEE7E09	PLC and Industrial Automation	1,2	a,b,d,e,l,m,n	3	0	0	3	40	60	100
25	15BEEE7E10	Microcontroller Based System Design	1	a,b,c,h,i,l	3	0	0	3	40	60	100

ELECTIVE-VI AND ELECTIVE-VII VIII SEMESTER											
26	15BEEE8E01	Electric Hybrid Vehicle	2	a,c,d,h,m,n	3	0	0	3	40	60	100
27	15BEEE8E02	Smart Grid	2	a,b,c,h,i,l	3	0	0	3	40	60	100
28	15BEEE8E03	Flexible AC Transmission Systems	2	a,b,c,e,j,l	3	0	0	3	40	60	100
29	15BEEE8E04	Power Generation Economics	2	a,c,e	3	0	0	3	40	60	100
30	15BEEE8E05	Total Quality Management	1	b,e,f,g,h,i,j	3	0	0	3	40	60	100
31	15BEEE8E06	Intellectual Property Rights	1	h,j,l	3	0	0	3	40	60	100
32	15BEEE8E07	Power Quality	2	a,c,d,e,h,l	3	0	0	3	40	60	100
33	15BEEE8E08	Biomedical Instrumentation	1,2	a,c,d,e,f,m,n	3	0	0	3	40	60	100
34	15BEEE8E09	Industrial Automation	1	a,c,d,e,k,m,n	3	0	0	3	40	60	100
35	15BEEE8E10	Computer Aided Analysis and Design of Electrical Apparatus	1	a,c,d,g	3	0	0	3	40	60	100
36	15BEEE8E11	Power System Dynamics	2	a,c,e	3	0	0	3	40	60	100
37	15BEEE8E12	VLSI Design	2	a,b,c,f,g	3	0	0	3	40	60	100
38	15BEEE8E13	Power Generation Systems	2	c,d,e,g,h,i	3	0	0	3	40	60	100
39	15BEEE8E14	Modern semi conductor Devices	2	a,c,d,e,g	3	0	0	3	40	60	100
40	15BEEE8E15	Optimisation Techniques	2	a,c,e	3	0	0	3	40	60	100
41	15BEEE8E16	Real Time Operating System	1	a,c,e,j,l,n	3	0	0	3	40	60	100
42	15BEEE8E17	Advances in Soft Computing	1	a,c,e	3	0	0	3	40	60	100
43	15BEEE8E18	Digital System Design using VHDL	1	a,c,e,h,l	3	0	0	3	40	60	100
44	15BEEE8E19	Virtual Instrumentation	1	a,b,e,h,l,m,n	3	0	0	3	40	60	100

List of Open Electives offered by Other Departments Science & Humanities											
SUB. CODE	TITLE OF THE COURSE	PE O	PO	L	T	P	C	CIA	ESE	TOTAL	
15BESH0E01	Industrial Mathematics I	1,2	a,c,d,h,j	3	0	0	3	40	60	100	
15BESH0E02	Industrial Mathematics II	1	a,b,c	3	0	0	3	40	60	100	
15BESH0E03	Probability and Random Process	1	a,g,h,j	3	0	0	3	40	60	100	
15BESH0E04	Probability and Statistical Methods	1,2	a,b,g,h,j	3	0	0	3	40	60	100	
15BESH0E05	Probability and Queuing Theory	1, 2	a,b,c,g	3	0	0	3	40	60	100	
15BESH0E06	Fuzzy Mathematics	1,2	a,b,c,	3	0	0	3	40	60	100	
15BESH0E07	Mathematical Physics	1,2	a,b,c,d,g,h,j	3	0	0	3	40	60	100	

15BESH0E08	Advanced Engineering Mathematics	1	a,b,c	3	0	0	3	40	60	100
15BESH0E09	Linear Algebra	1	a,b,c,h,j	3	0	0	3	40	60	100
15BESH0E10	Transforms and Partial Differential Equations	1	a,b,c,h,j	3	0	0	3	40	60	100
15BESH0E11	Technical Writing	1,2	a,c,d,h,j	3	0	0	3	40	60	100
15BESH0E12	Geophysics	1	a,b,c	3	0	0	3	40	60	100
15BESH0E13	Engineering Acoustics	1	a,g,h,j	3	0	0	3	40	60	100
15BESH0E14	Alternate Fuels and Energy Systems	1	a,g,h,j	3	0	0	3	40	60	100
15BESH0E15	Solid Waste Management	1,2	a,b,g,h,j	3	0	0	3	40	60	100
15BESH0E16	Green Chemistry	1, 2	a,b,c,g	3	0	0	3	40	60	100
15BESH0E17	Applied Electrochemistry	1, 2	a,b,c,g	3	0	0	3	40	60	100
15BESH0E18	Industrial Chemistry	1, 2	a,b,c,g	3	0	0	3	40	60	100
Computer Science Engineering										
15BEC0E01	Python Programming	1,2	a,b,c,d	3	0	0	3	40	60	100
15BEC0E02	Internet Programming	1,2	a,b,c,g,h	3	0	0	3	40	60	100
15BEC0E03	Multimedia and Animation	1,2	a,b,c,g,h,j	3	0	0	3	40	60	100
15BEC0E04	PC Hardware and Trouble shooting	1	a,b,c,d,j	3	0	0	3	40	60	100
15BEC0E05	Game Programming	1,2	a,b,c,d	3	0	0	3	40	60	100
Electronics and Communication Engineering										
15BEE0E01	Real Time Embedded Systems	1,2	a,b,c,d	3	0	0	3	40	60	100
15BEE0E02	Consumer Electronics	1	a,b,c,,j	3	0	0	3	40	60	100
15BEE0E03	Fundamentals of Nanotechnology	1,2	a,d,g,h,j	3	0	0	3	40	60	100
15BEE0E04	Image & Video Processing	1	a,b,c,d	3	0	0	3	40	60	100
15BEE0E05	VLSI Technology	1,2	a,b,d	3	0	0	3	40	60	100
15BEE0E06	Fundamentals of MEMS	1,2	a,b,d	3	0	0	3	40	60	100
15BEE0E07	Neural Networks and its Applications	1	a,b,c,d	3	0	0	3	40	60	100
15BEE0E08	Fuzzy Logic and its Applications	1	a,c,e	3	0	0	3	40	60	100
Bio Technology										
15BTB0E01	Bioreactor Design	1,2	a,b,c,	3	0	0	3	40	60	100
15BTB0E02	Food Processing and Preservation	1,2	a,b,d	3	0	0	3	40	60	100
15BTB0E03	Molecular Modeling	1	a,b,c,	3	0	0	3	40	60	100
15BTB0E04	Bioremediation	2	a,b,c,d,g,h,j	3	0	0	3	40	60	100
15BTB0E05	Biophysics	1,2	a,b,c,	3	0	0	3	40	60	100
15BTB0E06	Basic Bioinformatics	1,2	a,b,d	3	0	0	3	40	60	100

15BTBTOE07	Fundamentals of Nano Biotechnology	1	a,b,c,	3	0	0	3	40	60	100
Mechanical Engineering										
15BEME0E01	Introduction to MEMS	1	a,b,c,d	3	0	0	3	40	60	100
15BEME0E02	Robotics	1	a,b,d,g	3	0	0	3	40	60	100
15BEME0E03	Industrial Safety and Environment	1,2	a,b,c,d	3	0	0	3	40	60	100
15BEME0E04	Transport Phenomena	1,2	a,b,c,d,g,h,j	3	0	0	3	40	60	100
15BEME0E05	Introduction to Biomechanics	1,2	a,b,c,d	3	0	0	3	40	60	100
Automobile Engineering										
15BEAEOE01	Automobile Engineering	1,2	a,b,d,g	3	0	0	3	40	60	100
15BEAEOE02	Basics of Two and Three Wheelers	1,2	a,b,d	3	0	0	3	40	60	100
15BEAEOE03	Automobile Maintenance	1	a,b,c	3	0	0	3	40	60	100
15BEAEOE04	Introduction to Modern Vehicle Technology	1,2	a,b,c	3	0	0	3	40	60	100
Civil Engineering										
15BECEO0E01	Housing, Plan and Management	1,2	a,b,c,d	3	0	0	3	40	60	100
15BECEO0E02	Building Services	1,2	a,b,c,d	3	0	0	3	40	60	100
15BECEO0E03	Coastal Zone Management	1,2	a,b,d	3	0	0	3	40	60	100
15BECEO0E04	Experimental Method and Model Analysis	1	a,b,c	3	0	0	3	40	60	100
15BECEO0E05	Management of Irrigation Systems	1,2	a,b,c,d	3	0	0	3	40	60	100
15BECEO0E06	Computer Aided Design of Structure	1,2	a,b,d	3	0	0	3	40	60	100
15BECEO0E07	Pavement Engineering	1,2	a,b,d	3	0	0	3	40	60	100
15BECEO0E08	Rock Engineering	1,2	a,b,c,d	3	0	0	3	40	60	100
15BECEO0E09	Storage Structures	1,2	a,b,d	3	0	0	3	40	60	100
15BECEO0E10	Wind Engineering	1,2	a,b,c,d	3	0	0	3	40	60	100
15BECEO0E11	Advanced Construction Technology	1	a,b,c	3	0	0	3	40	60	100
List of Electives Offered to Other Departments										
Electrical and Electronics Engineering										
15BEEEE0E01	Electric Hybrid Vehicle	2	a,c,d,h,m,n	3	0	0	3	40	60	100
15BEEEE0E02	Energy Management and Energy Auditing	2	b,e,f,g,h,i,j,n	3	0	0	3	40	60	100
15BEEEE0E03	Sensors & Transducers	1	a,b,c,e	3	0	0	3	40	60	100

			,i							
15BEEEOE04	Programmable Logic Controller	1, 2	a,b, d,e,l	3	0	0	3	40	60	100
15BEEEOE05	Renewable Energy Sources	1	a,b,c,d, e,g,l	3	0	0	3	40	60	100
15BEEEOE06	Advanced Control Systems	2	b,c,h,i	3	0	0	3	40	60	100

**--Skill Development

**--Employability

**--Entrepreneurship

PROGRAM OUTCOMES: On successful completion of the programme,

a	Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.
b	Identify and formulate Electrical and Electronics Engineering problems from research literature and be able to analyze the problem using first principles of Mathematics and Engineering Sciences.
c	Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.
d	Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.
e	Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems and also being conscious of the limitations.
f	Understand the role and responsibility of the Professional Electrical and Electronics Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.
g	Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for Sustainable Development.
h	Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.
i	Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.
j	Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.
k	Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.
l	Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

PROGRAM SPECIFIC OUTCOMES:

m	Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering
n	Identify and formulate Electrical and Electronics Engineering problems from research literature and be able to analyze the problem using first principles of Mathematics and Engineering Sciences.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	Have successful technical and professional careers in their chosen fields such as circuit theory, Field theory, control theory and computational platforms.
PEO 2	Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics and their applications in power engineering

MAPPING

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
1	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓
2	✓	✓	✓	✓	✓	✓		✓		✓			✓	✓

SEMESTER – I

15BECC101 COMMUNICATIVE ENGLISH – I L T P C 3 0 0 3

Course Objectives :

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence
- To study formal context

Course Outcomes

Students undergoing this course will be able to

- Use English language for communication: verbal & non –verbal.
- Enrich comprehension and acquisition of speaking & writing ability.
- Gain confidence in using English language in real life situations.
- Improve word power: lexical, grammatical and communication competence.
- Acquire good vocabulary for easy communication.
- Be familiar with sentence structure and sentence formation.

Unit I

9

Listening – Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, Course Objectives, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions – Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II

10

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar** – Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary** – Compound Nouns/Adjectives – Irregular verbs.

Unit III**10**

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV**8**

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit V**8**

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

TOTAL: 45 HOURS**TEXT BOOK**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP, New Delhi.	2015

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007

3	Rutherford Andrea, J.	Basic Communication Skills Technology	Pearson Education, New Delhi.	2006
---	-----------------------	--	----------------------------------	------

WEBSITES

www.learnerstv.com – Listening/ Speaking/ Presentation

www.usingenglish.com – Writing/ Grammar

www.englishclub.com – Vocabulary Enrichment/ Speaking

www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking

www.teachertube.com – Writing Technically

www.Dictionary.com – Semantic / Grammar

Course Objectives:

- To develop analysing skills for solving different engineering problems.
- To understand the concept of Matrices, Sequence and Series.
- To remember the basics of differential calculus and its applications.
- To Create knowledge about Hyperbolic functions, Beta and Gamma functions.
- To apply the problems in differential equations.
- To study the algebraic manipulation

Course Outcomes:

- Acquire the basic knowledge and understanding of mathematics
- Apply advanced matrix knowledge to engineering problems.
- Improve their ability in evaluating geometrical applications of differential calculus problems.
- Understand the concepts of sequences and series.
- Evaluating engineering problems involving hyperbolic functions, Beta and Gamma functions.
- To solve the problems by applying the differential Equations.

UNIT I**MATRICES****12**

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II**DIFFERENTIAL CALCULUS****12**

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – **Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima** and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III**SEQUENCES AND SERIES****13**

Sequences: Definition and examples – **Series:** Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV**HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS****12**

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma

integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS

11

Linear Differential equations of second and higher order with constant coefficients - Euler's form of
Differential equations – Method of variation parameters.

TOTAL : 60 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi.	2014
2	Sundaram, V. Lakhminarayan,K.A. & Balasubramanian,R.	Engineering Mathematics for first year.	Vikas Publishing Home, New Delhi.	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Sri Ramachary SKVS, Bhujanga Rao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics(Special Functions and Complex Variables)	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants
4. [www. Intmath.com/calculus/calculus-intro.php](http://www.Intmath.com/calculus/calculus-intro.php)

Course Objectives:

- To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology
- Understand the basics of laser and optical fiber with appropriate applications.
- Introduce the concepts of quantum mechanics for diverse applications.
- Impart the basic knowledge of crystal and its various crystal structures.
- Disseminate the fundamentals of nuclear physics and their applications.
- To study the quantum mechanics.

Course Outcomes:

- Identify the elastic nature of materials and its thermodynamic properties.
- Infer the characteristics of laser and optical fibers for engineering applications.
- Develop the idea of quantum mechanics through applications.
- Identify the different atomic arrangements of crystals and its defects
- Make use of the concepts of sound waves for medical applications
- Illustrate the basic ideas of nuclear reactors for energy resources

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS**9**

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending.

Concept of entropy- change of entropy in reversible and irreversible processes –refrigeration.

UNIT II LASER AND FIBER OPTICS**9**

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER - CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram)

UNIT III QUANTUM PHYSICS**9**

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS**9**

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V ULTRASONICS AND NUCLEAR PHYSICS**9**

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications – Sonogram. Introduction – basics about nuclear fission and fusion, nuclear composition –Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

TOTAL: 45 HOURS**TEXT BOOK**

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2 nd Edition- 2015

REFERENCES

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	8 th Edition 2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	9 th Edition 2011

WEBSITES

1. www.nptel.ac.in
2. www.physicsclassroom.com

3. www.oyc.yale.edu
4. www.physics.org

Course Objectives:

- To gain knowledge on adsorption phenomena.
- To make the students conversant with basics of water technology.
- To make the student acquire sound knowledge of electrochemistry and storage devices.
- To acquaint the student with concepts of fuels and rocket propellants.
- To develop an understanding of the basic concepts of corrosion science.
- To acquaint the students with the basics of surface chemistry.

Course Outcomes:

- Outline the basic principles of chemistry for water treatment (K)
- Examine the electrochemical properties to design non – conventional energy storage devices (S)
- Apply the concepts combustion of different fuels (S)
- Identify the concepts of corrosion and its protection in the engineering field (S)
- Apply the concepts of surface chemistry in the field of engineering (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY**9**

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES**9**

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode – Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS**9**

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, H_2 - O_2 Fuel Cell -Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE**9**

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion -

Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY

9

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm-Industrial adsorbent materials- Role of adsorbents in catalysis and water softening-Emulsion-Types-water/oil, oil/water- Applications of adsorption.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Raman Sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., 3 rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES

- <http://www.studynotes.ie/leaving-cert/chemistry/>
- <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>

- <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>
- <http://ocw.mit.edu/courses/#chemistry>
- <http://www.chem.qmul.ac.uk/surfaces/sec>

Course Objectives

Students will

- Identify and understand the working of key components of a computer system.
- Identify and understand the various kinds of input-output devices
- Study different types of storage media commonly associated with a computer.
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure.
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language
- Study the real type application of it.

Course Outcomes

Students will

- Write small programs related to simple/ moderate mathematical
- Write small programs related to logical problems in 'C'.
- Study, analyze and understand simple data structures and how to use it in C language
- Identify and understand the working of different operating systems like windows and Linux etc.
- Analysis the real time application of it
- Write small programs related to project works

UNIT I OVERVIEW OF COMPUTER 8

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types-Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II OVERVIEW OF 'C' 8

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III SELECTION AND ITERATION 9

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop- break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV FUNCTIONS 10

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V ARRAYS AND STRINGS 10

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and

multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	E. Balagurusamy	Computing Fundamentals and C Programming	TMH Education, 5 th Edition	2014
2.	Yashavant Kanetkar	Let us C	BPB Publications, 13 th Edition	2013
3.	H. M. Deitel and D. J. Deitel	C: How to Program	Prentice Hall, 7 th Edition	2012
4.	E. Balagurusamy	Programming in ANSI C	TMH Education, 6 th edition	2012

ENGINEERING PHYSICS**Course Objectives**

- To develop basic laboratory skills and demonstrating the application of physical principles.
- To prepare for the lab experiment and perform individually a wide spectrum of experiments.
- To present experimental data in various appropriate forms like tabulation, and plots.
- To analyze, Interpret and Summarize experimental results.
- To communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
- To learn the bandgap of semiconductor.

Course Outcome

- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.
- Prepare for the lab experiment and perform individually a wide spectrum of experiments.
- Present experimental data in various appropriate forms like tabulation, and plots.
- Analyze, Interpret and Summarize experimental results.
- Communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
- Prepare to develop the skills for understanding basic electric circuits.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY

Course Objectives

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.
- To estimate the amount of alkalinity ions, hardness, chloride in water sample
- To make the student acquire practical skills in the determination of conductance of solutions, EMF etc
- To acquaint the students with the determination of molecular weight of a polymer by viscometry
- To carried out different types of titrations for estimation of concerned in materials
- To study the molecular weight and degree of polymerization using viscometry

Course Outcome

1. Familiarize the properties of material and basic concepts in chemistry
2. Get experience in argentometric method experimentation
3. Get practical exposure to analyse the water sample
4. Get knowledge in spectrophotometry
5. Acquire knowledge about different crystal formation in water
6. Practical knowledge in determine the chemical oxygen demand

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand

Course Objectives

- Identify and understand the working of key components of a computer program.
- Identify and understand the various kinds of keywords and different data types of C programming
- Understand, analyze and implement software development tools using algorithm
- Understand, analyze and implement software development tools using linux
- Acquire and analyse the roots of equations
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in “C” language

Course Outcomes:

The course will enable the students.

- 1.To formulate simple algorithms for arithmetic and logical problems.
- 2.To translate the algorithms to programs(in C language).
- 3.To test and execute the programs and correct syntax and logical errors.
- 4.To implement conditional branching, iteration and recursion.
- 5.To decompose a problem in to functions and synthesize a complete program using divide and conquer approach. and use arrays, pointers and structures to formulate algorithms and programs.
- 6.To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

LIST OF EXPERIMENTS

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function

TOTAL: 45 HOURS

15BEEE113

ENGINEERING GRAPHICS

L T P C 1 0 4 3

Course Objectives

- to prepare the students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare the students to communicate effectively and to use the techniques, skills, and modern engineering tools necessary for engineering practice
- To prepare the students for creating drawings in engineering
- To prepare the students for getting experience in engineering graphics
- To prepare the students for getting experience in engineering solid modelling and computer aided design
- To prepare the students to get better understandings in projection of solids

Course Outcomes:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design
3. Exposure to the visual aspects of engineering graphics standards
4. Exposure to solid modeling and computer-aided geometric design .
5. Exposure to creating working drawings and engineering communication
6. Exposure to know about projection of solids

UNIT I INTRODUCTION

(3 +10)

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES

(3 + 10)

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING

(3 + 12)

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES

(3 + 12)

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLID

(3 + 12)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

INTRODUCTION TO DRAFTING SOFTWARE/PACKAGE (NOT FOR EXAM) (4)

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL: 75 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Venugopal K and Prabhu Raja V	Engineering Graphics	New Age International Publishers	2007
2.	VTU	A Primer on Computer Aided Engineering Drawing	Belgaum	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Kumar M S	Engineering Graphics	D D Publications, Chennai, Ninth Edition	2007
2.	Bureau of Indian Standards	Engineering Drawing Practices for Schools and Colleges SP 46	BIS, New Delhi	2003
3.	Luzadder W J	Fundamentals of Engineering Drawing	Prentice Hall Book Co., New York	1998

WEBSITES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Course Objectives

- 1.To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
- 4.To know the value of being a human being and the value of being a useful citizen.
- 5.To provide a much needed orientational input in value education to the young enquiring minds.
- 6.To know the self exploration and meaning of life

Course Outcomes

- 1.To involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. To make free from any dogma or value prescriptions.
3. To analysis process of self-investigation and self-exploration, and not of giving sermons.
4. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student leading to continuous self-evolution.
5. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.
6. To Educate the values and meaning of life in the young minds and to transform them as responsible citizens

UNIT I**4**

Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT II**4**

Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT III**5**

Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT IV**4**

Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT V**3**

Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings .

TOTAL: 20 HOURS**REFERENCES**

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publications

1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

Course Objectives

- To motivate learners to acquire listening & speaking skills in both formal and informal context
- To focus on question forms & to make them understand the important of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading
- To equip them to write for academic as well as work place context
- To enable students to face interviews
- To study the receptive and productive skills

Course Outcomes

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance them reading texts critically and analytically
- Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.
- Enable to write documents and formal written communication
- Admire and appreciate elegance in communication.

UNIT 1

10

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT II

8

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT III

9

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R)**Writing** - Essay writing -Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT IV**8**

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT V**10**

Listening – Types of listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

TOTAL: 45 HOURS**TEXT BOOK**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP, New Delhi.	2015

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES

www.learnerstv.com – Listening/ Speaking/ Presentation

www.usingenglish.com – Writing/ Grammar

www.englishclub.com – Vocabulary Enrichment/ Speaking

www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking

www.teachertube.com – Writing Technically

www.Dictionary.com – Semantic / Grammar

Course Objectives:

- To understand the concepts and applications of partial differential equations
- Determine mathematical tools needed in evaluating multiple integrals and their usage.
- Utilize Gauss, Stokes and Greens theorems to simplify calculations of integrals and prove simple results.
- Apply the knowledge of Mathematics in various Engineering fields by making them to identify the functions in engineering problems as analytic function and their analyze as a function of a complex variables.
- Develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, to specify some difficult integration that appear in applications can be solved by complex integration in application areas such as fluid dynamics and flow of the electric current.
- To study complex integration.

Course Outcomes:

- The student will be able to Understand how to solve the given standard partial differential equation
- The students will be able to understand mathematical tools needed in evaluating multiple integrals and their usage. Find the areas and volumes using multiple integrals
- To calculate with them and apply them and also to calculate grad, div and curl in Cartesian and other simple coordinate systems.
- Improve their ability in Vector calculus
- To find the Analytic functions using the Cauchy Riemann equations and they will learn mapping properties of elementary functions and mapping properties of some special transcendental functions. They will understand relations between conformal mappings and quadratic differentials and how geometric structures are changing under conformal mappings.
- To Evaluate complex integrals using the Cauchy integral formula and the residue Theorem and to appreciate how complex methods can be used to prove some important theoretical results.

UNIT- I PARTIAL DIFFERENTIAL EQUATIONS**11**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT-II MULTIPLE INTEGRALS**11**

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT-III VECTOR CALCULUS**13**

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelepipeds.

UNIT-IV ANALYTIC FUNCTIONS**12**

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT-V COMPLEX INTEGRATION**13**

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

TOTAL : 60 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, Manicavachagam pillay.T.K and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEBSITES

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html

Course Objectives

- To enrich the understanding of various types of materials and their applications in engineering and technology
- Introduce the concepts of classical and quantum electron theories for diverse applications.
- Understand the basics of magnetic materials and its properties.
- Impart the basic knowledge of superconducting and dielectric materials.
- Inculcate the technology in synthesis of Nano materials.
- To know about polarization techniques

Course Outcomes

- Explain the ideas of classical and quantum electron theories and energy band structures.
- Illustrate the basics of semiconductor physics and its related concepts.
- Compare the different magnetic materials, its properties and infer its role in various fields.
- Identify the properties of superconducting materials and its engineering applications.
- Extend the various polarization techniques and applications of dielectric materials.
- Summarize the basics of nano structures and synthesizing techniques

UNIT I CONDUCTING MATERIALS**9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS**9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIAL

9

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications.

Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS

9

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS

9

Metallic glasses: preparation, properties and applications .Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications. Composite materials, Aircraft materials and non-metallic materials. Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

TOTAL: 45 HOURS

TEXT BOOK

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition- 2015

REFERENCES

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley & Sons Inc., New York.	9 th Edition 2013
2	James F Shackelford	Introduction to Materials Science for Engineers	Macmillan Publication Company, New York	8 th Edition 2014

3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	8 th Edition 2005
---	----------------	-------------------------------------	-------------------------------	---------------------------------

WEBSITES

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

Course Objectives:

- To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures
- To impart knowledge on ecosystem and biodiversity.
- To motivate public to participate in environment protection and improvement.

Course Outcomes (COs)

- To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures
- To impart knowledge on ecosystem and biodiversity.
- To analysis the real time application of it

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**9**

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM**9**

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY**9**

Introduction to biodiversity, Definition- Genetic diversity, Species diversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION**9**

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention

of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT

9

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

TOTAL: 45 HOURS

TEXT BOOKS

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES

S.No	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	William P. Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Ltd., New Delhi.	2005
3.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES

1. <http://people.eku.edu/ritchisong/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=120>
3. www.newagepublishers.com/samplechapter/001281.
4. www.unesco.org/ext/field/beijing/scienceb.htm, www.infinitepower.org/education.htm

5. <http://www.sciencedaily.com/news/top/environment/>

Course Objectives

- To gain knowledge on the principles and procedure for the Analysis of Circuits.
- To enable the students to understand the DC circuit analysis and network theorems.
- To learn the Sinusoidal steady state analysis.
- To Obtain the solution of first and Second order system
- To learn and analyse the electrical circuits using Laplace Transforms.
- To understand transients and resonance in RLC circuits and coupled circuits.

Course Outcomes

- At the end of this course, students will demonstrate the ability to Apply network theorems for the analysis of electrical circuits.
- Obtain the solution of first and Second order system
- Analyse the electrical circuits using Laplace Transforms.
- Obtain the transient and steady-state response of electrical circuits.
- Analyse circuits in the sinusoidal steady-state (single-phase and three-phase).
- Analyse two port circuit behavior.

UNIT I DC CIRCUIT ANALYSIS**12**

Definition of voltage, current, power - Ohm's law and Kirchhoff's Laws – Classification of network elements – R, L, C parameters – Energy sources – series parallel circuits - Star-delta transformation - Mesh and nodal methods -source transformations.

UNIT II DC NETWORK THEOREMS**12**

Superposition theorem – Thevenin's and Norton's theorems - Maximum power transfer theorem - Reciprocity theorem.

UNIT III AC CIRCUIT ANALYSIS**12**

AC generations- complex operator – Voltage and current sources - Form Factor and Peak Factor for different patterns of alternating waveforms - Phase relation in R, L & C - Real, reactive and apparent powers-Power factor – Impedance diagram – phasor diagram – Series circuits – Parallel circuits – Compound circuits.

UNIT IV COUPLED CIRCUITS AND TRANSIENTS (Qualitative treatment only)**12**

Introduction to coupled circuits – Mutual inductance – Coefficient of coupling - Ideal transformer - Dot rule - Transient response –DC response of RL, RC, R L C circuits – Sinusoidal response of RL, RC, RLC circuits.

UNIT V POLYPHASE CIRCUITS**12**

Three phase system(Star, Delta connections) – advantages- interconnection of three- phase sources and loads - balanced and unbalanced circuits.

TOTAL: 60 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sudakar A. and Shyam Mohan S.Palli	Circuits and Networks (Analysis and Synthesis)	Tata McGraw Hill Book Co	2007
2	A.Chakrabarti	Circuit Theory – Analysis and Synthesis	Dhanpat Rai & Co. New Delhi, Fifth Edition	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Arumugam and Prem Kumar	Electric Circuit Theory	Khanna Publishers, New Delhi	2000
2	Joseph Edminister	Electric Circuits	Schaum's outline series, Tata McGraw Hill Book Company, Third Edition	2013
3	Hayt W.H and Kemmerley J.E	Engineering Circuit Analysis	Tata McGraw Hill Book Co., Fifth Edition	2002

Course Objectives

- To study the basic theorems used in mechanical engineering.
- To study the fundamentals of manufacturing process and machine tools.
- To study the principles of heat transfer.
- To study the different types of machine tools
- To study the energy conservation devices
- To know about the application of it

Course Outcomes

- To impart the basic knowledge of various basic fields of mechanical engineering.
- To understand about basic manufacturing processes.
- To understand about basic machining process.
- To understand about power plants.
- To understand about automobile engineering

INTRODUCTION (Not included for examination) 2

Engineering and Technology - History of Mechanical Engineering- Mechanics - Statics and dynamics
- Broad areas in Mechanical Engineering.

UNIT I MANUFACTURING PROCESSES 9

FOUNDRY - Principles - Patterns - Types, Molding Processes, Cupola and Induction Furnaces.
METAL FORMING - Principles - Hot and cold working of metals - Forging, rolling, extrusion and wire drawing, sheet metal operations. WELDING - Principles - Oxy-Acetylene Welding and Manual Metal Arc Welding, Brazing and Soldering.

UNIT II MACHINE TOOLS 8

Machining principles - Construction and working principles of basic machine tools - Lathe, Drilling, Shaper, Planer and Milling machine.

UNIT III ENERGY CONVERSION DEVICES (Theoretical study using schematic diagrams only) 8

Boiler – Fire tube boiler, Water tube boiler, Turbine -Impulse & Reaction turbine, Hydraulic turbines - Pelton wheel, Francis turbine and Kaplan turbine. I.C. engines – Working of two stroke, four stroke, spark ignition and compression ignition engines. Pumps – positive and non positive displacement pump.

UNIT IV THERMODYNAMICS BASICS AND REFRIGERATION 9

Basic concepts - Classical and Statistical approaches - Thermodynamic systems - closed, open, isolated. Property – State - Process-adiabatic - Quasi-static process – Cycle - Point and Path function – Energy - Work transfer - Concept of temperature and heat- Zeroth law of thermodynamics - Concept of ideal gases - First law and Second law of thermodynamics. Study of household refrigerator, window air conditioner, split air conditioner Ratings and selection criteria of above devices. Refrigerants and their impact on environment.

UNIT V HEAT TRANSFER**9**

One-dimensional Heat Conduction in cartesian coordinate system : Plane wall – Cylinder - Composite walls –Heat transfer through extended surfaces (simple fins). Convection: Free convection and forced convection - Internal and external flow. Radiation: Black–Gray bodies - Cooling of electronic components: Thermoelectric cooling – Chip cooling.

TOTAL: 45 HOURS**REFERENCES**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Venugopal K. and Prahu Raja V. G. Sreekanjana	Basic Mechanical Engineering	Anuradha Publishers, Kumbakonam	2013
2	Shantha Kumar S R J	Basic Mechanical Engineering	Hi-tech Publications, Mayiladuthurai	2000
3	Nag P K	Engineering Thermodynamics	Fifth Edition”, Tata McGraw-Hill, New Delhi	2013

15BEEE211 ENGINEERING PRACTICE LABORATORY L T P C 0 0 3 2

Course Objectives

- To provide exposure to the students with hands on experience on various basic engineering practices .
- To provide exposure to the students with hands on experience on various basic engineering practices in Civil Engineering.
- To provide exposure to the students with hands on experience on various basic engineering practices in Mechanical Engineering.
- To provide exposure to the students with hands on experience on various basic engineering practices in Electrical Engineering.
- To provide exposure to the students with hands on experience on various basic engineering practices in Electronics Engineering.
- To get the knowledge about application of it

Course Outcomes

- To understand various basic engineering practices in Civil Engineering
- To understand various basic engineering practices in Mechanical Engineering.
- To understand various basic engineering practices in Electrical Engineering.
- To understand various basic engineering practices in Electronics Engineering.
- To analysis the real time application of it
- To understand the different process in the industry

PART – A (CIVIL & MECHANICAL)

- | | |
|--|----------|
| i. WELDING | 6 |
| i. Preparation of arc welding of butt joints, lap joints and tee joints. | |
| ii. BASIC MACHINING | 6 |
| i. Simple Turning and Taper turning | |
| ii. Drilling and Tapping | |
| iii. SHEET METAL WORK | 6 |
| i. Model making – Trays, funnels, etc. | |
| iv. DEMONSTRATION ON | 4 |
| i. Smithy operations | |
| ii. Foundry operations | |
| iii. Plumbing Works | |
| iv. Carpentry Works | |

PART –B (ELECTRICAL & ELECTRONICS)

- | | |
|--|-----------|
| v. ELECTRICAL ENGINEERING | 10 |
| i. Study of electrical symbols and electrical equipments. | |
| ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring. | |
| iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter. | |
| iv. Measurement of electrical quantities – voltage, current, power & power factor in R load. | |

- v. Measurement of energy using single phase energy meter.

vi. ELECTRONICS ENGINEERING (13)

- i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
- ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- iii. Study of logic gates AND, OR, NOT, NOR and NAND.
- iv. Study of HWR and FWR.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jeyachandran, K., Natarajan, S. and Balasubramanian, S	A Premier on Engineering Practices Laboratory	Anuradha Publishers, Kumbakonam	2007
2	Jeyapoovan, T., Saravanapandian, M	Engineering Practices Lab Manual	Vikas Puplishing House Pvt. Ltd, Chennai	2006
3	Bawa, H.S	Workshop Practice	Tata McGraw – Hill Publishing Company Limited, New Delhi	2007

Course Objective

- To impart the basic knowledge about the Electric circuits.
- To understand the different electrical measurements.
- To understand the working of oscilloscope.
- To acquire the knowledge of network theorems
- To observe and analyse the electrical parameters in RLC resonance circuits
- To experiment the basic laws in voltage and current

Course Outcomes (Cos)

- To understand and analyze basic electric circuits.
- Getting basic practical knowledge about the DC Electric circuits.
- Getting knowledge about the testing of different network theorems using simple circuits.
- To introduce basic electrical equipments in the lab
- To enable the students to analysis the basic laws using simple circuits.
- Apply the knowledge in real time application.

LIST OF EXPERIMENTS

1. Study of Electrical Measurements and the Oscilloscope.
2. Study of Potentiometers and Rheostats.
3. Study and verify of Series Circuits, Parallel Circuits and Series-Parallel Circuits in DC Circuits.
4. Study and verify of Ohm's Law and Kirchoff's law.
5. Study and verify of Mesh Analysis.
6. Study and verify of Nodal Analysis.
7. Verification of Superposition Theorem
8. Verification of Thevenin's Theorem
9. Verification of Maximum Power Transfer
10. Verification of Series RLC Resonance and Parallel RLC Resonance.

Course Objectives:

- To give a basic knowledge on biology to all the students from various academic backgrounds
- To study about basics of cell biology
- To study about biomolecules
- To study about human anatomy
- To study about genetic disorders
- To study about recent trends

Course Outcomes

- To understand the basics of biomolecules human anatomy and physiology
- To understand the anatomy
- To understand the physiology
- To get knowledge about genetic disorders
- To get knowledge about human anatomy
- To have better understanding of advancements in biology

UNIT-I BASICS OF CELL BIOLOGY**4**

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT-II BIOMOLECULES**4**

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins- classification and functions; Nucleic acids-basic structure; Hormones-definition, importance; Vitamins.

UNIT-III HUMAN ANATOMY AND PHYSIOLOGY**5**

Levels of Structural organization, the eleven systems of human body, central nervous system- cardiovascular system and immune system.

UNIT-IV GENETICS AND GENETIC DISORDERS**4**

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information- gene mutation, disorders due to mutant genes.

UNIT-V TECHNOLOGICAL ADVANCES IN BIOLOGY**3**

Biopharmaceuticals, Gene therapy, genetically modified crops, probiotics.

TOTAL: 20 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Verma, P. S., Agarwal, V. K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S. Chand &Company Ltd.,New Delhi	2006

REFERENCES

S.No	Author(S) Name	Title of the Book	Publisher	Year of Publications
1	Nelson, D. L. and Cox, M. M	LehningerPrinciples of Biochemistry 4 th Edition	Freeman, W. H. & Company, New york	2004
2	Tortora, G. J., Derrickson, B	Principles of Anatomy and Physiology, 11 th Editionh	John Wiley & Sons, New York	2006

WEBSITE

1. <http://www.biotechonweb.com/Application-of-biotech-in-Medical.html>

SEMESTER III

15BEEE301

METHODS OF APPLIED MATHEMATICS

L T P C 3 2 0 4

Course Objectives:

- To hone the analytical skills in the minds of Engineers.
- To provide sound foundation in the mathematical fundamentals necessary to formulate, solve and analyze Engineering problems.
- To study the fourier series
- To study the basic principles of different transforms.
- To study the application of PDE
- To study the difference equations

Course Outcomes:

Upon Completion of this course the students will be able to:

- Explain the fundamental concepts of probability and standard distributions which can describe real life phenomenon.
- Explain the basic concepts of one- and two-dimensional random variables and their applications in engineering.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
- Discuss the notion of sampling distributions and statistical techniques used in engineering and management problems.
- Discuss about the techniques in quality control that model engineering problems

UNIT I LAPLACE TRANSFORM

13

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions.

UNIT II FOURIER SERIES

12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT III FOURIER TRANSFORM

12

Fourier integral theorem (Statement Only) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

12

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-

dimensional heat equation (Insulated edges excluded)

UNIT V Z -TRANSFORM AND DIFFERENCE EQUATIONS

10

Z-transform - Elementary properties – Inverse Z- transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL : 60HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. www.nptel.ac.in

Course Objectives

- To study the working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- To study the concepts of magnetic fields
- To study the concepts of magnetic circuits.
- To study the working principles of DC machines as Generator types, determination of their no-load/load characteristics, starting and methods of speed control of motors.
- To estimate various losses taking place in D.C. Motor
- To study the different testing methods to arrive at their performance.

Course Outcomes (COs)

At the end of this course, students will demonstrate the ability to

1. Understand the concepts of magnetic fields
2. Understand the concepts of magnetic circuits.
3. Understand the operation of dc machines.
4. Analyse the differences in operation of different dc machine configurations.
5. Analyse the single phase transformers circuits.
6. Analyse three phase transformers circuits.

UNIT I DC GENERATORS**12**

Definitions – Basic laws and rules – Construction and operation - types - Emf equation - Commutation – Armature reaction – Parallel operation.

UNIT II DC MOTORS**12**

Definitions – Basic laws and rules - Operation - types – Back Emf equation - Torque equation - Starters – Speed control - Applications

UNIT III TESTING OF DC MACHINES**12**

Losses and efficiency – Swinburne's, Hopkinson's and load tests – Retardation test – Electric braking.

UNIT IV SINGLE PHASE TRANSFORMER**12**

Principle of operation – Types and construction–EMF equation-. Phasor diagram - Open Circuit and Short circuit test– Equivalent circuit – Load test – Regulation and efficiency -All day efficiency – Sumpner's test.

UNIT V THREE PHASE TRANSFORMER**12**

Principle of operation – Types and construction -Three phase transformers connections – Scott connection – Parallel operation - Auto transformers- Inrush current phenomenon and its prevention – Off-load and On-load tap changing.

TOTAL: 60 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kothari D.P. and Nagrath I.J	Electric Machines	Tata McGraw Hill, Fourth Edition	2011
2	Fitzgerald A.E., Kingsly C. and Kusko.A	Electric Machinery	Tata McGraw Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sen S.K	Electric Machinery	Khanna Publishers, New Delhi	2008
2	Say M.G	Alternating Current Machines	5th Edition, Pitman Publishing	2007
3	Irving. L. Kosow	Electrical Machines and Transformers	PHI, 2 nd Edition	2007
4	Theraja B.L. and Theraja A.K	A Text Book of Electrical Technology	Vol. II, S.Chand & Co. Ltd., New Delhi	2007
5	Bimbhra P.S	Electrical Machinery	Khanna Publishers, New Delhi	2009

WEBSITE

http://nptel.iitm.ac.in/courses/IIT-MADRAS/Electrical_Machines_I/index.php

Course Objectives

- To introduce the basic mathematical concepts related to electromagnetic vector fields
- To impart knowledge on the concepts of electrostatics, electrical potential, energy density and their applications.
- To impart knowledge on the concepts of magnetostatics, magnetic flux density, scalar and vector potential and its applications.
- To impart knowledge on the concepts of Faraday's law, induced emf and Maxwell's equations
- To impart knowledge on the concepts of Concepts of electromagnetic waves and Pointing vector.
- To study the different thermodynamic fields

Course Outcomes (COs)

At the end of the course, students will demonstrate the ability

- 1.To understand the basic laws of electromagnetism.
- 2.To obtain the electric and magnetic fields for simple configurations under static conditions.
- 3.To understand the concept of Conductors, Dielectrics and Capacitance.
- 4.To analyse time varying electric and magnetic fields.
- 5.To understand Maxwell's equation in different forms and different media.
- 6.To understand the propagation of EM waves.

UNIT I INTRODUCTION 12

Sources and effects of electromagnetic fields – Vector fields – Different co- ordinate systems – Divergence theorem – Stoke's theorem.

UNIT II ELECTROSTATIC 12

Coulomb's Law – Electric Field Intensity – Field Due to Point, Line, Surface and Volume Charges – Electric Flux Density - Gauss's law and its Application – Electrical Potential — Electrical Field in Free space, conductors – **Electric Field due to infinite long Conductors, circular loop** – Boundary Conditions, Poisson's and Laplace's equations – Capacitance – Energy Stored in Capacitance – Energy Density .

UNIT III MAGNETOSTATICS 12

Lorentz law of force, Magnetic Field Intensity- Biot Savarts law – Ampere's Law – Magnetic Field due to Straight Conductors, circular loop,– Magnetic flux density (B) – B in free space, conductor, Magnetic Materials- Magnetization – Magnetic Field in Multiple Boundary Conditions – Magnetic Force – Self Inductance and Mutual Inductance – Inductance of Solenoids, Toroids.

UNIT IV ELECTRODYNAMIC FIELDS 12

Faraday's laws, Maxwell's Equations (differential and integral forms) – Conduction Current and Displacement Current – **Relation between Field Theory and Circuit Theory.**

UNIT V ELECTROMAGNETIC WAVES 12

Generation – Electromagnetic Wave Equations –Wave Propagation in Free Space, Dielectrics and conductors – Skin Depth, Pointing Theorem – Plane Wave Reflection and Refraction.

•

TEXTBOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	William H. Hayt	Engineering Electromagnetics	Tata McGraw Hill, New Delhi	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Nagrath, I.J., Kothari D.P	Electric machines	Tata McGraw Hill publishing Co Ltd., New Delhi	2004
2	Kraus and Fleish	Electromagnetics with Applications	5 th edition, McGraw Hill international edition	2010
3	Sadiku	Elements of electromagnetics	6 th edition, oxford university press	2014
4	Joseph Edminister	Schaum's outline of electromagnetic	4 th edition, McGraw Hill	2013

WEBSITES

1. http://en.wikipedia.org/wiki/Electromagnetic_force
2. <http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6013Electromagnetics-and-ApplicationsFall2002/CourseHome/index.htm>

Course Objectives

- Understand electronic systems with a continuously variable signal
- Understand proportional relationship between a signal and a voltage or current that represents the signal.
- To learn function of basic component's use in linear circuits.
- Understand component symbol, working principle, classification and specification.
- To get more understanding about amplifiers and oscillators
- To learn different theorems for simplification of basic linear electronics circuits.

Course Outcomes

- To impart knowledge on semiconductor devices,
- Understand the working of amplifiers,
- Understand the working of oscillators,
- Understand the working of pulse circuits.
- Analyse the real time application of semiconductor diode
- Analyse the application of amplifier, transistor and special devices

UNIT I SEMICONDUCTOR DIODE**9**

Theory of p-n junction – p-n junction as diode – p-n diode currents – Volt-amp characteristics – Diode resistance – Temperature effect of p-n junction – Transition and diffusion capacitance of p-n diode – zener diode -Diode switching times.

UNIT II TRANSISTOR**9**

Junction transistor – Transistor construction CE, CB and CC configurations – Transistor switching times Voltage rating –Junction field effect transistor–pinch off voltage– output and transfer characteristics

UNIT III AMPLIFIER**9**

CE, CC and Common base amplifiers –Differential amplifiers-Push-pull amplifiers -Negative feedback amplifiers - Voltage / current, series/shunt -Single and double tuned amplifier.

UNIT IV MISCELLANEOUS DEVICES**9**

Construction and operation: Solar cell, photodiode, photo transistor, opto coupler and laser diode, UJT, thermistors, piezo electric devices, MOSFETS–FET as a variable resistor.

UNIT V OSCILLATORS AND PULSE CIRCUITS**9**

Oscillators – Colpitts, Hartley, Phase shift, Wien bridge and crystal oscillators. RC Diode clippers and clippers, Wave shaping circuits: Multivibrators types – Schmitt triggers – UJT based saw tooth oscillators- varactor diode, tunnel diode -LDR, LEDs, LCDs.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jacob Millman & Christos.C.Halkias.	Electronic Devices & Circuits	Prentice Hall of India, New Delhi.	2003
2	Allen Mottershead	Electronic Devices and Circuits – An	Prentice Hall of India Private Limited, New	2003

		Introduction	Delhi.	
3	David A. Bell	Electronic Devices and Circuits	Prentice Hall of India, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Robert. L. Boylestad & Lo Nashelsky	Electronic Devices & Circuit Theory	Pearson Education	2002
2	Jacob Millman & Herbert Taub	Pulse, Digital & Switching Waveforms	Tata McGraw Hill, Edition 2000	2003
3	Donald L.Schilling and Charles Belove	Electronic Circuits	Tata McGraw Hill	2003

Course Objectives

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

Course Outcomes

At the successful completion of this course, the student is expected to have/be able to:

- List and generally explain the main sources of energy and their primary applications in the US, and the world.
- Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.
- Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.
- List and describe the primary renewable energy resources and technologies.
- Analyze the different energy sources
- Students gathered the real time inter connected system modeling in wind power

UNIT I INTRODUCTION**9**

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY**9**

Introduction to solar energy: solar radiation, availability, measurement and estimation – Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY**9**

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic – Types of wind machines . Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY**9**

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES**9**

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL: 45 HOURS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers ,Fourth edition	2010
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Fourth edition	2005
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2006

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objective

- To impart the basic knowledge about the Electric circuits.
- To understand the working of Electrical Machines and Transformers.
- To observe the speed control experiments in DC motor
- To acquire the knowledge of energy consumption measurements in single phase system
- To observe and analyse the electrical parameters in R load
- To experiment the basic laws in voltage and current

Course Outcomes (Cos)

At the end of this course, students will demonstrate the ability

- To understand and analyze basic electric and magnetic circuits.
- Getting basic practical knowledge about the Electric circuits.
- Getting knowledge about the testing of Electrical Machines and Transformers.
- To observe the speed control experiments in DC moto
- To study the working principles of electrical machines and power converters.
- Gathered knowledg of commercial system energy calculations

LIST OF EXPERIMENTS

1. Open circuit characteristics and load test on separately excited DC generator.
2. Open circuit characteristics and load test on DC compound generator.
3. Open circuit characteristics and load test on DC shunt generator.
4. Load test on DC shunt motor.
5. Load test on DC series motor.
6. Load test on DC compound motor.
7. Swinburne's test and speed control on DC shunt motor.
8. OC and SC tests on single phase transformer.
9. Load test on single phase transformer.
10. Sumpner's test

Course Objectives

- To introduce the fundamentals of BJT
- To impact FET input and output characteristics
- To impact JFET input and output characteristics
- To learn knowledge of transistor
- To study about oscillator
- To study the design and implementation of various electronic circuits

Course Outcomes

- To analysis FET input and output characteristics
- To analysis JFET input and output characteristics
- To demonstrate the knowledge of transistor
- To analysis real time application of oscillator
- To design and implementation of various electronic circuits
- To analysis the real time application of it

LIST OF EXPERIMENTS

1. Static characteristics of semiconductor diode.
2. Characteristics of Zener diode and study of simple voltage regulator circuits.
3. Static Characteristics of transistor configuration.
4. Static and transfer characteristics of JFET.
5. Differential amplifier using FET.
6. Static characteristics of UJT.
7. Characteristics of Photodiode and Phototransistor.
8. Colpitts oscillator.
9. RC Phase shift oscillator.
10. Frequency response of common emitter amplifier.

Course Objectives

- To impart knowledge on the MATLAB software
- To study about Simulink creation using MATLAB
- To study Electrical CAD
- To get knowledge about proteus
- To get knowledge about PLC
- To study about PLC language

Course Outcomes (COs)

- To analysis real time project in MATLAB software
- To analysis real time project using MATLAB coding
- To analysis real time project in Electrical CAD
- To analysis real time project in proteus
- To analysis real time project in PLC
- To analysis real time project using PLC language

LIST OF EXPERIMENTS

1. Introduction to MATLAB, Starting and Quitting MATLAB, Basic Commands, Working with Matrices.
2. MATLAB Expressions, Relational and Logical Operations, Plotting Function Complex and Statistical Functions, Input / Output of Variables Flow Control.
3. MATLAB Simulink Basic; Starting Simulink - Basic Elements - Building a System - Gathering Blocks - Modifying the Blocks - Connecting the Blocks - Running Simulations.
4. Introduction to Electrical CAD : Schematic components and Symbol Builder.
5. Electrical CAD: Circuit Builder Component tools and Wire/Wire number tools.
6. Introduction to Proteus: Create and name a new file, Insert segment(s) into the session, Edit each segment and Segment Parameters.
7. Proteus: Test segments in real time, save the finished session and Transfer it to Proteus.
8. Proteus: Create a model and test it.
9. Introduction to Programmable Logic Controller (PLC): Program Files, Data Files and input/ output table file operation.
10. Programmable Logic Controller (PLC): Program Scan, Scan Process, Data flow overview, Scan Patterns and PLC Programming Language.

SEMESTER IV

15BEEE401 ELECTRICAL MACHINES II L T P C 3 1 0 4

Course Objectives

- To learn Construction and performance of salient and non-salient type synchronous generators.
- To get the knowledge of operation and performance of synchronous motor.
- To study and understand the concept of AC machine windings.
- To study and understand the concepts of rotating magnetic fields.
- To study the operation and performance of 3 Phase induction motors and its starting and speed control.
- To study the Construction, principle of operation and performance of single phase induction motors and few special machines

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Understand the concept of AC machine windings.
2. Understand the concepts of rotating magnetic fields.
3. Understand the operation of ac machines.
4. Analyse performance characteristics Induction Machines.
5. To understand the different types of single phase induction motor based on its starting methods.
6. Understand the operation of synchronous motor and analyze the performance of motor under different loading and excitation conditions.

UNIT I ALTERNATORS

12

Alternators - Types and constructional features - Emf equation - Armature reaction - Load characteristics - Phasor diagram - **Predetermination of regulation by EMF, MMF and ZPF methods.**

UNIT II TWO REACTION THEORY

12

Basic ideas of two reaction theory - Direct and quadrature axis reactances and their determination - Phasor diagram and regulation of salient pole alternators - Parallel operation - Synchronizing torque - Expression for synchronizing power.

UNIT III SYNCHRONOUS MOTORS

12

Synchronous motors - Principle of operation - Synchronous machines on infinite bus bars - Phasor diagram - V and inverted V curves - **Current and power circle diagrams - Hunting and its suppression - Starting methods** - Synchronous condenser.

UNIT IV INDUCTION MOTORS

12

Polyphase induction motors - Types and constructional features - Principle of operation - Torque - slip characteristics - Effect of rotor resistance - Equivalent circuit - Circle diagram - **Starting and speed control of Induction motor-Introduction to Induction generator.**

UNIT V SINGLE PHASE INDUCTION MOTOR

12

Construction and Principle of operation of single phase induction motor- Double revolving field theory - Methods of starting - types- Applications.

- **TOTAL: 60 HOURS**

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kothari D. P. and Nagrath I. J	Electric Machines	Tata McGraw Hill, Fourth Edition	2011
2	Theraja B. L and Theraja A. K	A Textbook of Electrical Technology	Vol. II, S Chand & Co. Ltd., New Delhi	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Fitzgerald A. E., Kingsly C. and Kusko A	Electric Machinery	Tata McGraw Hill	2007
2	Langsdorf A. S	Theory of A.C Machinery	Tata McGraw Hill	2001
3	Sen. S. K	Electric Machinery	Khanna Publishers, New Delhi,	2008
5	Bimbhra P.S	Electrical Machinery	Khanna Publishers, New Delhi	2009

WEBSITES

1. www.classle.net/sites/default/files/text/68781/2_2_0.pdf
2. www.gtbit.org/downloads/emecsem3/emecsem3n4qbank.pdf

Course Objectives

- To develop expression for computation of fundamental parameters of lines.
- To categorize the lines into different classes and develop equivalent circuits for these classes.
- To study the voltage distribution in insulator strings and cables and methods to improve the same
- To learn the modeling of transmission line parameters.
- To study the different insulation materials
- To learn about the use of cables in transmission line parameters

Course Outcomes

At the end of the course the students will be able

- To understand the transmission and distribution systems of electric power,
- To understand electrical and mechanical design parameters of lines.
- To understand the transmission line parameters
- To analyse and modeling the transmission line parameters
- To understand the different cables for transmission lines
- To understand the different insulation materials for transmission lines

UNIT I INTRODUCTION**12**

Structure of electric power system: Generation, transmission and distribution; HVDC and EHV AC transmission: comparison of economics of transmission, technical performance and reliability, application of HVDC transmission system.

UNIT II TRANSMISSION LINE PARAMETERS**12**

Parameters of single and three phase transmission lines with single and double circuits: Resistance, inductance and capacitance of solid, stranded and bundled conductors: Symmetrical and unsymmetrical spacing and transposition; skin and proximity effects; interference with neighbouring communication circuits. Typical configuration, conductor types and electrical parameters of 400, 220, 110, 66 and 33 kV lines.

UNIT III MODELING AND PERFORMANCE OF TRANSMISSION LINES 12

Classification of lines: Short, medium and long line; equivalent circuits, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation; real and reactive power flow in lines: Power-angle diagram; surge-impedance loading, loadability limits based on thermal loading, angle and voltage stability considerations; shunt and series compensation; Ferranti effect and corona loss. Sag computations. FACTS (qualitative treatment only): SVC, TCSC, STATCOM and UPFC.

Insulators: Types, voltage distribution in insulator string and grading, improvement of string efficiency. Underground cables: Constructional features of LT and HT cables, capacitance, dielectric stress and grading, thermal characteristics.

UNIT V SUBSTATION, GROUNDING SYSTEM AND DISTRIBUTION SYSTEM 12

Types of substations: bus-bar arrangements; substation bus schemes: single bus scheme, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, breaker-and-a-half with two main buses, double bus-bar with bypass isolators. Resistance of grounding systems: Resistance of driven rods, resistance of grounding point electrode, grounding grids, design principles of substation grounding system; neutral grounding. Radial and ring-main distributors, interconnectors. AC distribution: AC distributor with concentrated load; three-phase four wire distribution system sub-mains; stepped and tapered mains.

TOTAL: 60 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hadi Saadat	Power System Analysis	Tata McGraw Hill Publishing, New Delhi Company	2003
2	Central Electricity Authority (CEA)	Guidelines for Transmission System Planning	Tamil Nadu Electricity Board	2003
3	Colin Bayliss and Brian Hardy	Transmission and Distribution Electrical Engineering	Elsevier, Newnes	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gupta, B. R	System Analysis and Design	S.Chand, New Delhi	2003
2	V.K.Metha Rohit Metha	Principles of power system	S.Chand & co, New Delhi	2010
2	Singh, S. N	Electric Power Generation, Transmission and Distribution	Prentice Hall of India Pvt. Ltd, New Delhi	2002

WEBSITE

<http://www.adamiano.com/>

Course Objectives

- To understand the use of transfer function models for analysis physical systems and introduce the control system components.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed-loop frequency responses of systems.
- To introduce stability analysis
- To introduce state variable representation of physical systems
- To introduce the design of compensators.

Course Outcomes

1. Derive the transfer function of electrical and mechanical systems using various reduction techniques
2. Analyze the response of the control system by investigating steady state error and time domain specifications
3. Construct the root locus to find the stability of the system and explain the effects of different types of controller
4. Construct the frequency response of the system using various plots and correlate the time and frequency domain specifications and effect of compensation
5. Design the different types of compensators using frequency response plots to stabilize the control system
6. Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT-I CONTROL SYSTEM MODELLING**12**

System concept, differential equations and transfer functions. Modeling of electric systems, translational and rotational mechanical systems, Simple electromechanical systems. Block diagram representation of systems – Block diagram reduction methods – Closed loop transfer function, determination of signal flow graph. Mason's gain formula – Examples.

UNIT-II TIME DOMAIN ANALYSIS**12**

Test signals – time response of first order and second order systems – time domain specifications – types and order of systems – generalized error co-efficient – steady state errors – concepts of stability – Routh-Hurwitz stability – root locus.

UNIT-III FREQUENCY DOMAIN ANALYSIS**12**

Introduction – correlation between time and frequency response – stability analysis using Bode plots, Polar plots, Nichols chart and Nyquist stability criterion – Gain margin – phase margin.

UNIT-IV COMPENSATORS**12**

Realization of basic compensators – cascade compensation in time domain and frequency

domain and feedback compensation – design of lag, lead, lag-lead compensator using Bode plot.
Introduction to P, PI and PID controllers.

UNIT-V CONTROL SYSTEM COMPONENTS AND APPLICATION OF CONTROL SYSTEMS

Stepper motors – AC servo motor – DC servo motor – Synchros – sensors and encoders – DC tachogenerator – AC tachogenerator – Hydraulic controller – Pneumatic controller – Typical application of control system in industry.

TOTAL: 60 HOURS

TEXT BOOKS

S.NO.	Author(s) Name	Title of the Book	Publisher	Year of publication
1	Ogata.K	Modern Control Engineering	Prentice Hall of India, New Delhi	2003
2	Nagrath & Gopal	Control System Engineering	New Age International Edition, New Delhi.	2002

REFERENCES

S.NO.	Author(s) Name	Title of the Book	Publisher	Year of publication
1	Benjamin.C.Kuo	Automatic Control Systems	Prentice Hall of India, New Delhi	2002
2	Norman S. Nise	Control System Engineering	Wiley Publication, 6 th edition	2010

Course Objectives

- To introduce the fundamentals of Digital Circuits, combinational and sequential circuits.
- To study various number systems and to simplify the mathematical expressions using Boolean functions – simple problems.
- To study the implementation of combinational circuits
- To study the design of various synchronous and asynchronous circuits.
- To expose the students to various memory devices.
- To study the application of it

Course Outcomes:

- At the end of this course, students will demonstrate the ability to
1. Use numerical methods to analyse a power system in steady state.
 2. Understand stability constraints in a synchronous grid.
 3. Understand methods to control the voltage, frequency.
 4. Understand methods to control the power flow.
 5. Understand the monitoring and control of a power system.
 6. Understand the basics of power system economics

UNIT I NUMBER SYSTEM AND BOOLEAN ALGEBRA 9

Review of number system; types and conversion, codes. Boolean algebra: De–Morgan’s theorem, switching functions and simplification using K–maps and Quine McCluskey method.

UNIT II COMBINATIONAL CIRCUITS 9

Design of Logic gates. Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers. Function realization using gates and multiplexers.

UNIT III SYNCHRONOUS SEQUENTIAL CIRCUITS 9

Flip flops – SR, D, JK and T. Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Counters, state diagram; state reduction and state assignment.

UNIT IV ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Analysis of asynchronous sequential machines, state assignment and asynchronous design problem – Hazards.

UNIT V PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES 9

Memories: RAM, ROM, PROM, EPROM, EEPROM, PLA, PAL, PLD, FPGA, and Digital logic families. GATE implementations.

- **TOTAL: 45 HOURS**

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Morris Mano, M.	Digital Logic and Computer Design	Prentice Hall of India, New Delhi.	2002

2	Charles H Roth	Fundamentals Logic Design	Jaico Publishing, New Delhi.	2002
---	----------------	---------------------------	------------------------------	------

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Floyd, L.	Digital Fundamentals	Pearson Education, New Delhi.	2003
2	John F Wakerly	Digital Design Principles and Practice	Pearson Education, New Delhi.	2002
3	Rafiquzzaman , M.	Fundamentals of Digital Logic and Microcomputer Design	Wiley–Interscience, New York	2005
4	John M Yarbrough	Digital Logic, Application and Design	Thomson, USA.	2002

WEBSITES

1. <http://www.onesmartclick.com/engineering/linear-integrated-circuits.html>
2. http://www.allaboutcircuits.com/vol_4/index.html

Course Objectives

- To study the units, dimensions and standards.
- To study the different types of measuring instruments.
- To provide adequate knowledge in electrical and electronic measurement techniques and instruments.
- To make the students to have a clear knowledge of the basic laws governing the operation of the instruments, relevant circuits and their working.
- Introduction to general instrument system, error, calibration etc.
- Emphasis is laid on analog and digital techniques used to measure voltage, current, energy and power, etc.

Course Outcomes

At the end of the course the students will have

1. Learn units, dimensions and standards.
2. Learn basics of different types of measuring instruments to measure different electrical quantities
3. Apply their knowledge to measure electrical quantities using standard analog and digital measuring instruments
4. basic knowledge of measurement systems towards measurements, including error analysis, interpretation, experimental uncertainty, calibration, etc.
5. To apply basic concepts of measurement systems with electrical signals, including signal conditioners (gain, attenuation), indicating and recording devices
6. Measure different electrical parameters using conventional bridges and acquire data through digital measuring instruments and interpret the data.

UNIT I INTRODUCTION**9**

Functional elements of an instrument – Units and standards of measurements – Static and dynamic characteristics – Sources of Errors in measurement – DC and AC bridges – Wheatstone, Kelvin's double, Maxwell, Anderson, Wien and Schering bridges – Measurement of high resistance – Standards and calibration.

UNIT II MEASURING INSTRUMENTS**9**

Classification of instruments – working principle of potentiometers – Principle of operation and construction of PMMC, MI, type instruments – Principle types and working of analog and digital voltmeters, ammeters and multimeters – Determination of B-H curve and measurement of iron loss – Instrument transformers – CT and PT – Instruments for measurement of frequency and phase.

UNIT III MEASUREMENT OF POWER AND ENERGY**9**

Dynamometer type wattmeter – Single and three phase wattmeters – Induction type instruments Single and three phase energy meters – calibration of energy meters – direct and phantom loading – Grounding techniques – Megger - Power factor meter- Principle of operation, construction and types of digital frequency meters, Digital Energymeters.

UNIT IV STORAGE, DISPLAY DEVICES AND TRANSDUCERS**9**

Magnetic measurements – Magnetic disk and tape-recorders – Strip chart recorder – XY recorder. Digital plotters and printers – Cathode ray Oscilloscope– digital CRO and dot matrix display. Classification of transducers – Selection of transducers – Resistive – capacitive

and inductive transducers – LVDT – Piezo-electric, optical and digital transducers.

UNIT V VIRTUAL INSTRUMENTATION

9

Concept of VIs and sub VI - Display types – Digital – Analog – Chart and Graphs. Loops - structures - Arrays – Clusters. Local and global variables – String and file I/O. Timers and dialog control.

TOTAL: 45 HOURS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Doebelin. E.O.	Measurement Systems – Application and Design	Tata McGraw Hill Publishing Company, New Delhi.	2003
2	Sawhney. A. K.	A Course in Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai and Co., New Delhi.	2004

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Moorthy. D. V. S.	Transducers and Instrumentation	Prentice Hall of India Pvt. Ltd, New Delhi.	2003
2	Martin Reissland	Electrical Measurements	NewAge International (P) Ltd., Delhi.	2001
3	Gupta, J. B	A Course in Electronic and Electrical Measurements	S. K. Kataria and Sons, Delhi.	2003
4	Gary. W. Johnson and Richard	LabVIEW Graphical Programming	Tata McGraw Hill Publications, New York.	2006

WEBSITES

1. <http://www.elect.mrt.ac.in>

Course Objectives

- To expose the students to the operation of synchronous machines and induction motors and give them experimental skills
- To study the operation of synchronous motor on infinite bus for different excitation condition
- To Study the performance of single phase induction motor by conducting direct and indirect testing
- To study the performance of three phase induction motor by conducting direct and indirect testing
- To study the importance of various componenets in alternators
- To study the importatnce need of ZPF methods

Course Outcomes (COs)

1. Compare the different indirect testing methods to predetermine the voltage regulation of three phase salient and non-salient pole alternator
2. Determine the positive, negative and zero sequence impedance of alternators
3. Analyze the operation of synchronous motor on infinite bus for different excitation condition
4. Assess the performance of three phase induction motor by conducting direct and indirect testing
5. Assess the performance of single phase induction motor by conducting direct and indirect testing
6. Choose the appropriate induction motor starter for various industrial and commercial applications

LIST OF EXPERIMENTS

1. Regulation of Alternator by EMF and MMF Methods
2. Load test on three phase Alternator
3. Regulation of salient pole Alternator by Slip Test
4. Regulation of Alternator by ZPF method
5. V and Inverted V curves of Synchronous Motor
6. Equivalent Circuit of three phase Induction Motor
7. Load Test on three phase Induction Motor
8. Performance characteristics of three phase Induction Motor by Circle Diagram
9. Load Test on single phase Induction Motor
10. Speed control of Slip Ring Induction Motor
11. Study of different types of starting of Induction Motors

Course Objectives:

- To introduce the scientific computing, covering some important aspects of solving algebraic equations, IVP, BVP.
- To implement the methods using the spread sheet in Excel
- To implement solution of numerical integration
- To implement solution of initial value problems governed by ODE
- To implement solution of BVP governed by PDE
- To implement solution of transcendental equation.

Course Outcomes:

1. To develop analytical skills for solving different engineering problems.
2. To understand the concepts of Matrices, sequences and series.
3. To solve problems by applying Differential Calculus and Differential equations.
4. To analysis initial value problems governed by ODE
5. To analysis BVP governed by PDE
6. To analysis transcendental equation.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x = f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
 - i) Runge - Kutta 4th order method
 - ii) Modified Euler's method
 - iii) Milne's method
 - iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
 - i) Laplace Equation
 - ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
 - iii) One dimensional wave equation
Implicit method

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014
2	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009

Course Objectives

Students will learn

- To provide a platform for understanding the basic concepts of linear control theory and its application to practical systems
- To find the transfer function of DC Shunt Motor.
- To find the frequency response of different compensators
- To find the step response of p controller.
- To find the step response of pi & pid controller.
- To identify the type of damping from the given characteristic equation.

Course Outcomes (COs)

1. Determine the transfer function of DC Shunt Motor.
2. Ability to find the frequency response of different compensators
3. Ability to find the step response of P Controller.
4. Ability to find the step response of PI & PID Controller.
5. Ability to identify the type of damping from the given Characteristic equation.
6. Evaluate the speed control of Dc motor.

LIST OF EXPERIMENTS

1. Transfer function of separately Excited DC generator.
2. Transfer function of armature controlled DC shunt motor.
3. Transfer function of field controlled DC shunt motor.
4. Transfer function of AC servomotor.
5. Step response of P, PI, and PID controllers.
6. Identification of type of damping from the given characteristic equation of second order system.
7. Simulation of step response & step response of second order under damped system using 'C' and MATLAB simulink.
8. Frequency response of Lead compensator network.
9. Frequency response of Lag compensator network.
10. DC Motor speed control.

Course Objectives

- To introduce the application of electronic devices for conversion, control and conditioning of electric power.
- To get an overview of different types of power semi-conductor devices and their switching characteristics.
- To understand the operation, characteristics and performance parameters of controlled rectifiers and basic topologies of DC-DC switching regulators.
- To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods.
- To know the practical application for power electronics converters in conditioning the power supply.
- To get the knowledge of real time application of it

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Understand the differences between signal level .
2. Understand the differences between power level devices.
3. Analyse controlled rectifier circuits.
4. Analyse the operation of DC-DC choppers.
5. Analyse the operation of voltage source inverters.
6. Understand different modulation techniques.

UNIT I POWER SEMI CONDUCTOR DEVICES**12**

Silicon Controlled Rectifier(SCR), TRIAC, DIAC - Structure, V-I Characteristics- Two Transistor Model, Structure and characteristics of Power Diode, Power BJT, MOSFET, IGBT, GTO, Comparisons of Power Semiconductor Devices-Firing circuits.

UNIT II PHASE CONTROLLED CONVERTERS**12**

Operation and Analysis of Single Phase Half and Fully Controlled Converter using R, RL load- Three Phase Half and Fully Controlled Converter using R, RL load-Effects of Source Impedance, Dual converter (only Block diagram approach).

UNIT III CHOPPERS**12**

Step-Down and Step-up Choppers-Control Strategies of Chopper- Multi Quadrant Operation of Chopper- Switched Mode Regulators: Buck, boost, Buck-Boost Regulator- Applications of DC Chopper.

UNIT IV DC-AC CONVERTER**12**

Single phase half bridge and full bridge inverters - three phase bridge inverters (120 and 180 degree modes of operation)- Multilevel inverter (block diagram Approach only)- PWM techniques- single PWM, multiple PWM, Sinusoidal PWM, Current source inverter(CSI).

UNIT V AC-AC CONVERTER AND APPLICATIONS

12

Single phase cyclo converter, Single phase AC voltage controller- Applications- Uninterrupted Power Supply topologies (On line and Off line) – Flexible AC Transmission Systems –Unified Power Flow Controller– HVDC Transmission.

TOTAL: 60 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Muhammad H Rashid	Power Electronics: Circuits, Devices and Applications	Pearson Education New Delhi	2004
2	Ned Mohan, Tore M Undeland, William P Robbins	Power Electronics: Converters, Applications and Design	John Wiley and sons, New Delhi	2003
3	Singh. M.D and Kanchandani	Power Electronics	Tata McGraw Hill &Hill Publication Company limited, NewDelhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Bimal K Bose	Modern Power Electronics and AC Drives	Pearson Education , New Delhi	2003
2	Andrzej M. Trzynadlowski	Introduction to Modern power	Wiley India Pvt. Ltd	2012
3	Robert W Erickson and Dragan Maksimovic	Fundamentals of Power Electronics	Springer, New Delhi	2006

WEBSITE

[http://nptel.iitm.ac.in/courses/Webcoursecontents/IITKharagpur/PowerElectronics/PDF/L-1\(SSG\)\(PE\)\(\(EE\)NPTEL\).pdf](http://nptel.iitm.ac.in/courses/Webcoursecontents/IITKharagpur/PowerElectronics/PDF/L-1(SSG)(PE)((EE)NPTEL).pdf)

Course Objectives

- To become familiar with different aspects of modeling of components and system
- To study different methods of analysis of power system for power system planning and operation.
- To model steady-state operation of large sized power system
- To understand the power flow problem using efficient numerical methods suitable for computer application.
- To model and analyse power systems under abnormal (fault) conditions.
- To model and analyse the dynamics of power system for small signal and large signal disturbances and to design the system for enhancing stability.

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Understand the concepts of power systems.
2. Understand the various power system components.
3. Evaluate fault currents for different types of faults.
4. Understand the generation of over-voltages and insulation coordination.
5. Understand basic protection schemes.
6. Understand concepts of HVdc power transmission and renewable energy generation.

UNIT I THE POWER SYSTEM – AN OVERVIEW AND MODELING 12

Modern Power System - Basic Components of a power system - Per Phase Analysis
Generator model - Transformer model - line model. The per unit system -Change of base.

UNIT II POWER FLOW ANALYSIS 12

Introduction - Bus Classification - Bus admittance matrix, Nodal method, Singular transformation method without mutual coupling - Solution of non-linear Algebraic equations - Gauss Seidal method - Newton Raphson method - Fast decoupled method - Flow charts and comparison of the three methods.

UNIT III FAULT ANALYSIS - BALANCED FAULT 12

Introduction – Balanced three phase fault – short circuit capacity – systematic fault analysis using bus impedance matrix – algorithm for formation of the bus impedance matrix.

UNIT IV FAULT ANALYSIS – SYMMETRICAL COMPONENTS AND UNBALANCED FAULT 12

Introduction – Fundamentals of symmetrical components – sequence impedances – sequence networks – single line to ground fault – line fault - Double line to ground fault – Unbalanced fault analysis using bus impedance matrix.

UNIT V POWER SYSTEM STABILITY 12

Basic concepts and definitions – Rotor angle stability – Voltage stability – Mid Term and Long Term stability – Classification of stability – An elementary view of transient stability – Equal area criterion – Responses to a short circuit fault- factors influencing transient stability – Numerical integration methods – Euler’s method – modified Euler’s method – Runge Kutta methods.

TOTAL: 60 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hadi Saadat	Power System Analysis	Tata McGraw Hill Publishing Company, New Delhi.	2002
2	Olle I Elgerd	Electric Energy Systems Theory – An Introduction	Tata McGraw Hill, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kundur, P	Power System Stability and Control	Tata McGraw Hill Publications,	2010
2	Nagrath, I. J. and Kothari, D. P	Modern Power System Analysis	Tata McGraw Hill Publications, New Delhi.	2009
3	Duncan Glover, J. and Mulukutla. S Sarma	Power System Analysis and Design	CL-Engineering. Hyderabad, India.	2001

WEBSITE

<http://www.powerqualityanddrives.com>

Course Objectives

- To study the IC fabrication procedure.
- To study characteristics; realize circuits; design for signal analysis using Op-amp ICs.
- To study the applications of Op-amp.
- To study internal functional blocks and the applications of special ICs like Timers,
- To study PLL circuits, regulator Circuits, ADCs.
- To get the knowledge of recent development in it

Course Outcomes

- Ability to understand and analyse, linear and digital electronic circuits.
- Understand the IC fabrication procedure.
- Understand the characteristics; realize circuits; design for signal analysis using Op- amp ICs.
- Analysis the applications of Op-amp.
- Analysis the internal functional blocks and the applications of special ICs like Timers,
- Analysi the real time time application of PLL circuits, regulator Circuits, ADCs.

UNIT I IC FABRICATION**9**

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging.

UNIT II CHARACTERISTICS OF OPAMP**9**

Ideal OP-AMP characteristics-Non ideal characteristics- DC characteristics- Input bias current-Input bias voltage-Input offset current-Thermal drift.AC characteristics –Frequency response-Frequency compensation techniques- Slew rate. Basic applications of op-amp – summer, differentiator and integrator.

UNIT III APPLICATIONS OF OPAMP**9**

Instrumentation amplifier, first and second order active filters, V/I and I/V converters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R-2R ladder and weighted resistor types), A/D converter - Dual slope, successive approximation and flash types.

UNIT IV SPECIAL ICs**9**

555 Timer circuit – Functional block, characteristics and applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications.

UNIT V APPLICATION ICs**9**

IC voltage regulators – Fixed voltage regulators, Adjustable voltage regulators- 723 general purpose voltage regulator, LM380 power amplifier, ICL8038 function generator IC, isolation amplifiers, optocoupler, optoelectronic ICs.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ramakant A Gayakward	Op-amps and Linear Integrated Circuits	Pearson Education, USA.	2011
2	Roy Choudhary, D, and Sheil B Jani	Linear Integrated Circuits	New Age Publishing, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jacob Millman, Christos C Halkias	Integrated Electronics - Analog and Digital circuits system	Tata McGraw Hill, New Delhi.	2003
2	David A Bell	Op-amp and Linear ICs,	Prentice Hall of India, New Delhi.	2007

WEBSITE

<http://www.onesmartclick.com/engineering/linear-integrated-circuits.html>

Course Objectives

- To study the Architecture of 8085 and 8051.
- To study the addressing modes and instruction set of 8085 and 8051.
- To introduce the need and use of Interrupt structure.
- To develop skill in simple program writing.
- To introduce commonly used peripheral/interfacing ICs and Advanced Processors.
- To study the advanced processors

Course Outcomes

1. At the end of this course, students will demonstrate the ability to Explain about the architecture of 8051 microprocessor, pin configuration, interrupts and the timing diagram of 8085
2. Develop the assembly language program using mnemonics and corresponding machine code based on architecture of 8051 microprocessor
3. Define the 8051 microcontroller with its architecture, pinouts, memory organization, interrupts and compare the programming concepts with 8051
4. Illustrate the interfacing of 8085 with various peripheral devices for transmission, reception and control of data
5. Make use of the data conversion technique such as ADC and DAC and to interface with 8085 processor and 8051 microcontroller
6. Develop the microcontroller assembly language program for various real time applications

UNIT I 8085 PROCESSOR 9

Architecture – Functional block diagram – Signals – Memory interfacing – I/O ports and data transfer concepts – Timing Diagram – Interrupt structure.

UNIT II INSTRUCTION SETS 9

Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation and control instructions.

UNIT III PERIPHERAL INTERFACING 9

Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 Key board / display controller and 8253 Timer/ Counter – Interfacing with 8085 – A/D and D/A converter interfacing.

UNIT IV 8051 MICRO CONTROLLER 9

Architecture – Functional block diagram – Instruction format and addressing modes – Interrupt structure – Timer – I/O ports – Serial communication.

UNIT V ADVANCED PROCESSORS 9

Architecture of PIC 16C7X MICROCONTROLLER - memory organization – Addressing modes – Instruction set – Introduction to TMSLF2407 DSP controller and ARM Processors.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gaonkar, R. S.	Microprocessor Architecture, Programming, and Applications with the 8085	Wiley Eastern Ltd., New Delhi.	2002
2	Muhammad Ali Mazidi and Janice Gilli Mazidi	The 8051 Micro Controller and Embedded Systems	Pearson Education , New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Fernando E Valdes–Perez and Ramon Pallas–Areny	Microcontrollers: Fundamentals and Applications with PIC	CRC , Colorado, USA	2009
2	William Routt	Microprocessor Architecture, Programming and Systems Featuring the 8085	Delmar Cengage Learning, New York	2006
3	David Calcutt, Frederick Cowan, and Hassan Parchizadeh	8051 Microcontrollers: An Applications Based Introduction	Newnes, United States	2004
4	John B. Peatman	Design with PIC Microcontrollers	Pearson Education, Asia	2004
5	Hamid A. Toliyat, Steven Campbell	DSP based Electromechanical Motion Control	CRC Press, USA	2003

WEBSITES

1. http://ce.kashanu.ac.ir/sabaghian/micro/Micro_Spring2005.htm
2. <http://www.berk.tc/micropro/microlinks.htm>
3. <http://www.arm.com/products/processors/instruction-set-architectures/index.php>

Course Objectives

- To study the characteristics of switching devices and its applications in rectifier inverter, chopper and resonant converter.
- To study about power electronic circuits
- To study about industrial control of power electronic circuits
- To study about the various characteristic of SCR and TRIAC
- To study about the various characteristic of PWM inverter
- To study power electronic circuits for different loads

Course Outcomes (COs)

At the end of this course, students will demonstrate the ability to

1. The students will be able to demonstrate the all power semiconductor devices.
2. To expose students to operation and characteristics of power semiconductor devices and passive components, their practical application in power electronics.
3. To provide a practical exposure to operating principles, design and synthesis of different power electronic converters.
4. To introduce students to industrial control of power electronic circuits as well as safe electrical connection and measurement practices.
5. Able to analyze power electronics circuits
6. Able to apply power electronic circuits for different loads

LIST OF EXPERIMENTS

1. Demonstrate the characteristics of SCR.
2. Demonstrate the characteristics of MOSFET.
3. Demonstrate the characteristics of IGBT.
4. Design and Simulation studies on single half and fully controlled convertor using R, RL load.
5. Design and simulation studies on boost convertor using power semiconductor devices..
6. Design and Simulation studies on buck convertor using power semiconductor devices..
7. Design and Simulation studies on single phase invertors using power semiconductor devices.
8. Implementation of single phase half controlled converter using SCR.

9. Implementation of single phase fully controlled convertor using SCR
10. Implementation of DC-DC Boost convertor using MOSFET.
11. Implementation of DC-DC Buck convertor using MOSFET.
12. Implementation of three phase induction motor using PWM inverter

Course Objectives

- To understand Basic Analog Circuits and their applications using Active Devices
- To learn basic function of single stage amplifier, multistage amplifier and power Amplifier and their working principle.
- To understand the Boolean functions, Adder and subtractor circuits.
- To understand Basic Analog Circuits and their applications using Active Devices
- To understand basic construction of feedback circuits and their application in Oscillators
- Understand basic amplifier and oscillator circuits and their application in analog circuits.

Course Outcomes (COs)

1. Determine the output wave forms of Full Wave Rectifiers with and without filters.
2. Draw the equivalent circuit of MOSFET and sketch the V-I characteristics.
3. Design the Darlington amplifier and develop the circuit.
4. Compare the theoretical and practical frequency response of Wein bridge oscillators.
5. Design of Astable and Monostable multivibrators for generation of different waveforms
6. Design of clipper and clamper.

LIST OF EXPERIMENTS

1. Verification of truth table of Logic Gates and Flip Flops.
2. Implementation of Boolean Functions, Adder and Subtractor circuits.
3. a. Code converters, Excess 3, 2's Complement, Binary to gray code, Parity generator and parity checker using suitable ICs.
b. Encoders and Decoders.
4. Counters: Design and implementation of 4-bit modulo counters as synchronous and asynchronous types using FF IC's and specific counter IC.
5. Shift Registers: Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's.
6. Multiplexer and De-multiplexer (4:1, 8:1 and 1:4, 1:8)
7. Study of NE/SE 555 timer in Astable and Monostable operation.
8. Inverting and non-inverting amplifiers, Adder and comparator using Op-Amps.
9. Integrator and Differentiator using Op-Amps.
10. Study of Analog to Digital Converter and Digital to Analog Converter:
Verification of A/D conversion using dedicated ICs.
11. Voltage to frequency characteristics of NE/ SE 566 VCO IC.
12. Frequency multiplication using NE/SE 565 PLL IC.

Course Objectives

- To deal with measurement of inductance and capacitance.
- To deal with measurement of resistance.
- To deal with calibration of current transformer
- To deal with calibration of single phase energy meter.
- To get the knowledge of two watt meter method to measure 3 phase power and power factor
- To deal with calibration of voltmeter, ammeter and wattmeter.

Course Outcomes (COs)

At the end of this course, students will demonstrate the ability to

1. Train the students in the measurement of displacement, resistance, inductance, torque and angle etc.,
2. Give exposure to ac, dc bridges
3. Give knowledge on transient measurement.
4. Understand the procedure and usage of instruments
5. Acquire knowledge of principle of calibration of a measuring instrument and Plotting of calibration curves
6. Acquire hand-on experience on measurement of parameters and verification of Laws of illumination

LIST OF EXPERIMENTS

1. Calibration of Pressure and Displacement Transducer.
2. Measurement of inductance & capacitance.
3. Measurement of resistance using wheatstone bridge
4. Calibration of current transformer and Study of instrument transformers.
5. Calibration of single phase energy meter.
6. Conversion of Galvanometer into Voltmeter and Ammeter.
7. Measurement of three phase power and power factor using two wattmeter method.
8. Measurements of resistance using Kelvin's bridge.
9. Calibration of Voltmeter, Ammeter and Wattmeter
10. Study of phantom loading.

- To study and understand the operation of electric drives controlled from a power electronic converter and to introduce the design concepts of controllers.
- To understand the stable steady-state operation and transient dynamics of a motor-load system.
- To study and analyze the operation of the converter/chopper fed dc drive and to solve simple problems.
- To study and understand the operation of both classical and modern induction motor drives.
- To understand the differences between synchronous motor drive and induction motor drive and to learn the basics of permanent magnet synchronous motor drives.
- To analyze and design the current and speed controllers for a closed loop solid-state d.c motor drives.

Course Outcomes

- At the end of the course the students will be able to
- understand the concept of drive characteristics and various converters used for drives.
- understand the operation of electric drives controlled from a power electronic converter.
- analyze the operation of the converter/chopper fed dc drive and to solve simple problems.
- Understand the operation of both classical and modern induction motor drives.
- Understand the differences between synchronous motor drive and induction motor drive and to learn the basics of permanent magnet synchronous motor drives.

UNIT I DRIVE CHARACTERISTICS

12

Concept of Electric Drives –parts of electrical Drives – Dynamics of electric drive – torque equation – Selection of power rating of motor-Four quadrant operation of electric drives– Loads with rotational and translational motion – Steady state stability- components of load torques- Modes of operation and Characteristics.

UNIT II CONVERTER AND CHOPPER FED DC MOTOR DRIVES

12

Steady state analysis of the single and three phase converter fed separately excited DC motor drive – continuous and discontinuous conduction -Chopper controlled DC drives - Time ratio control and current limit control - Single, two and four quadrant operations.

UNIT III INDUCTION MOTOR DRIVES

12

Three phase induction motor drives-AC Voltage controlled drives- variable frequency control – V/f control -Slip Power recovery schemes- rotor frequency control -VSI fed induction motor drive and CSI fed induction motor drive- Basic of vector control.

UNIT IV SYNCHRONOUS MOTOR DRIVES

12

V/f control and self control of synchronous motor: Margin angle control and power factor control permanent magnet synchronous motor –Sinusoidal and Trapezoidal types, closed loop control of synchronous motor, Basics of Traction drives.

UNIT V CONTROLLER FOR DRIVES**12**

Transfer function for DC motor / load and converter – closed loop control with current and speed feedback , design of controllers; current controller and speed controller-converter selection and Characteristics.

TOTAL: 60 HOURS**TEXT BOOK**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gopal K Dubey	Fundamentals of Electric Drive	Narosa Publishing house, II Edition	2011
2	B.K Bose	Modern Power Electronics and AC Drives	Pearson Education, 3rd Reprint	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	S.K. Pillai	A First course on Electrical Drives	Wiley Eastern Limited- Reprint of 3 rd edition	2014

WEBSITE

<http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-Delhi/Industrial Drives/index.htm>

Course Objectives

- To model the power system under steady state operating condition
- To understand and apply iterative techniques for power flow analysis
- To model and carry out short circuit studies on power system
- To model and analyze stability problems in power system
- To study the monitoring and control of a power systems.
- To study the basics of power system economics.

Course Outcomes (COs)

At the end of this course, students will demonstrate the ability to

1. Use numerical methods to analyse a power system in steady state.
2. Understand stability constraints in a synchronous grid.
3. Understand methods to control the voltage, frequency.
4. Understand methods to control the power flow.
5. Understand the monitoring and control of a power system.
6. Understand the basics of power system economics.

UNIT I INTRODUCTION**12**

System load variation: System load characteristics, load curves - daily, weekly and annual, load-duration curve, load factor, diversity factor. Reserve requirements: Installed reserves, spinning reserves, cold reserves, hot reserves. Overview of system operation: Load forecasting, unit commitment, load dispatching. Overview of system control: Governor Control, LFC, EDC, AVR, system voltage control, security control.

UNIT II REAL POWER - FREQUENCY CONTROL**12**

Fundamentals of speed governing mechanism and modeling: Speed-load characteristics – Load sharing between two synchronous machines in parallel; concept of control area, LFC control of a single-area system: Static and dynamic analysis of uncontrolled and controlled cases, Economic Dispatch Control. Multi-area systems: Two-area system modeling; static analysis, uncontrolled case; tie line with frequency bias control of two-area system derivation.

UNIT III REACTIVE POWER–VOLTAGE CONTROL**12**

Typical excitation system, modeling, static and dynamic analysis, stability compensation; generation and absorption of reactive power: Relation between voltage, power and reactive power at a node; methods of voltage control: Injection of reactive power. Tap-changing transformer, numerical problems - System level control using generator voltage magnitude setting, tap setting of OLTC transformer and MVAR injection of switched capacitors to maintain acceptable voltage profile and to minimize transmission loss.

UNIT IV UNIT COMMITMENT AND ECONOMIC DISPATCH**12**

Statement of Unit Commitment (UC) problem; constraints in UC: spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints; UC solution methods: Priority-list methods, forward dynamic programming approach, numerical problems only in priority-list method using full-load average production cost. Incremental cost curve, co-ordination equations without loss and with loss, solution by direct method and λ -iteration method. (No derivation of loss coefficients) Base point and participation factors. Economic dispatch controller added to LFC control.

UNIT V COMPUTER CONTROL OF POWER SYSTEMS**12**

Energy control centre: Functions – Monitoring, data acquisition and control. System hardware configuration – SCADA and EMS functions: Network topology determination, state estimation, security analysis and control. Various operating states: Normal, alert, emergency, inextremis and restorative. State transition diagram showing various state transitions and control strategies.

TOTAL: 60 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Olle I Elgerd	Electric Energy Systems Theory – An Introduction	Tata McGraw Hill Publishing Company Ltd, New Delhi 2 nd Edition,.	2003
2	Allen J Wood and Bruce F Wollenberg	Power Generation, Operation and Control	John Wiley and Sons, Inc..	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kothari, D.P. and Nagrath, I.J.,	Modern Power System Analysis	Tata McGraw Hill Publishing Company Limited, New Delhi.3 rd Edition,	2003
2	Grigsby, L.L	The Electric Power Engineering Hand Book	CRC Press and IEEE Press	2001

WEBSITE

<http://www.cdeep.iitb.ac.in/nptel/ElectricalEngineering/PowerSystemOperationandControl/CourseObjectives.html>

Course Objectives:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT**9**

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS**9**

Economics analysis – Depreciation Methods, time value of money, Calculation of simple payback, net present value, internal rate of return, present worth method, replacement analysis, life cycle costing analysis.

UNIT III ILLUMINATION, HEATING AND WELDING**9**

Nature of radiation – definition – laws – photometry – lighting calculations – design of illumination systems (for residential, industrial, commercial, health care, street lightings, sports, administrative complexes) - types of lamps - energy efficiency lamps. Methods of heating, requirement of heating material – design of heating element – furnaces – welding generator – welding transformer and its characteristics.

UNIT IV ELECTRIC TRACTION**9**

Introduction – requirements of an ideal traction system – supply systems – mechanics of train movement – traction motors and control – multiple units – braking – current collection systems – recent trends in electric traction.

UNIT V BASIC PRINCIPLES OF ENERGY AUDIT**9**

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons 7th Edition	2009
2	E. Openshaw Taylor	Utilization of Electrical Energy in SI Units'	Orient Longman Pvt.Ltd	2003
3	B.R. Gupta	Generation of Electrical Energy	Eurasia Publishing House (P) Ltd, New Delhi	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	H. Partab	Art and Science of Utilisation of Electrical Energy	Dhanpat Rai and Co, New Delhi	2004
2	C.L. Wadhwa	Generation, Distribution and Utilization of Electrical Energy	New Age International Pvt.Ltd	2003
3	J.B. Gupta	Utilization of Electric Power and Electric Traction	S.K.Kataria and Sons	2002

Course Objectives

- To know the fundamentals of cost analysis and economics.
- To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.
- To make the students to understand capital market, break even point analysis and depreciation
- To know economic evaluation and financial analysis of investments and projects.
- To know the financial management and stock exchanges.
- To know about the recent trends in it

Course Outcomes (COs)

At the end of this course, students will demonstrate the ability to

1. Understand the principles and basic concepts.
2. Understand the fundamentals of cost analysis and economics.
3. Understand the methodology of engineering economy and source of finance
4. Perform economic evaluation and financial analysis of investments and projects.
5. Analyse the financial management and stock exchanges.
6. Analyse the capital market, break even point analysis and depreciation for a project.

UNIT I FUNDAMENTALS OF ENGINEERING ECONOMICS 9

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics- Demand and supply analysis-Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT II FINANCIAL MANAGEMENT 9

Course Objectives and functions of financial management – financial statements, working capital management– factors influencing working capital requirements – estimation of working capital. Capital budgeting - Need for Capital Budgeting – Project Appraisal Methods - Payback Period
ARR – Time Value of Money.

UNIT III CAPITAL MARKET 9

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions –Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT IV NEW ECONOMIC ENVIRONMENT 9

National Income – concepts – methods of calculating national income - Economic systems, economic Liberalization –Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT V COST ANALYSIS AND BREAK EVEN ANALYSIS 9

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

• **TOTAL: 45 HOURS**

TEXT BOOKS

S.No.	Author(s) Name	Title of the Book	Publisher	Year of publication
1	Ramachandra Aryasri .A, and V. V.Ramana Murthy	Engineering Economics & Financial Accounting	Tata McGraw Hill,—,New Delhi	2007
2	Varshney R. L., and K.L Maheshwari	Managerial Economics	Sultan Chand & Sons, New Delhi	2001

REFERENCES

S.No.	Author(s) Name	Title of the Book	Publisher	Year of publication
1	M.L.Jhingan	Principles of Economics	Konark Publications	2010
2	Prasanna Chandra	Fundamentals of Financial Management	Tata McGraw Hill, New Delhi.	2007
3	D.M.Mithani	Money, Banking, International Trade & Public Finance	Himalaya Publishing House	2004

WEBSITES

1. <http://economictimes.indiatimes.com>
2. <http://www.economist.com/>
3. <http://www.managementstudyguide.com/financial-management.htm>

COURSE OBJECTIVES

On completion of the course, students are able to:

- To understand the basic architecture of 8- bit microprocessors.
- Able to write programs on 8085 microprocessor based systems.
- Identify the addressing modes of an instruction.
- Develop programming skills in assembly language
- To understand the basic architecture of microcontroller.
- To understand the real time application of it

COURSE OUTCOMES(COs)

1. Apply the basic arithmetic and logical operations using 8085 microprocessor with the help of assembly language programming
2. Analyze the performance of different weighted and non weighted codes, its conversions with logic diagram using 8085 microprocessor
3. Illustrate the interfacing of 8085 with various peripheral devices for serial and parallel communication of data
4. Demonstrate the basic instructions with 8051 microcontroller execution including conditional jumps, looping and calling subroutines
5. Make use of the basic conversion techniques of ADC and DAC to interface it with 8085 processor and 8051 microcontroller
6. Develop a model using processor to apply computing platform and software for engineering problems

LIST OF EXPERIMENTS**8-bit Microprocessor**

1. Simple arithmetic operations
 - Multi precision addition / subtraction / multiplication / division
2. Programming with control instructions
 - Increment / Decrement
 - Ascending / Descending order
 - Maximum / Minimum of numbers
 - Rotate instructions.
 - Hex / ASCII / BCD code conversions
3. Interface Experiments
 - A/D Interfacing
 - D/A Interfacing
 - Traffic light controller
4. Simple Interfacing experiments using 8251, 8279 and 8254
5. Programming practice on assembler and simulator tools

8-bit Micro controller

6. Demonstration of basic instructions with 8051 Micro controller execution, including
 - Conditional jumps, looping
 - Calling subroutines
 - Stack parameter testing
7. Parallel port programming with 8051 using port 1 facility
 - Stepper motor and D/A converter
8. Programming Exercise on
 - RAM direct addressing
 - Bit addressing
9. Programming practice using simulation tools and C - compiler
 - Initialize timer
 - Enable interrupts
10. Study of micro controllers with flash memory.

Additional Experiments Using 8051 Microcontroller:

1. A/D Conversion with LCD display.
2. Speed control of DC Motor using PWM technique.
3. Programming with flash controller (EPROM, EEPROM).
4. Interfacing Monitor and Keyboard.
5. Seven Segment display interface.
6. Interfacing of I/O devices (Relay, LED and Buzzer).
7. PLC programming using 8051 microcontroller.
8. Study of “In Circuit Debugger”.

Course Objectives

Students will learn

- The various line parameters
- The voltage regulation and efficiency of different types of transmission lines.
- A network under symmetrical fault conditions and interpret the results
- A network under unsymmetrical fault conditions and interpret the results
- The bus impedance and admittance matrix
- Acquire software development skills and experience in the usage of standard package necessary for analysis and simulation of power system required for its planning, operation and control.

Course Outcomes (COs)

1. Analyze the various line parameters
2. Evaluate the voltage regulation and efficiency of different types of transmission lines.
3. Analyze a network under symmetrical fault conditions and interpret the results
4. Analyze a network under unsymmetrical fault conditions and interpret the results
5. Evaluate the Bus impedance Matrix
6. Evaluate the Bus admittance Matrix

LIST OF EXPERIMENTS

1. Computation of Parameters and Modeling of Transmission Lines.
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
3. Load Flow Analysis - I: Solution of Load Flow and related Problems using Gauss-Seidel Method
4. Load Flow Analysis - II: Solution of Load Flow and related Problems using Newton-Raphson and Fast-Decoupled Methods
5. Study of symmetrical and unsymmetrical Fault Analysis.
6. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System
7. Transient Stability Analysis of Multi-machine Power Systems
8. Electromagnetic Transients in Power Systems.
9. Load – Frequency Dynamics of Single- Area and Two-Area Systems.
10. Economic Dispatch in Power Systems without considering transmission losses.
11. Economic Dispatch in Power Systems with transmission losses.

SEMESTER VII

15BEEE701

PROFESSIONAL ETHICS

L T P C 3 0 0 3

Course Objective

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.
- To study ethics in society and realize the responsibilities and rights in the society
- To study advanced philosophical knowledge of the profession of recreation and leisure
- To study synthesis of trends and issues as related to current professional practice
- To evaluation of organizational theories and human resource management principles
- To study the ethical practice and ethical management

Course Outcome

At the end of this course, students will be able to

1. Apply ethics in society and realize the responsibilities and rights in the society
2. Discuss the ethical issues related to engineering
3. Advanced philosophical knowledge of the profession of recreation and leisure
4. Synthesis of trends and issues as related to current professional practice
5. Evaluation of organizational theories and human resource management principles
6. Ethical practice and ethical management

UNIT 1 INTRODUCTION TO ETHICS AND HUMAN VALUES 9

Meaning-Importance– Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality

UNIT II ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation –engineers as responsible experimenters – Characteristics of morally responsible engineers - codes of ethics –roles and limitations of codes - a balanced outlook on law –the proper role of law in engineering.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR)-discrimination.

UNIT V GLOBAL ISSUES 9

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw-Hill, New York	1996
2	Govindarajan M, Natarajan S, Senthil Kumar V. S	Engineering Ethics	Prentice Hall of India, New Delhi .	2004

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Charles D. Fleddermann	Engineering Ethics	Pearson Education / Prentice Hall, New Jersey	2004
2	Charles E Harris, Michael S. Protchard and Michael J Rabins	Engineering Ethics – Concepts and Cases	Wadsworth Thompson Learning, United States	2000
3	John R Boatright	Ethics and the Conduct of Business	Pearson Education, New Delhi	2003
4	Edmund G Seebauer and Robert L Barry	Fundamentals of Ethics for Scientists and Engineers	Oxford University Press, Oxford	2001

Course Objectives

- To expose the students to the various faults in power system
- To learn the various methods of protection scheme
- To understand the current interruption in Power System and study the various switchgears.
- Discussion on various earthing practices, usage of symmetrical components to estimate fault current and fault MVA.
- Study of Relays, protection scheme, and solid state relays.
- To understand the method of circuit breaking, various arc theories, Arcing phenomena – capacitive and inductive breaking, Types of circuit breakers.

Course Outcomes

- At the end of this course, students will demonstrate the ability to
1. Understand the different components of a protection system.
 2. Evaluate fault current due to different types of fault in a network.
 3. Understand the protection schemes for different power system components.
 4. Understand the basic principles of digital protection.
 5. Understand system protection schemes, and the use of wide-area measurements.
 6. Analysis the Real time application of it.

UNIT I INTRODUCTION 9

Principles and need for protective schemes – nature and causes of faults –Power system earthing
Zones of protection and essential qualities of protection – Protection scheme.

UNIT II OPERATING PRINCIPLES AND RELAY CONSTRUCTIONS 9

Electromagnetic relays – Over current, directional, distance and differential, under frequency relays – static relays.

UNIT III APPARATUS PROTECTION 9

Apparatus protection: Transformer, generator, motor; protection of bus bars and transmission lines – CTs and PTs and their applications in protection schemes.

UNIT IV THEORY OF CIRCUIT INTERRUPTION 9

Physics of arc phenomena and arc interruption. Restriking voltage, Recovery voltage, rate of rise of recovery voltage, resistance switching, current chopping, and interruption of capacitive current
DC circuit breaking.

UNIT V CIRCUIT BREAKERS 9

Types of Circuit Breakers – Air blast, Air break, oil, SF₆ and Vacuum circuit breakers – comparative merits of different circuit breakers – Testing of circuit breakers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ravindranath, B. and Chander, N	Power System Protection and Switchgear	New Age International (P) Ltd , New Delhi 2 nd Edition	2011
2	Badri Ram and Vishwakarma, D.N.	Power System Protection and Switchgear	Tata McGraw hill, New Delhi.	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Wadhwa, C. L.	Electrical Power Systems	New Age International (P) Ltd , New Delhi	2000
2	Gupta, P.V., Bhatnagar, V.S., Chakrabarti, A	A Text book on Power System Engineering	Reprint – 2009 edition, Dhanpat Rai and Co, New Delhi.	2009
3	Paithankar, Y.G. and Bhide, S.R.	Fundamentals of Power System Protection	Prentice Hall of India Pvt. Ltd., New Delhi.	2003

WEBSITES

1. www.pdf-search-engine.com/protection-and-switchgear-pdf.html - 69k
2. <https://subjects.ee.unsw.edu.au/elec9712/>.

Course Objectives

- To provide sound knowledge about constructional details and design of various electrical machines.
- To study mmf calculation and thermal rating of various types of electrical machines.
- To design armature and field systems for D.C. machines.
- To design core, yoke, windings and cooling systems of transformers.
- To design stator and rotor of induction machines.
- To design stator and rotor of synchronous machines and study their thermal behaviour.

Course Outcomes

- At the end of this course, students will demonstrate the ability to
1. Understand the construction of electrical machines.
 2. Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
 3. Understand the principles of electrical machine design
 4. carry out a basic design of an AC and DC machine.
 5. Use software tools to do design calculations.
 6. Understand performance characteristics of electrical machines

UNIT I MAGNETIC CIRCUITS AND COOLING OF ELECTRICAL MACHINES 12

Major consideration in electrical machine design –electrical engineering materials –design limitations and specifications- concept of magnetic circuit – mmf calculation for various types of electrical machines – Gap Contraction Factor –Net Length of Iron -real and apparent flux density of rotating machines -direct and indirect cooling methods – cooling of turbo alternators.

UNIT II DC MACHINES**12**

Constructional details – output equation – main dimensions - choice of specific loadings – choice of number of poles – armature design – winding diagrams – design of field poles and field coil – design of commutator and brushes

UNIT III TRANSFORMERS**12**

Constructional details of core and shell type transformers – output rating of single phase and three phase transformers — design of core, yoke and windings of transformers – equivalent circuit parameters from designed data – design of tank and cooling tubes of transformers.

UNIT IV THREE PHASE INDUCTION MOTORS**12**

Constructional details of squirrel cage and slip ring motors – output equation – main dimensions choice of specific loadings – design of stator – winding diagrams - design of squirrel cage and slip ring rotor - introduction to computer aided design.

UNIT V SYNCHRONOUS MACHINES**12**

Output equation – choice of specific loadings – main dimensions – short circuit ratio – design of stator and rotor of cylindrical pole and salient pole machines - design of field coil - performance calculation from designed data - introduction to computer aided design.

TOTAL: 60 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sen, S.K	Principles of Electrical Machine Design with Computer Programs	Oxford and IBH Publishing Co.Pvt. Ltd., New Delhi	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Agarwal, R.K	Principles of Electrical Machine Design	S.K.Kataria and Sons, Delhi.	2002
2	Mittle, V.N. and Mittle	Design of Electrical Machines	Standard Publications and Distributors, Delhi.	2002
3	Juha Pyrhonen, Tapani Jokinen, and Valeria Hrabovcova	Design of Rotating Electrical Machines	Wiley .	2009
4	Greg Stone, Edward A Boulter, Ian Culbert, and Hussein Dhirani	Electrical Insulation for Rotating Machines: Design, Evaluation, Aging, Testing, and Repair	1 st edition, Wiley-IEEE Press.	2004

WEBSITES

1. www.electricmotors.machinedesign.com/guiEdits/.../bdeee2_1.aspx
2. www.advancedmotortech.com/images/InductionMachine_Jan2012.pdf

Course Objectives

- Make use of various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.
- Construct various types of automatic starters for electrical motors.
- Construct control circuits for braking, jogging, reversing operations.
- To make use of PLCs for control applications.
- To study PLCs for controlling the motors.
- To study the single phase preventer circuits using PLC

Course Outcomes

The students will be able to

- Analysis the types of automatic starters for electrical motors.
- Analysis control circuits for braking, jogging, reversing operations.
- Analysis PLCs circuit for control applications.
- Program PLCs for controlling the motors.
- Analysis the single phase preventer circuits using PLC
- Analysis various types of control circuit elements like industrial switches, relays, timers, solenoids, contactors and interlocking arrangement.

LIST OF EXPERIMENTS

1. Conduct acidity test on transformer oil.
2. Wire and test the control circuit for DOL starter and jogging in cage motor.
3. Wire and test the control circuit for automatic and semi-automatic star-delta starter.
4. Wire and test the control circuit for dynamic braking of cage motor.
5. Wire and test the control circuit for Synchronization of Three Phase Alternators by bright lamp method.
6. Test the working of single phase preventer.
7. Wire and test the DOL starter using PLC.
8. Wire and test the Star-Delta starter using PLC.
9. Wire and test the control circuit for jogging, forward and reverse operations using PLC.
10. Wire and test the single phase preventer using PLC.

Course Objectives

- To introduce the basic electrical Estimation in the lab.
- To be able to deal with motor rewinding and transformer winding connections.
- To study the electrical design of party hall
- To study the electrical design of saw mill
- To study the electrical design of Primary health centre
- To study the electrical design of University building

Course Outcomes

At the end of the course the students will be able

1. To do wiring and winding for all electrical equipment's.
2. To analysis the electrical estimation for residential flat
3. To analysis the electrical estimation for University building
4. To analysis the electrical estimation for Primary health centre
5. To analysis the electrical estimation for Party hall
6. To analysis the electrical estimation for Saw mill

LIST OF EXPERIMENTS**ELECTRICAL****ESTIMATION:**

1. Residential single bed room Flat.
2. Industrial power wiring having 2 or 3 machines and Irrigation Pump motor (5hp) wiring.
3. University building having 6 class rooms with Computer centre having 35 computers, a/c unit, UPS, light and fan.
4. Primary Health Centre having minimum 6 rooms.
5. Lighting scheme of a party hall having minimum 20 twin TL fittings and Street Light service having 12 lamp light fittings
6. Erection of one no. 15hp induction motor in Saw mill / Flour mill and 3 phase Service connection to a building having 5 KW load.

REWINDING:

7. Design and wind 230/12-0-12 volt, 500mA Transformer and test it.

8. Design and wind a No volt coil used in starter.
9. Study about the winding connection diagram for Single Phase Induction Motor.
10. Study about the winding connection diagram for Three Phase Induction Motor.
11. Wind and insert the coils for ceiling fan motor (minimum 2 coils).
12. Give end connection for a 3 phase Induction motor winding for a 2 pole/ 4 pole operations and run it. Measure the No load current and speed.

Course Objectives

- To understand the gain knowledge about the various drives.
- To get the knowledge of speed control of stepper motor using microcontroller
- To get the knowledge of speed control of converter/chopper using microcontroller
- To get the knowledge of speed control of VSI fed 3 phase IM using microcontroller
- To learn speed control of different motors using DSP
- To understand the various process of electrical machines using simulation techniques

Course Outcomes

The students will be able to

- Analysis about the various drives.
- Analysis speed control of stepper motor using microcontroller
- Analysis speed control of converter/chopper using microcontroller
- Analysis speed control of VSI fed 3 phase IM using microcontroller
- Analysis speed control of different motors using DSP
- Analysis various process of electrical machines using simulation techniques

LIST OF EXPERIMENTS

1. Micro controller based speed control of Converter/Chopper fed DC motor.
2. Micro controller based speed control of VSI fed three-phase induction motor.
3. Micro controller based speed control of Stepper motor.
4. DSP based speed control of BLDC motor.
5. DSP based speed control of SRM motor.
6. Self control operation of Synchronous motors.
7. Condition monitoring of three-phase induction motor under fault conditions.
8. Simulation of Four quadrant operation of three-phase induction motor.
9. Simulation of Automatic Voltage Regulation of three-phase Synchronous Generator.
10. Simulation of closed loop control of chopper fed Dc motor drive.

LIST OF DEPARTMENT ELECTIVES

ELECTIVE – I (ONLY APPLICABLE FOR FIFTH SEMESTER)

15BEEE5E01

NETWORK ANALYSIS AND SYNTHESIS

L T P C 3 0 0 3

Course Objectives

- To understand the concept of network analysis.
- To understand the basic principles of network theorems.
- To study the electrical circuits using Laplace Transforms
- To study the transient and steady-state response of electrical circuits.
- To study the sinusoidal steady-state (single-phase and three-phase).
- To get the knowledge of two port circuit behavior.

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Apply network theorems for the analysis of electrical circuits.
2. Obtain the solution of first and Second order system
3. Analyse the electrical circuits using Laplace Transforms.
4. Obtain the transient and steady-state response of electrical circuits.
5. Analyse circuits in the sinusoidal steady-state (single-phase and three-phase).
6. Analyse two port circuit behavior.

UNIT-I INTRODUCTION

9

Circuits elements, Independent and dependent sources, signals and wave forms; periodic and singularity voltages, step, ramp, impulse, Doublet. Development of circuit concept, Conventions for describing networks.

UNIT-II GRAPH THEORY

9

Graph of a Network, definitions, tree, co tree, link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.

UNIT-III NETWORK THEOREMS (APPLICATIONS TO AC NETWORKS)

9

Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

UNIT-IV FILTERS SYNTHESIS

9

Classification of filters, Ladder network, T section, IT section, terminating half section. Pass bands and stop bands. Design of constant-K, m-derived filters. Composite filters.

UNIT-V NETWORK SYNTHESIS

9

Positive real function, definition and properties; Properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point admittance functions using Foster and Cauer first and second forms.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	S Chakraborty Ghosh A	Network Analysis & Synthesis	Tata Mc graw Hill 1 st edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.E. Van Valkenburg	Network Analysis	Phi Learning - 3rd Edition	2014
2	Gobind Daryanani	Principles of Active Network Synthesis & Design	Wiley India Pvt Ltd	2009

Course Objectives

- To study the state variable analysis
- To provide adequate knowledge in the phase plane analysis and also describing function analysis.
- To study the analysis discrete time systems using conventional techniques.
- To analyze the stability of the systems using different techniques.
- To study the design of optimal controller.
- To study the types of compensators

Course Outcomes

At the end of the course the student will be able to

- understand the state variable analysis, Z- transform, state equation
- Construct the frequency response of the system using various plots
- Correlate the time and frequency domain specifications and effect of compensation
- Design the different types of compensators using frequency response plots to stabilize the control system
- Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT 1 STATE VARIABLE ANALYSIS**9**

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement – State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS**9**

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM**9**

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM**9**

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL**9**

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.Gopal	Modern control system theory	New Age International Publishers	2002
2	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
3	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

Course Objectives

- To learn the economics connected with power generation.
- To understand the measurements of various parameter in power plant and their control.
- To study about Power plant instrumentation
- To acquire knowledge of renewable power system
- To study about technologies of distributed system
- To study layout and working of thermal, nuclear and hydropower plants.

Course Outcomes

At the end of the course the student will gain knowledge about

1. Economics of power generation, layout and working of thermal, nuclear and hydropower plants.
2. Distributed generation, boiler turbine monitoring system.
3. Assess the instrumentation available in the plant
4. Demonstrate the monitoring control in the plant
5. Analysis the various cost arrivals for various TARIFF consumers
6. Analysis the real time application of it.

UNIT I ECONOMICS OF POWER GENERATION**9**

Choice of power plant; Load management; Number and size of generating unit; Cost of electrical energy; All types of tariff – Calculation – Power factor improvement.

UNIT II THERMAL POWER PLANT**9**

Plant layout; Selection of site – Types of thermal power plants; Steam power plant based on fossil fuels; Thermal power plant equipment: Boiler, economizer, super heater, condenser, combustion chamber and gas loops, turbines, auxiliaries; Instrumentation and control; Heat balance.

UNIT III GASPOWER PLANT**9**

Open and close cycles; Regeneration; Inter-cooling and reheating; Steam – gas power plant; Combined cycle power plant ; Plant protection ; Instrumentation and Control; Plant management; Plant layout; Optimized Generation; Load flow.

UNIT IV HYDROPOWER PLANT**9**

Mass curve and storage capacity; Classification; Components; Turbines – Characteristics and their selection; Governor; Plant layout and design; Auxiliaries; Underground, automatic, remote controlled, and pumped storage plants. Optimized Generation.

UNIT V NUCLEAR AND DIESEL – ELECTRIC POWER PLANTS**9**

Nuclear reactors and fuels; Radioactivity; Mass defect and binding energy; Chain reaction; Materials used in nuclear plants; Types of reactors. Diesel–electric Power Plant: Fields of use; Sub–systems; Starting and stopping; Heat balance; Plant layout and design; Remote operation; Auxiliaries.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Black and Veatch	Power Plant Engineering	CBS Publishers & Distributors	2005

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gupta, B. R.	Generation of Electrical Energy	S. Chand Publishing, New Delhi 14 th Edition	2012
2	Deshpande, M. V.	Elements of Power Station Design	PHI Learning Pvt. Ltd. - reprint	2010

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objectives

- To introduce the fundamental techniques of analog, digital and data communication.
- To know satellite and fiber optic communication and Networking systems.
- To understand basic signals, analog modulation, demodulation and radio receivers.
- To explain the characteristics and model of transmission medium
- To study the recent development in it
- To study the application of it

Course Outcomes

- 1.Ability to understand and analyse analog circuits.
- 2.Gain Knowledge on digital modulation techniques.
- 3.Understand coding techniques
- 4.Analysis the real time application of it.
- 5.Analysis the model of transmission medium
- 6.understand the real time application of it

UNIT I MODULATION SYSTEMS**9**

Time and frequency domain representation of signals, amplitude modulation and demodulation, frequency modulation and demodulation, super heterodyne radio receiver. Frequency division multiplexing. Pulse width modulation.

UNIT II TRANSMISSION MEDIUM**9**

Transmission lines – Types, equivalent circuit, losses, standing waves, impedance matching, bandwidth; radio propagation – Ground wave and space wave propagation, critical frequency, maximum usable frequency, path loss, white Gaussian noise.

UNIT III DIGITAL COMMUNICATION**9**

Pulse code modulation, time division multiplexing, digital T-carrier system. Digital radio system. Digital modulation: Frequency and phase shift keying – Modulator and demodulator, bit error rate calculation.

UNIT IV DATA COMMUNICATION AND NETWORK PROTOCOL**9**

Data Communication codes, error control. Serial and parallel interface, telephone network, data modem, ISDN, LAN, ISO–OSI seven layer architecture for WAN.

UNIT V SATELLITE AND OPTICAL FIBRE COMMUNICATION**9**

Orbital satellites, geostationary satellites, look angles, satellite system link models, satellite system link equations. Advantages of optical fibre communication – Light propagation through fibre, fibre loss, light sources and detectors.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Wayne Tomasi	Electronic Communication Systems	Pearson Education New Delhi	2002
2	Roy Blake	Electronic Communication Systems	Thomson Delmar , New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	William Schweber	Electronic Communication Systems	Prentice Hall of India, New Delhi.	2002
2	Kennedy, G.	Electronic Communication Systems	Prentice Hall of India, New Delhi.	2002
3	Miller, M.	Modern Electronic Communication	Prentice Hall of India, New Delhi.	2003
4	John G Proakis and Masoud Salehi	Communication Systems Engineering	Prentice Hall of India, New Delhi.	2001

WEBSITES

1. www.complextoreal.com/tutorial.htm
2. www.discogs.com/artist/Nephlim+Modulation+Systems

Course Objectives

○

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To study about the perception concept in design
- To study about the design using ART phenomena
- To study about the vector quantization
- To have a solid understanding of Basic Neural Network

Course Outcomes

At the end of the course the student will be able to solve problems using neural

1. Understand the basic concepts of neural networks and its applications in various domains
2. Gain knowledge about learning process in Neural Networks
3. Apply perception concept in design
4. Design using ART phenomena
5. Gain knowledge on SOM concepts
6. Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS**9**

Biological Neuron, artificial neuron-comparison, neuron model, architectures-Feedforward and recurrent types. Perceptron -learning rule-graphical, algorithm, limitations, multilayer network.

UNIT II BACKPROPAGATION NETWORKS**9**

Backpropagation algorithm-derivation of up-dation rules, drawbacks. Variants of Backpropagation algorithm-momentum, variable learning rate-simple problems. Data based modeling using backpropagation algorithm – applications - example.

UNIT III ASSOCIATIVE AND SELF-ORGANIZING NETWORKS**9**

Associative Learning –supervised and unsupervised types- Instar , outstar and Kohonen networks, Bidirectional associative memories, Hopfield Network. Self organizing map algorithm
–Simple problems.

UNIT IV SUPERVISED AND UNSUPERVISED LEARNING NETWORKS**9**

Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

UNIT V APPLICATIONS**9**

Applications – electric drives- speed control of induction motors

TOTAL: 45 HOURS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	Martin T.Hagan,Howard B. Demuth, Mark Beale	Neural Network Design	Cenage Learning	2008
---	--	-----------------------	-----------------	------

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	S.N Sivanandam, S.Sumathi, S.N.Deepa	Introduction to Neural Networks using MATLAB 6.0	TMH	2006
2	Laurene V. Fausett	Fundamentals of Neural Networks-architecture, algorithm and application	Pearson Education	2004

**ELECTIVE – II AND ELECTIVE - III
(ONLY APPLICABLE FOR SIXTH SEMESTER)**

15BEEE6E01

COMPUTER ARCHITECTURE

L T P C 3 0 0 3

Course Objectives

- To study the various representations of data, register transfer language for micro operations and organization and design of a digital computer.
- To teach the concept of micro-programmed control unit, the central processing unit, stack and instruction formats.
- To Study the various arithmetic operation's algorithms
- To study the hardware implementations and concept of pipelining and vector processing.
- To illustrate the techniques to communicate with input and output devices.
- To study the recent trends in it

Course Outcomes

1. Understand the concepts of microprocessors, their principles and practices.
2. Write efficient programs in assembly language of the 8086 family of microprocessors.
3. Organize a modern computer system and be able to relate it to real examples.
4. Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.
5. Implement embedded applications using ATOM processor.
6. Analysis the real time application of it.

UNIT I DATA REPRESENTATION, MICRO-OPERATIONS, ORGANIZATION AND DESIGN 9

Data representation: Data types, complements, fixed-point representation, floating-point representation, other binary codes and error detection codes. Register transfer and micro operations: Register transfer language, bus and memory transfers, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit. Basic computer organization and design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input-output and interrupt. Complete computer description, design of basic computer, design of accumulator.

UNIT II CONTROL AND CENTRAL PROCESSING UNIT 9

Micro programmed control: memory, address sequencing, micro-program example, design of control unit. Central processing unit: General registers and organization, stack and pointer organization, instruction formats, modes, data transfer and manipulation, program control, reduced Instruction set computer.

UNIT III COMPUTER ARITHMETIC, PIPELINE AND VECTOR PROCESSING 9

Computer arithmetic: Addition, subtraction, multiplication and division algorithms, floating-point arithmetic operations, decimal arithmetic unit, decimal arithmetic operations. Pipeline and vector processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing array processors.

UNIT IV INPUT-OUTPUT ORGANIZATION 9

Input-output organization: Peripheral devices, input-output interface, asynchronous data transfer (UART and USART), modes of transfer, priority interrupt, direct memory access, input-output processor, serial communication.

UNIT V MEMORY ORGANIZATION**9**

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Morris Mano	Computer System Architecture	Pearson Education, India	2002
2	John L Hennessy and David A Patterson	Computer Architecture, A Quantitative Approach	Morgan Kaufmann, San Francisco, USA	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Vincent P Heuring and Harry F Jordan	Computer Systems Design and Architecture	Pearson Education, Asia	2002
2	Andrew S Tanenbaum	Structured Computer Organization	Pearson Education, New Delhi	2002
3	William Stallings	Computer Organization and Architecture	Pearson Education, New Delhi	2003

WEBSITES

1. arch-www.cs.wisc.edu
2. ece.eng.wayne.edu/~gchen/ece4680/lecture-notes/lecture-notes.html

15BEEE6E02 FUZZY LOGIC AND ITS APPLICATIONS L T P C 3 0 0 3

Course Objectives

- To introduce the basic concepts of Fuzzy logic and its applications in various domain
- To educate how to use Fuzzy computation to solve real-world problems
- To have a solid understanding of Basic fuzzy models
- To study about the development of fuzzy controllers
- To Understand the concepts of adaptive fuzzy control
- To study the fuzzy based model system

COURSE OUTCOMES

At the end of the course the students will be able to

- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control
- Ability to develop how to use Fuzzy computation to solve real- world problems
- Design fuzzy based model for any application

UNIT I FUZZY SETS AND RELATIONS

9

Classical sets, fuzzy sets-operation, properties. Fuzzy relations-Equivalence and tolerance relation, Fuzzication- membership function-types, methods.

UNIT II FUZZY INFERENCE SYSTEM

9

Building Blocks of a Fuzzy system, fuzzication, fuzzy Rule-based Systems. Composition of rules, types of inference, defuzzification methods. Fuzzy control system- examples

UNIT III FUZZIFICATION AND FUZZY ARITHMETIC

9

Lambda-cuts for fuzzy sets-lambda cutsfor fuzzy relations- defuzzification methodsExtension principle-functions of fuzzy sets- fuzzy transform-fuzzy numbers- approximate methods of extension-vertex method-DSW algorithm

UNIT IV FUZZY LOGIC AND FUZZY RULE BASED SYSTEMS

9

Fuzzy logic –approximate reasoning-fuzzy tautologies-contradictions-equivalence-and logical proofs-other forms of implication operation and composition operation-linguistic hedges-rule based systems-fuzzy associative memories-multiCourse Objectives decision making – fuzzy bayesian decision method.

UNIT V APPLICATIONS

9

Single sample identification-multifeature pattern recognition-image processing-simple fuzzy logic controllers-General fuzzy logic controllers-Industrial applications-Fuzzy tool box in Matlab.

TOTAL 45 HOURS

TEXTBOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Timothy J.Ross	Fuzzy Logic with Engineering Applications	Wiley student edition,2nd edition	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	George j.Klir & Tina A.Folger	Fuzzy sets Uncertainty & Information	PHI	2001

Course Objectives

- To study about the distributed generation system.
- To study about the relaying and protections in the distributed system.
- To get the knowledge of distributed generation, boiler turbine monitoring system.
- To get the knowledge in Planning of distributed system
- To know the control of DG inverter
- To gather knowledge of protection of distributed systems

Course Outcomes

At the end of the course the students will

- Understand the distributed generation system , boiler turbine monitoring system.
- Understand the Planning of distributed system
- Analysis the control of DG inverters
- Analysis the protection of distributed systems
- Understand the rel time system
- Analysis the norms and standards used in it

UNIT I INTRODUCTION TO DISTRIBUTED GENERATION**9**

Introduction to the concept of distributed generation - Distributed generation advantages and needs - Radial distribution system protection: Fuse, circuit breakers, reclosers- Per-unit analysis, fault analysis, sequence component analysis, sequence models of distribution system components. Implications of DG on distribution system protection coordination.

UNIT II DISTRIBUTION SYSTEM LOADING**9**

Introduction – Distribution system loading, line drop model, series voltage regulators and on line tap changers- Power quality requirements and source switching using SCR based static switches- Loop and secondary network distribution grids and impact of DG operation.

UNIT III RELAYING AND PROTECTION**9**

Relaying and protection, distributed generation interconnection relaying, sensing using CTs and PTs- Intentional and unintentional islanding of distribution systems. Passive and active detection of unintentional islands, non detection zones - EMI considerations in DG applications.

UNIT IV DISTRIBUTED GENERATION PLANNING**9**

DG planning and forecasting techniques - Load characteristics: Definitions - tariffs and metering of energy, cost implications of power quality, cost of energy and net present value calculations and implications on power converter design- Distribution Transformers: Types. Distribution sub- stations and primary systems: Voltage drop and power loss calculations: Distribution feeder costs.

UNIT V DG INVERTERS CONTROL**9**

Control of DG inverters, phase locked loops, current control and DC voltage control for stand alone and grid parallel operations. Protection of the converter.

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. M.K. Khedkar, Dr. G.M. Dhole	A Textbook of Electric Power Distribution Automation	Laxmi Publications, Ltd	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ned Mohan, Tore M. Undeland,	Power Electronics: Converters, Applications, and Design	Wiley	2002
	William P. Robbins			
2	Turan Gonen	Electric Power Distribution Systems	CRC Press	2006
3	Pabla, A. S	Electric Power Distribution	6th Edition, Tata McGraw-Hill Education	2011
4	M. V. Deshpande	Electrical Power System Design	Tata McGraw-Hill Education	2001

15BEEE6E05 COMPUTER ORGANIZATION AND ARCHITECTURE L T P C 3 0 0 3

Course Objectives

- To study the various representations of data, register transfer language for micro operations and organizations and design of digital computer
- To teach the concept of micro program control unit ,CPU, stack and instruction formats
- To study the concepts of microprocessors, their principles and practices
- To study the write efficient programs in assembly language of the 8086 family of microprocessors.
- To illustrate the technique to communicate with input and output devices
- To study the organization and operation of various memories and memory management hardware

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. Understand the concepts of microprocessors, their principles and practices.
2. Write efficient programs in assembly language of the 8086 family of microprocessors.
3. Organize a modern computer system and be able to relate it to real examples.
4. Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.
5. Implement embedded applications using ATOM processor.
6. Analysis the real time application of it.

UNIT I DATA REPRESENTATION, MICRO-OPERATIONS, ORGANIZATION AND DESIGN

9

Data representation: Data types, complements, fixed–point representation, floating-point representation, other binary codes, error detection codes. Register transfer and micro operations: Register transfer language, register transfer, bus and memory transfers, arithmetic micro- operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit- Basic computer organization and design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input output and interrupt. Complete computer description, design of basic computer, design of accumulator logic.

UNIT II CONTROL AND CENTRAL PROCESSING UNIT

9

Micro programmed control: Control memory, address sequencing, micro-program example, design of control unit-Central processing unit: General register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer.

UNIT III COMPUTER ARITHMETIC, PIPELINE AND VECTOR PROCESSING

9

Computer arithmetic: Addition and subtraction, multiplication algorithms, division

algorithms, floating-point arithmetic operations, decimal arithmetic unit, decimal arithmetic operations- Pipeline and vector processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing array processors.

UNIT IV INPUT-OUTPUT ORGANIZATION

9

Input-output organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access, input-output processor, serial communication.

UNIT V MEMORY ORGANIZATION

9

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

TOTAL: 45 HOURS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Morris Mano	Computer System Architecture	3rd Edition, Pearson Education	2008
2	Vincent P.Heuring and Harry F.Jordan	Computer Systems Design and Architecture	Pearson Education Asia Publications, II Edition	2008.

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Andrew S.Tanenbaum	Structured Computer Organization'	V Edition, Prentice Hall of India/Pearson Education	2006
2	William Stallings	Computer Organization and Architecture'	VII Edition, Prentice Hall of India/Pearson Education	2008

Course Objectives

- To provide a clear understanding of Embedded system terminologies and its devices.
- Various Embedded software Tools
- Design and architecture of Memories.
- Architecture of processor and memory organizations.
- Input/output interfacing
- Various processor scheduling algorithms.
- Basics of Real time operating systems.
- Introduction to PIC and its applications

Course Outcomes

At the end of the course the students will be able to

- 1. Understand overview of embedded systems architecture
- 2. Acquire knowledge on embedded system, its hardware and software.
- 3. Gain knowledge on overview of Operating system
- 4. Discuss about task Management
- 5. Gain knowledge about semaphore management and message passing.
- 6. Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEMS**9**

Introduction to embedded real time systems – The build process for embedded systems – Types of memory – Memory management methods.

UNIT II EMBEDDED SYSTEM ORGANIZATION**9**

Structural units in processor , selection of processor & memory devices – DMA – I/O devices : timer & counting devices – Serial communication using I2C , CAN USB buses – Parallel communication using ISA , PCI ,PCI/X buses – Device drivers.

UNIT III PROGRAMMING AND SCHEDULING**9**

Intel I/O instructions – Synchronization - Transfer rate, latency; interrupt driven input and output Nonmaskable interrupts, software interrupts, Preventing interrupts overrun - Disability interrupts. Multithreaded programming –Context Switching, Preemptive and non-preemptive multitasking, semaphores. Scheduling-thread states, pending threads, context switching.

UNIT IV REAL-TIME OPERATING SYSTEMS**9**

Introduction to basic concepts of RTOS, Unix as a Real Time Operating system – Unix based Real Time operating system - Windows as a Real time operating system – POSIX – RTOS- Interrupt handling - A Survey of contemporary Real time Operating systems:PSOS, VRTX, VxWorks, QNX, µC/OS-II, RT Linux – Benchmarking Real time systems – Basics.

UNIT V PIC MICROCONTROLLER BASED EMBEDDED SYSTEM DESIGN**9**

PIC microcontroller – MBasic compiler and Development boards – The Basic Output and

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rajkamal	Embedded system- Architecture, Programming, Design	TataMcgraw Hill	2003
2	Daniel W. Lewis	Fundamentals of Embedded Software	Prentice Hall of India	2004

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jack R Smith	Programming the PIC microcontroller with MBasic	Elsevier	2007
2	Tammy Noergaard	Embedded Systems Architecture	Elsevier	2006
3	Rajib Mall	Real-Time systems Theory and Practice	Pearson Education	2007
4	Sriram. V.Iyer & Pankaj Gupta	Embedded real time systems Programming	Tata McGraw Hill	2004

15BEEE6E06 PROGRAMMABLE LOGIC CONTROLLER AND ITS APPLICATIONS

L T P C 3 0 0 3

Course Objectives

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flow charts of ladder
- To understand the principles of spray process system

Course Outcome

At the end of the course the student will be able

- to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION

9

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING

9

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS

9

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS

9

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES

9

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006
---	---	--	---------	------

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2002
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2006

WEBSITES

<http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm>, - Introduction to programmable Logic controller

Course Objectives

- To introduce the concept of analyzing discrete time signals and systems in the time and frequency domain.
- To classify signals and systems and their mathematical representation.
- To analyse the discrete time systems.
- To study various transformation techniques and their computation.
- To study about filters and their design for digital implementation.
- To study about a programmable digital signal processor and quantization effects.

Course Outcomes

1. Represent signals mathematically in continuous and discrete-time, and in the frequency domain.
2. Analyse discrete-time systems using z-transform.
3. Understand the Discrete-Fourier Transform (DFT) and the FFT algorithms.
4. Design digital filters for various applications.
5. Apply digital signal processing for the analysis of real-life signals.
6. Analyse the real time application of it

UNIT I INTRODUCTION**9**

Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect, analog to digital conversion.

UNIT II DISCRETE TIME SYSTEM ANALYSIS**9**

Discrete Fourier series, Fourier transform of discrete sequence, Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution.

UNIT III DISCRETE FOURIER TRANSFORM & COMPUTATION**9**

Discrete Fourier Transform and its properties - Computation of DFT using FFT algorithm – DIT & DIF - FFT using radix 2 – Butterfly structure.

UNIT IV DESIGN OF DIGITAL FILTERS**9**

FIR design: Windowing Techniques - Rectangular, Hamming, Hanning – Need and choice of windows – Linear phase characteristics.

IIR design: Analog filter design - Butterworth filter design using impulse invariant and bilinear transformation - Warping, prewarping - Frequency transformation.

UNIT V PROGRAMMABLE DSP CHIPS**9**

Architecture and features of TMS 320C54 signal processing chip – Overview of instruction

set and addressing modes of TMS 320C54

• **TOTAL: 45 HOURS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Proakis, J. G. and Manolakis, D. G	Digital Signal Processing Principles, Algorithms and Applications.	Pearson Education, New Delhi.	2003
2	Mitra, S.K	Digital Signal Processing – A Computer Based Approach	Tata McGraw Hill Publications, New Delhi.	2001

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Alan V Oppenheim, Ronald W Schafer and John R Buck	Discrete – Time Signal Processing	Pearson Education, New Delhi.	2003
2	Venkataramani, B., and Bhaskar, M.,	Digital Signal Processors, Architecture, Programming and Applications.	Tata McGraw Hill, New Delhi.	2003
3	Salivahanan, S., Vallavaraj, A., Gnanapriya, C	Digital Signal Processing	Tata McGraw Hill Publications, New Delhi.	2003

WEBSITES

1. <http://www.dspguide.com>
2. <http://www.dsptutor.freeuk.com>

Course Objectiv

- To understand the various types of over voltages in power system and Protection methods.
- To study about generation of over voltages in laboratories. To
- know about measurement of over voltages.
- To study about the nature of Breakdown mechanism in solid, liquid and gaseous Dielectrics
- To study about discussion on commercial insulates.
- To study about testing of power apparatus and insulation coordination

Course Outcomes

1. Identify the causes of over voltages and its effects and estimate the reflection and refractions of travelling waves in transmission lines
2. Discuss the various types of breakdown mechanisms and analyze the breakdown mechanisms in solid, liquid, gases and composite dielectrics
3. Explain the generation and design of different types of Generating circuits for high voltage and currents of AC, DC and impulse
4. Measure AC and DC high voltage and current using high resistance with series ammeter, dividers, peak voltmeter and generating voltmeters
5. Discuss the testing methodologies related to various high voltage equipment with reference to national and international standards
6. Estimate the AC and DC high voltage and current using CVT, electrostatic voltmeters, sphere gaps, high current shunts and digital techniques in high voltage measurement

UNIT I OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effect on power system – Lightning, switching surges and temporary over voltages – protection against over voltages.

UNIT II ELECTRICAL BREAKDOWN IN GASES, LIQUIDS AND SOLIDS 9

Gaseous breakdown in uniform and non-uniform fields – corona discharges – Vacuum breakdown – conduction and breakdown in pure and commercial liquids – breakdown mechanisms in solid and composite dielectrics.

UNIT III GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generator.

UNIT IV MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

Measurement of High voltages and High currents – digital techniques in high voltage measurement.

UNIT V HIGH VOLTAGE TESTING AND INSULATION COORDINATION 9

High voltage testing of electrical power apparatus – power frequency, impulse voltage and DC testing – International and Indian standards – Insulation Coordination.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Naidu, M. S. and Kamaraju, V	High Voltage Engineering	Tata McGraw Hill, New Delhi	2004
2	Kuffel, E. and Zaengl, W. S	High Voltage Engineering Fundamentals	Butterworth-Heinemann	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Abdel-AlAm/Ani	High-Voltage Engineering: Theory and Practice	CRC , Colorado, USA	2000
2	Dieter Kind, Kurt Feser	High Voltage Test Techniques	Newnes, NSW, Australia	2000

WEBSITES

1. iopscience.iop.org
2. www.newagepublishers.com

Course Objectives

- To expose the students to the concepts of special electrical machines and analyze their performance and to impart knowledge on
- Construction and performance of synchronous reluctance motors.
- Principle of operation and performance of stepping motors .
- To study the knowledge on construction and operation of permanent magnet brushless D.C. motors.
- To study the real time need of special machines
- Construction, principle of operation and performance of switched reluctance motors, permanent magnet synchronous motors.

Course Outcomes

At the end of this course students will demonstrate the ability to

1. Analyze and design controllers for special Electrical Machines.
2. Acquire the knowledge on construction and operation of stepper motor.
3. Understand the concept of construction and operation of stepper switched reluctance motors.
4. Acquire the knowledge on construction and operation of permanent magnet brushless D.C. motors.
5. Acquire the knowledge on construction and operation of permanent magnet synchronous motors.
6. Determine a special Machine for a particular application.

UNIT I SYNCHRONOUS RELUCTANCE MOTORS**9**

Constructional features – Types – Axial and radial air gap motors – Operating principle – Reluctance – Phasor diagram – Characteristics – Vernier motor – Driver circuits – Applications of AC motors.

UNIT II STEPPING MOTORS**9**

Construction and Principle of operation – Types: Permanent Magnet, Hybrid and Variable reluctance motor – Single and multi stack configurations – Theory of torque predictions – Dynamic Characteristics – Driver circuits – Applications of stepper motors.

UNIT III SWITCHED RELUCTANCE MOTORS**9**

Construction and Principle of operation – Torque prediction – Power controllers – Non-linear analysis – Microprocessor based control – Characteristics – Driver circuits.

UNIT IV PERMANENT MAGNET BRUSHLESS DC MOTORS**9**

Construction and Principle of operation – Electronic Commutator – Difference between electronic and Mechanical Commutator – Types of PMBLDC motors – Magnetic circuit analysis – EMF and torque equations – Power controllers – Motor characteristics and control – Applications of DC motors.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS**9**

Construction and Principle of operation – EMF and torque equations – Torque-speed characteristics – Reactance – Phasor diagram – Power controllers – Volt-ampere requirements of

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	P.P.Acarney	Stepping Motors, A Guide to Modern theory and practice	Peter Peregrines, London	2002
2	B K Bose	Modern Power Electronics & AC drives	Pearson	2002
3	T.Kenjo	Stepping motors and their microprocessor controls	Oxford University press, New Delhi	2000
4	Sen.P.C	Principles of Electrical Machines and Power Electronics	John willey & Sons, Second edition	2008

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hughes	Electric Motors and Drives	Affiliated East - West Press Pvt., Ltd	2007
2	S. Heier	Grid Integration of Wind Energy Conversion Systems	Wiley	2006
3	Ali Emadi (Ed)	Handbook of Automotive Power Electronics and Motor Drives	CRC Press	2005
4	H A Toliyat, S Campbell	DSP Based Electro Mechanical Motion Control	CRC Press	2004
5	Dubey.G.K	Fundamentals of Electric Drives	Alpha Science International Limited, Second revised edition	2008

Course Objectives

- To expose the students to the basic concepts of optical fibres and their properties.
- To provide adequate knowledge about the Industrial applications of optical fibres.
- To expose the students to the Laser fundamentals.
- To study the source and detectors in optical system
- To provide adequate knowledge about Industrial application of lasers.
- To provide adequate knowledge about holography and Medical applications of Lasers.

Course Outcomes

- At the end of the course the student will be understand the concept of fibre optics and about laser instruments.
- Introduce the characteristics of laser for engineering applications.
- Develop the idea of quantum mechanics through applications.
- Gain knowledge in industrial application about optical fibre
- Develop the new strategies in laser technology in industries
- Acquire knowledge in advanced medical system utility under this technology

UNIT I OPTICAL FIBRES AND THEIR PROPERTIES UNIT I OPTICAL FIBRES AND THEIR PROPERTIES

9

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors and splicers – Fiber termination – Optical sources – Optical detectors.

UNIT II INDUSTRIAL APPLICATION OF OPTICAL FIBRES

9

Fibre optic sensors – Fibre optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT III LASER FUNDAMENTALS

9

Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT IV INDUSTRIAL APPLICATION OF LASERS

9

Laser for measurement of distance, length, velocity, acceleration, current, voltage and Atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT V HOLOGRAM AND MEDICAL APPLICATIONS**9**

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumors of vocal cords, brain surgery, plastic surgery, gynaecology and oncology.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	J.M. Senior	Optical Fibre Communication – Principles and Practice'	Prentice Hall of India – 2 nd edition	2013
2	J. Wilson and J.F.B. Hawkes	Introduction to Opto Electronics'	Prentice Hall of India	2001

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	G. Keiser	Optical Fibre Communication'	McGraw Hill – 4 th edition	2012
2	M. Arumugam	Optical Fibre Communication and Sensors'	Anuradha Publications	2002

ELECTIVE – IV AND ELECTIVE - V
(ONLY APPLICABLE FOR SEVENTH SEMESTER)

15BEEE7E01

COMPUTER NETWORKS

L T P C 3 0 0 3

Course Objectives

- To study about various network architecture
- To study and analyse about various switching.
- To study about web security and its need
- To study about protocols and its controls
- To study about subnetting and domains basics
- To study about real time need of network management

Course Outcomes

- At the end of the course the student will be able to understand the computer networks and network protocols.
- To gain switching mechanisms of various interlink networks
- To know web securities and its need in real time digital world
- To gather D-link concepts
- To acquire wireless communication software and its related devices
- Gather protocols of dealing network accessories

UNIT I

INTRODUCTION

9

Network architecture – layers – Physical links – Channel access on links – Hybrid multiple access techniques - Issues in the data link layer - Framing – Error correction and detection – Link-level Flow Control

UNIT II WIRELESS NETWORKS

9

Medium access – CSMA – Ethernet – Token ring – FDDI - Wireless LAN – Bridges and Switches

UNIT III SWITCHING

9

Circuit switching vs. packet switching / Packet switched networks – IP – ARP – RARP – DHCP – ICMP – Queueing discipline – Routing algorithms – RIP – OSPF – Subnetting – CIDR – Interdomain routing – BGP – Ipv6 – Multicasting – Congestion avoidance in network layer

UNIT IV NETWORK PROTOCOLS

9

UDP – TCP – Adaptive Flow Control – Adaptive Retransmission - Congestion control – Congestion avoidance – QoS

UNIT V WEB SECURITY

9

Email (SMTP, MIME, IMAP, POP3) – HTTP – DNS- SNMP – Telnet – FTP – Security – PGP SSH

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Larry L. Peterson, Bruce S. Davie	Computer Networks: A Systems Approach	Third Edition, Morgan Kauffmann Publishers Inc	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	James F. Kuross, Keith W. Ross	Computer Networking, A Top-Down Approach Featuring the Internet	Third Edition, Addison Wesley	2004
2	Nader F. Mir	Computer and Communication Networks	Pearson Education	2007
3	Comer	Computer Networks and Internets with Internet Applications	Fourth Edition, Pearson Education	2003
4	Andrew S. Tanenbaum	Computer Networks	Fourth Edition	2003
5	William Stallings	Data and Computer Communication	Sixth Edition, Pearson Education	2000

Course Objectives

- To understand the mobile channel environment, communication techniques and wireless standards for mobile communication.
- To learn cellular concept including handoff mechanism, cell coverage and capacity.
- To understand the mobile radio propagation models for indoor and outdoor conditions.
- To study the digital modulation and equalization techniques suitable for mobile communication.
- To learn speech coding and multiple access techniques for mobile communication.
- To familiarize with the international wireless network standards.

Course Outcomes

1. Understand past, present and future trends in mobile communication.
2. Gain knowledge about mobile cellular communication
3. Understand various standards in use for wireless communication and its application.
4. Demonstrate some basic application of GPS.
5. Gain knowledge about RADAR working and its applications
6. Gathered knowledge in digital modulation and equalization techniques suitable for mobile communication.

UNIT I CELLULAR CONCEPT AND SYSTEM DESIGN FUNDAMENTALS 9

Introduction to wireless communication: Evolution of Mobile Communication, mobile radio systems – Examples, trends in cellular radio and personal communications. Cellular concept: Frequency reuse, channel assignment hand off, interference and system capacity, tracking and grade of service, improving coverage and capacity in cellular systems.

UNIT II MOBILE RADIO PROPAGATION

9

Free space propagation model, reflection, diffraction, scattering, link budget design, outdoor propagation models, indoor propagation models, small scale multipath propagation, impulse model, small scale multipath measurements, parameters of mobile multipath channels, types of small scale fading.

UNIT III MODULATION TECHNIQUES AND EQUALIZATION

9

Modulation techniques: Minimum Shift Keying (MSK), Gaussian MSK, M-array QAM, Performance of MSK modulation in slow-flat fading channels. Equalization: Survey of equalization techniques, linear equalization, non-linear equalization, algorithms for adaptive equalization. Diversity Techniques, RAKE receiver.

UNIT IV CODING AND MULTIPLE ACCESS TECHNIQUES

9

Coding: Vocoder, linear predictive coders, selection of speech coders for mobile communication, GSM coders. Multiple access techniques: FDMA, TDMA, CDMA, SDMA, capacity of cellular CDMA.

UNIT V WIRELESS SYSTEMS AND STANDARDS**9**

Second generation and third generation wireless network and standards, WLL, blue tooth, GSM, IS-95 and DECT.

TOTAL: 45 HOURS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rappaport, T. S	Wireless Communications: Principles and Practice	Prentice Hall of India, New Delhi	2003
2	Blake, R	Wireless Communication Technology	Thomson Delmar, New York	2003

REFERENCES

S. No.	Author(s) Name	Title of theBbook	Publisher	Year of Publication
1	Stephen G Wilson	Digital Modulation and Coding	Pearson Education, New Delhi	2003
2	Jochen Schiller	Mobile Communications	Addison Wesley, Boston	2003
3	Mischa Schwartz	Mobile Wireless Communications	Cambridge University Press, Cambridge, UK	2005

WEBSITES

1. www.pearson.ch/download/media/9780130422323.pdf
2. www.wtec.org/loyola/wireless/chapter02.pdf

Course Objectives

- To study about representing knowledge.
- To study the reasoning and decision making in uncertain world. 'construct plans and methods for generating knowledge.
- To study the concepts of expert systems.
- To study the knowledge about the various searching strategies
- To study about first order logic
- To study the need of real time world about robotics

Course Outcomes

At the end of the course the student will be able to

- understand concepts about artificial intelligence, reasoning and also about expert system tools.
- To understand about representing knowledge.
- To acquire knowledge about the reasoning and decision making in uncertain world.
- To construct plans and methods for generating knowledge.
- To acquire knowledge about the concepts of expert systems.
- To acquire knowledge about the various searching strategies for solutions

UNIT I INTRODUCTION

9

Introduction to AI: Intelligent agents – Perception – Natural language processing – Problem solving agents – Searching for solutions: Uniformed search strategies – Informed search strategies.

UNIT II KNOWLEDGE AND REASONING

9

Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning – Logical agents: Propositional logic – First order logic – Syntax and semantics – Using first order logic – Inference in first order logic.

UNIT III UNCERTAIN KNOWLEDGE AND REASONING

9

Uncertainty – Acting under uncertainty – Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning – Making simple decisions.

UNIT IV PLANNING AND LEARNING

9

Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains.

Learning: Learning decision trees – Knowledge in learning – Neural networks – Reinforcement

learning – Passive and active.

UNIT V EXPERT SYSTEMS

9

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Stuart Russel and Peter Norvig	Artificial Intelligence A Modern Approach	Prentice Hall India, New Delhi	2003
2	Donald A Waterman	A Guide to Expert Systems	Pearson Education, India	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	George Luger F	Artificial Intelligence – Structures and Strategies for Complex Problem Solving	Pearson Education, New Delhi	2002
2	Janakiraman, Sarukesi, K	Foundations of Artificial Intelligence and Expert Systems	Macmillan Series in Computer Science	2001
3	Patterson, W	Introduction to Artificial Intelligence and Expert Systems	Prentice Hall of India, New Delhi	2003
4	Michael Negnevitsky	Artificial Intelligence: A Guide to Intelligent Systems	Addison Wesley, Harlow, England	2005

WEBSITES

1. <http://nptel.iitm.ac.in/video.php/courseId=1084>
2. www.pes.edu

Course Objectives

- To study the generation of switching transients and their control using circuit – theoretical concept.
- To study the mechanism of lightning strokes and the production of lightning surges.
- To study the propagation, reflection and refraction of travelling waves.
- To study the impact of voltage transients caused by faults, circuit breaker action, Load rejection on integrated power system.
- To study the recent advancement in it

Course Outcomes

At the end of the course the Outcomes will be able to

- understand and observe the generation of switching transients and their control using circuit – theoretical concept.
- analyses mechanism of lighting strokes
- analyses the production of lighting surges
- design the propagation, reflection and refraction of travelling waves.
- design the circuit breaker for fault condition
- design various protective devices

UNIT I INTRODUCTION AND SURVEY**9**

Source of transients, various types of power systems transients, effect of transients on power systems, importance of study of transients in planning.

UNIT II SWITCHING TRANSIENTS**9**

Introduction, circuit closing transients: RL circuit with sine wave drive, double frequency transients, observations in RLC circuit and basic transforms of the RLC circuit. Resistance switching: Equivalent circuit for the resistance switching problems, equivalent circuit for interrupting the resistor current. Load switching: Equivalent circuit, waveforms for transient voltage across the load, switch; normal and abnormal switching transients. Current suppression, current chopping, effective equivalent circuit. Capacitance switching, effect of source regulation, capacitance switching with a restrike, with multiple restrikes, illustration for multiple restriking transients, ferroresonance.

UNIT III LIGHTNING TRANSIENTS**9**

Causes of overvoltage, lightning phenomenon, charge formation in the clouds, rate of charging of thunder clouds, mechanisms of lightning strokes, characteristics of lightning strokes; factors contributing to good line design, protection afforded by ground wires, tower footing resistance. Interaction between lightning and power system: Mathematical model for lightning.

UNIT IV TRAVELLING WAVES ON TRANSMISSION LINE – COMPUTATION OF TRANSIENTS**9**

Computation of transients: Transient response of systems with series and shunt lumped parameters and distributed lines. Travelling wave concept: step response, Bewley's lattice diagram, standing waves and natural frequencies, reflection and refraction of travelling waves.

UNIT V TRANSIENTS IN INTEGRATED POWER SYSTEM**9**

The short line and kilometric fault, distribution of voltage in a power system: Line dropping and load rejection; voltage transients on closing and reclosing lines; over voltage induced by faults; switching surges on integrated system; EMTP for transient computation.

TEXT BOOKS**TOTAL: 45 HOURS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	R.D.Begamudre	Extra High Voltage AC Transmission Engineering	New Academic Science - 4 edition	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	C.L.Wadhwa	Electrical Power Systems	New Age International Pvt., Ltd – 6 th edition	2010
2	Pritindra Chowdhari	Electromagnetic transients in Power Systems	Research Studies Press; 2 edition	2003

Course Objectives

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

Course Outcomes

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3. Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS

9

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS

9

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS

9

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER

9

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLENEOUS TRANSDUCERS

9

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
---------------	---------------------------	--------------------------	------------------	--------------------------------

1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES:

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2000
2	Patranabis. D	Sensors and Transducers	PHI Learning Pvt. Ltd.	2003
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2000
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2001

Course Objectives

- To study about HVDC systems
- To study about HVDC control systems
- To Study the control strategies used in HVdc transmission system.
- To Study the improvement of power system stability using an HVdc system.
- To Study and Analysis the components of HVDC system
- To study about aspects of EHVAC systems

Course Outcomes

At the end of the course the student will

1. Justify the advantages of dc transmission over ac transmission.
2. Reproduce the operation of Line Commutated Converters and Voltage Source Converters.
3. Evaluate the control strategies used in HVdc transmission system.
4. Identify and propose the improvement of power system stability using an HVdc system.
5. gain knowledge about HVDC transmission, converters used and about EHVAC systems.
6. Analysis the real time application of it.

UNIT I EHV TRANSMISSION**9**

Introduction-Necessity for EHV Transmission-Problems involved in EHV Transmission-Operational Aspects of EHV power transmission-Compensation of EHV systems-Gas insulated EHV lines-Environmental and biological aspects.

UNIT II GENERAL BACKGROUND OF EHVAC TRANSMISSION SYSTEMS**9**

Standard Voltage levels for Transmission lines-Hierarchical levels of Transmission Network-Average values of line parameters-Power handling capacity and line losses-Cost of Transmission line and Equipments-Mechanical consideration in line performance-Comparison of Overhead and Underground lines-Examples of Giant power pools in the world.

UNIT III ASPECTS OF EHVAC SYSTEM**9**

Power Transferability of Ac line – Line losses-Conductor cost -Transient stability of Ac line – control of power flow through line Right – of- way(Row)-Corona- Towers(support)-Insulation Coordination and surge arrester protection-Line insulation-Clearance and Creepage distances.

UNIT IV HVDC TRANSMISSION SYSTEMS**9**

Choice of HVDC Transmission - Comparison of AC and DC Transmission – Economics of DC power Transmission, Technical Performance and Reliability – Description of HVDC Converter station- Types of HVDC Links- Merits and Limitations of HVDC System - Applications - Modern Trends in HVDC transmission –Case Studies of HVDC links in the

world.

UNIT V CONVERTERS AND HVDC SYSTEM CONTROL

9

Pulse number – Choice of Converter Configuration – Simplified analysis of Graetz circuit – Principles of HVDC link Control –DC Breaker - Harmonic Elimination – AC and DC Filter design –Protection Systems in HVDC Substation-HVDC Simulator.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Naidu, M. S. and Kamaraju, V	High Voltage Engineering	Tata McGraw Hill, New Delhi	2004
2	Kuffel, E. and Zaengl, W. S	High Voltage Engineering Fundamentals	Butterworth-Heinemann	2000

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Abdel-AlAm/Ani	High-Voltage Engineering: Theory and Practice	CRC , Colorado, USA	2000
2	Dieter Kind, Kurt Feser	High Voltage Test Techniques	Newnes, NSW, Australia	2000

WEBSITES

1. iopscience.iop.org
2. www.newagepublishers.com

Course Objectives

- To study and gain knowledge about switched mode power conversion.
- To study about technology in SMPS
- To study the technology in various functions
- To study the resonant converter and its applications
- To study the basic power converters and its techniques
- To gather information about harmonics and its impacts

Course Outcomes

- At the end of the course the student will be able to understand the concept of capacitors and inductor design.
- To understand the working of Power Converters and components of low-voltage electrical installation
- To acquire knowledge of Steady state and dynamic functions in various applications
- To acquire knowledge about industrial UPS applications
- To know the importance of power quality system in advanced equipments
- To know the design of conversion ratio

UNIT I INTRODUCTION

9

Reactive elements in power electronics system- electromagnetics – design of inductor- design of transformer – capacitors for power electronic applications – types of capacitor

UNIT II POWER CONVERTERS

9

Switched mode power converters – continuous and discontinuous mode of operation in buck, boost and boost-buck converter – isolated DC to DC: forward converter- pushpull converter – fly back converter

UNIT III STEADY STATE AND DYNAMIC FUNCTIONS

9

Pulse width modulated converter: average modeled of the converter – steady state solution – transfer function of the converter- generalized state space mode of the converter – linear small signal model – dynamic functions of the converter.

UNIT IV RESONANT CONVERTERS

9

Resonant converters – ZCS Resonant converters – L and M type – ZVS Resonant converters- comparison between ZCS and ZVS converters – resonant switch converters – buck converter with zero current switching – operation of the circuit – conversion ratio of the converter –

boost converter with zero voltage switching

UNIT V HARMONICS

9

Sub harmonic instability in current programmed control – determination of duty ratio for current programmed control – power circuit of UPF rectifiers – average current mode control – resistor emulator UPF rectifiers

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Keng C. Wu	Switch-Mode Power Converters: Design and Analysis	Elsevier Academic Press	2006

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Issa Batarseh	Power Electronic Circuits	John Wiley	2004
2	Philip T Krein	Elements of Power Electronics	Oxford Press	2014

Course Objectives

- To study about key issues in electric utilities restructuring.
- To study about open access same time information systems.
- Gain the knowledge about power system restructure.
- To study about ISO and its types, roles.
- To know about electricity markets
- To study about knowledge of various trades

Course Outcomes

At the end of the course student will be able to

- Analysis about electric energy trading, electric pricing.
- Analysis about open access same time information systems.
- Gain the knowledge about power system restructure.
- Analysis the real time application of it
- Acquiring knowledge of embedded cost and pricing models in various countries
- Acquiring knowledge of various trades

UNIT I OVERVIEW OF KEY ISSUES IN ELECTRIC UTILITIES RESTRUCTURING 9

Restructuring Models: PoolCo Model, Bilateral Contracts Model, Hybrid Model - Independent System Operator (ISO): The Role of ISO - Power Exchange(PX):Market Clearing Price(MCP) - Market operations: Day-ahead and Hour-AheadMarkets, Elastic and Inelastic Markets - Market Power - Stranded costs -Transmission Pricing: Contract Path Method, The MW-Mile Method - CongestionPricing: Congestion Pricing Methods, Transmission Rights - Management of Inter- Zonal/Intra Zonal Congestion: Solution procedure, Formulation of Inter-ZonalCongestion Sub problem, Formulation of Intra-Zonal Congestion Sub problem.

UNIT II ELECTRIC UTILITY MARKETS IN THE UNITED STATES 9

California Markets: ISO, Generation, Power Exchange, Scheduling Coordinator,UDCs, Retailers and Customers, Day-ahead and Hour-AheadMarkets, Block forwards Market, Transmission Congestion Contracts(TCCs) – New York Market: Market operations - PJM interconnection - Ercot ISO - New England ISO - Midwest ISO: MISO's Functions, Transmission Management, Transmission System Security, Congestion Management, Ancillary Services Coordination, Maintenance Schedule Coordination - Summary of functions of U.S. ISOs.

UNIT III OASIS - OPEN ACCESS SAME-TIME INFORMATION SYSTEM 9

FERC order 889 - Structure of OASIS: Functionality and Architecture of OASIS - Implementation of OASIS Phases: Phase 1, Phase 1-A, Phase 2 - Posting of information: Types of information available on OASIS, Information requirement of OASIS, Users of OASIS - Transfer Capability on OASIS: Definitions, Transfer Capability Issues, ATC Calculation, TTC Calculation, TRM Calculation, CBM Calculation - Transmission Services - Methodologies to Calculate ATC -Experiences with OASIS in some Restructuring Models:

UNIT IV ELECTRIC ENERGY TRADING

9

Essence of Electric Energy Trading - Energy Trading Framework: The Qualifying factors - Derivative Instruments of Energy Trading: Forward Contracts, Futures Contracts, Options, Swaps, Applications of Derivatives in Electric Energy Trading -Portfolio Management: Effect of Positions on Risk Management - Energy Trading Hubs - Brokers in Electricity Trading - Green Power Trading.

UNIT V ELECTRICITY PRICING - VOLATILITY, RISK AND FORECASTING 9

Electricity Price Volatility: Factors in Volatility, Measuring Volatility – Electricity Price Indexes: Case Study for Volatility of Prices in California, Basis Risk -Challenges to Electricity Pricing: Pricing Models, Reliable Forward Curves -Construction of Forward Price Curves: Time frame for Price Curves, Types of Forward Price Curves – Short-term Price Forecasting: Factors Impacting Electricity Price, Forecasting Methods, Analyzing Forecasting Errors, Practical Data Study.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mohammad Shahidehpour and Muwaffaq Almoush	Restructured Electrical Power Systems Operation, Trading and Volatility	Marcel Dekkar, Inc	2001
2	M.Ilic, F.Galiana and L.Fink	Power Systems Restructuring : Engineering and Economics	Kluwer Academic Publishers	2000
3	Editor, Loi Lei Lai	Power System Restructuring and Deregulation : Trading, Performance and Information Technology	John Wiley and sons Ltd	2001
4	K.Bhattacharaya, M.H.J.Bollen and J.E.Daader	Operation of Restructured Power Systems	Kluwer Academic Publishers	2001
5	F.C.Schwepe, M.C.Caramanis, R.D.Tabors and R.E.Bohn	Spot Pricing of Electricity	Kluwer Academic Publishers	2002
6	Editors: J.H.Chow F.F. Wu and J.A.Momoh	Applied Mathematics for Restructured Electric Power Systems: Optimization, Control and Computational Intelligence	Springer	2004

Course Objectives

- To understand the basic principles of PLC and industrial automation systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flow charts of ladder and spray process system
- To understand the principles of PID.

Course Outcome

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION TO INDUSTRIAL AUTOMATION**9**

Requirements of industrial automation- Industrial electrical equipment requiring control and integration through PLC –Functions of the central or distributed control panels in a plant- Conventional central relay and interlock panels and the various components used - Advantages of PLC based system.

UNIT II PLC CONFIGURATION FOR MEETING PLANT CONTROL FUNCTION**9**

PLC configuration and various components of the PLC- CPU, I/O cards, power supply, memory, extension boards, communication boards- Overall Plant motor list from mechanical supplier - Deriving the required control elements, various sensors and functions- Area wise segregation of PLC depending on the locations of the inputs and outputs- Concept of parallel and serial (remote) inputs and outputs – Optimizing the overall cost of PLC and the control cabling.

UNIT III PLC HARDWARE**9**

Detailed specifications of low, medium and high end PLC components like, CPU, Digital input and output modules, Analog input and output modules, special function modules parallel I/O-s and remote I/O-s – Special communication cables for the remote I/O-s - Segregation of the functions depending on the time critical or non- critical nature to decide parallel or remote I/Os- Deciding the memory size and capability based on program size and data – Cubicalization of the PLC and the I/O modules to optimize plant control cable cost – Assignment by using E-plan software or otherwise to detail the PLC and I/O-Switch their addressing –Location of PLC in the plant to optimize the cable cost –Cubicle layout.

UNIT IV PLC SOFTWARE**9**

Getting started with PLC programming system- PC based programming software- Modes of PLC programming - Configuring PLC memory for program and data- Data types and addressing modes- Input and output configuration and addressing- PLC programming instructions- Basic instructions, medium end instructions and high end instructions- Testing and trouble shooting of the program software– Execution times and estimation overall PLC cycle time – Optimization of the cycle time - Use of hard-ware and software interrupts- Introduction to IEC 1131-3 for PLC programming- Assignment for writing PLC software

and testing the same in laboratory.

UNIT V INTEGRATED AUTOMATION SYSTEM ELEMENTS

9

Introduction to integrated automation system and the various levels like level '0', level '1', level '2' - Introduction to field bus, control bus and information bus- Use of different protocols for interfacing with other automation system and drives- HMI-s and their functions for the various plant information- Integration of PLCs with plant HMI-s located at different strategic locations – Concept of client- server HMI-s and development and run type HMI-s - Assignment of screen development for a typical plant requirement.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Frank D Petruszella	Programmable Logic Controllers	Tata McGraw Hill Publishers, III Edition	2005
2	Kevin Collins	PLC Programming for Industrial Automation	“”, Meadow books	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	W.Bolton	Programmable Logic Controllers	Newnes Publication , IV Edition	2006
2	Gary Dunning	Introduction to Programmable Logic Controllers	Delmar Thomson Learning, II Edition	2001

15BEEE7E10 MICROCONTROLLER BASED SYSTEM DESIGN L T P C 3 0 0 3

Course Objectives

- To expose the students to the fundamentals of microcontroller based system design.
- To teach I/O and RTOS role on microcontroller.
- To impart knowledge on PIC Microcontroller based system design.
- To introduce Microchip PIC 8 bit peripheral system Design
- To give case study experiences for microcontroller based applications

Course Outcomes

- At the end of the course the student will be able to understand the concepts of PIC
- Define the 8051 microcontroller with its architecture, pinouts, memory organization, interrupts and compare the programming concepts with 8051
- Illustrate the interfacing of 8085 with various peripheral devices for transmission, reception and control of data
- Make use of the data conversion technique such as ADC and DAC and to interface with 8085 processor and 8051 microcontroller
- Develop the microcontroller assembly language program for various real time applications

UNIT I 8051 ARCHITECTURE

9

Architecture – memory organization – addressing modes – instruction set –Timers - Interrupts I/O ports, Interfacing I/O Devices – Serial Communication.

UNIT II 8051 PROGRAMMING

9

Assembly language programming – Arithmetic Instructions – Logical Instructions –Single bit Instructions – Timer Counter Programming – Serial Communication Programming Interrupt Programming – RTOS for 8051 – RTOSLite – FullRTOS – Task creation and run – LCD digital clock/thermometer using FullRTOS

UNIT III PIC MICROCONTROLLER

9

Architecture – memory organization – addressing modes – instruction set – PIC programming in Assembly & C –I/O port, Data Conversion, RAM & ROM Allocation, Timer programming, MP- LAB.

UNIT IV PERIPHERAL OF PIC MICROCONTROLLER

9

Timers – Interrupts, I/O ports- I2C bus-A/D converter-UART- CCP modules -ADC, DAC and Sensor Interfacing –Flash and EEPROM memories.

UNIT V SYSTEM DESIGN –CASE STUDY

9

Interfacing LCD Display – Keypad Interfacing - Generation of Gate signals for converters and Inverters - Motor Control – Controlling DC/ AC appliances – Measurement of frequency - Stand alone Data Acquisition System.

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Muhammad Ali Mazidi, Janice G. Mazidi and Rolin D. McKinlay	The 8051 Microcontroller and Embedded Systems'	Prentice Hall,	2005.

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey	PIC Microcontroller and Embedded Systems using Assembly and C for PIC18'	Pearson Education	2008
2	John Iovine	PIC Microcontroller Project Book	McGraw Hill	2000
3	Myke Predko	Programming and customizing the 8051 microcontroller	Tata McGraw Hill	2001

**ELECTIVE – VI AND ELECTIVE – VII
(ONLY APPLICABLE FOR EIGHTH SEMESTER)**

15BEEE8E01

ELECTRIC HYBRID VEHICLE

L T P C 3 0 0 3

Course Objectives

- To study the basic concepts of electric hybrid vehicles.
- To study about energy storage system for hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives

Course Outcomes

- At the end of the course the student will be able to understand the concepts of electric hybrid vehicle.
- Summarize the basic concepts in bioprocess Engineering.
 - Explain the concept of Hybrid Electric Vehicles.
 - Understand the concept of Hybrid Electric Drive-Trains.
 - Identify the different Energy Management Strategies.
 - Understand the concept of different Energy Storage devices.
 - Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy

management strategies, implementation issues of energy management strategies.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2004
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2003

- To study about the characteristics of smart grid, models and operating principles.
- To study about energy storage and communication systems used in smart grid.
- To study the models and operating principles of smart grid
- To study the different batteries technology
- To get knowledge about communication system in smart grid
- To study about reliability and stability process

Course Outcomes

At the end of the course the student will be able to

1. Gain the knowledge about Distributed Generations.
2. Acquire the knowledge about Island mode of operation.
3. Understand the basic knowledge about storage devices
4. Analysis the different batteries technology.
5. Understand the communication system in smart grid
6. Analysis the reliability and stability process

UNIT I INTRODUCTION : SMART GRID AND EMERGING TECHNOLOGIES 9

Defining a smart grid – Characteristics of smart grid - Values of a smart grid – The economic Case – The environmental Case – Benefits to utilities – Benefits to consumers – Power system components – Power system protection: Traditional Vs Smart – Case study – Generation fundamentals – Traditional Generations – Distributed Generations – micro grid generation – Generator Protection – Challenges and Opportunities – Cost of smart grid – Government Regulations – Emerging Technologies - FACTS – optimizing integration systems – Multi generation buildings – Case study.

UNIT II SMART GRID: MODELS AND OPERATING PRINCIPLES 9

Solar Photovoltaic models and grid Integration – Design of a 2 MVA PV station – DG system as part of utility power system – The smart grid PV - UPS DG system – Split DC Bus UPS – PV DG system – Island mode of operation – Parallel operation of Inverters – Power Quality. Wind turbine model and grid Integration – Micro turbine model & Grid Integration. Electric Vehicle model and Grid Integration.

UNIT III SMART GRID: DISTRIBUTED GENERATION SYSTEMS 9

Power Converter System – Control System Development – Current limit and Saturation Control, Simulation using simulate and MATLAB. Inverter Parallel operation – Load sharing control Algorithm – Distributed Generation System and Newton Raphson method in power flow – Plant modeling and 3 phase 4 wire DG unit topology – Single distributed generation System –MIMO Linear system Stability robustness – PWM rectifier control – 3 Phase AC – DC – AC topology.

UNIT IV ENERGY STORAGE AND COMMUNICATION 9

State-of-the art storage devices – Battery types – Ultra capacitors based Energy Storage System

Flywheel – Wide Area Network – Substation Information System – Wireless Networks – Distribution Automation – AMI Networks – Utility monitoring and Control – Inter-system Coordination – Industrial systems – Consumer Residential Systems – Network Protection – Channel model Fundamental – Low, medium, High voltage, main Topologies – Residential and Business Indoor wiring Topologies – The Power line Channel model – Digital Transmission Techniques - Threats – IEC61850 Considerations.

UNIVERSITY SMARTGRID: RELIABILITY, STABILITY AND COMPONENT INTEGRATION 9

Smart Grid Programming – Virtual Power Producer – Intelligent reconfiguration using SCADA Problems in distributed grids – Solutions. Integration of Mini – Micro generation in distribution Grids – Power supply Quality generic standards – Renewable Energies specific standards – Smart Grid stability analysis schemes – Supply guarantee and Power quality – Integration in power systems – Distributed Generation advantages and needs.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Fox-Penner	Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities	Island Press , Washington DC	2010
2	StanMark Kaplan, Fred Sissine	Smart Grid: Modernizing Electric Power Transmission and Distribution; Energy Independence, Storage and Security; Energy Independence and Security Act and Resiliency	The Capitol.Net, Washington DC	2009
3	Ali Keyhani Mohammad N. Marwali , Min Dai	Integration of Green and Renewable Energy in Electric Power Systems	Wiley, USA	2009
4	Ryszard Michal Strzelecki , Grzegorz Pawel Benysek	Power Electronics in Smart Electrical Energy Networks	Springer, USA	2008

5	Hendrik C. Ferreira ,Lutz Lampe , John Newbury,Theo G Swart	Power Line Communications: Theory and Applications for Narrowband and Broadband Communications over Power Lines	Wiley, New York	2010
---	---	--	-----------------	------

WEBSITES

1. www.wca.org
2. www.sandc.com

Course Objectives

- To study the various FACTS controllers and its applications.
- To study the characteristics of ac transmission
- To study the effect of shunt and series reactive compensation.
- To study the controllers of FACTS
- To study the coordination of FACT controlling systems
- To study about the reactive compensation according to the need

Course Outcomes

- At the end of the course the student will gain knowledge about various FACTS controller and its applications.
- Evaluate the characteristics of ac transmission
- Reproduce the effect of shunt and series reactive compensation.
- Justify the working principles of FACTS devices and their operating characteristics
- Getting knowledge in FACTS controller and its coordination
- Real time application studied about FACTS

○

UNIT I INTRODUCTION TO FACTS 9

Reactive power control in electrical power transmission lines - series compensation - Concepts of SVC, TCSC and UPFC.

UNIT II SVC AND ITS APPLICATIONS 9

Course Objectives of shunt compensation – Principle and operating characteristics of Thyristor Controlled Reactor(TCR) – Thyristor Switched Capacitor(TSC)-Voltage control by SVC – Advantages of slope in dynamic characteristics – Applications: Enhancement of transient stability – steady state power transfer – Enhancement of power system damping – prevention of voltage instability.

UNIT III TCSC AND ITS APPLICATIONS 9

Series compensation and its Course Objectives-Operation of the TCSC – Different modes of operation Application: Improvement of the system stability limit -Enhancement of system damping – Voltage collapse prevention

UNIT IV EMERGING FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM) – Principle of operation – V-I Characteristics – Unified Power Flow Controller (UPFC) – Principle of operation –Modes of Operation-Applications – Modeling of UPFC for Power Flow – Studies.

UNIT V COORDINATION OF DIFFERENT FACTS CONTROLLERS 9

Controller interactions – SVC – SVC interaction – Co-ordination of multiple controllers using linear control techniques – Control coordination using genetic algorithms.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mohan Mathur. R., Rajiv.K.Varma	Thyristor–Based Facts Controllers for Electrical Transmission Systems	IEEE press and John Wiley & Sons, Inc, New York	2002
2	Narain G. Hingorani, Laszio. Gyugyl	Understanding FACTS : Concepts and Technology of Flexible AC Transmission Systems	Standards publishers, New Delhi	2001

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Narin G. Hingorani	High Power Electronics and Flexible AC Transmission Systems	IEEE High Power Engineering Review volume 8: issue 7	2002

WEBSITES

1. www.uni-due.de
2. www.chetanasprojects.com

Course Objectives

- To study about the economic aspects.
- To study about the economic dispatch and operation.
- To study about stability constraints in a synchronous grid.
- To study the methods to control the voltage, frequency.
- To study the problem formulation of power flow
- To study the basics of power system economics

Course Outcomes

- At the end of the course student will be able to .
1. understand the concept of power generation economics
 2. Understand stability constraints in a synchronous grid.
 3. Understand methods to control the voltage, frequency.
 4. Understand methods to control the power flow.
 5. Understand the monitoring and control of a power system.
 6. Understand the basics of power system economics.

UNIT I ECONOMIC CONSIDERATIONS**9**

Cost of electrical energy - Expressions for cost of electrical energy – Capital-interest Depreciation - Different methods - Factors affecting cost of operation - Number and size of generating units - Importance of high load factor - Importance of power factor improvement- Most economical power factor - Meeting the KW demand on power stations – Power system tariffs – Regions and structure of Indian Power System.

UNIT II ECONOMIC DISPATCH**9**

Modeling of Cost Rate Curves – Economic Dispatch Calculation - Losses neglected, with generator Real and Reactive power limits; Losses included - Losses of economy in incremental cost data - Problems - Generator Capability Curve – Effect of Ramping rates – Prohibited Operating Zones - Automatic Load dispatch in Power Systems.

UNIT III ECONOMIC OPERATION**9**

General loss formula - Evolution of incremental transmission loss rate - Method of calculation of loss coefficients – Systematic development of transmission loss formula - Transmission loss as a function of plant generation – Participation Factor - Non – Smooth Fuel Functions (Quadratic, Valve point loading, CCCP, Multiple Fuel) – Problems - Introduction to Artificial Intelligence Techniques for solving ELD problems.

UNIT IV INTERCONNECTED SYSTEMS**9**

Interconnected operation - Economic operation of hydro thermal power plants – Iteration scheme Gradient approach – Newton's method - Modeling and solution approach to short term and long term Hydro-Thermal scheduling problem using Dynamic Programming.

UNIT V OPTIMAL POWER FLOW AND FUNDAMENTALS OF MARKETS**9**

Problem formulation - Cost minimization - Loss minimization - Solution using NLP and successive LP methods – Constraints - DC and AC OPF (Real and Reactive Power Dispatch)

Effect of Contingencies - Voltage and Phase angle - Transient Voltage Dip/Sag Criteria.
 Fundamentals of Markets – Introduction to Efficiency and Equilibrium - Modeling of
 consumers and producers – Single and Double Auction mechanism - Global welfare – Dead
 Loss – Spot and Forward Markets.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Allen J Wood and B F Wollenberg	Thyristor–Based Facts Controllers for Electrical Transmission Systems	John Wiley & Sons, New York	2004
2	D. P. Kothari and I. J. Nagrath	Modern Power System Analysis	Tata McGraw Hill Publishing Company, New Delhi	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Steven Stoft	Power System Economics	John Wiley & Sons	2000
2	Daniel S. Kirschen and Goran Strbac	Power System Economics	John Wiley & Sons	2004
3	Hadi Saadat	Power System Analysis	Second Edition, McGraw Hill Publishers, Scholarly Transaction Papers	2002

Course Objectives

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.
- To study the fundamentals of quality controls.
- To study the concepts of total quality management.
- To study the concepts of total education

Course Outcomes

At the end of this course, students will demonstrate the ability to

1. Understand the principles and basic concepts.
2. Understand the fundamentals of quality controls.
3. Explain the concepts of total quality management.
4. Explain the concepts of total education
5. Diagnose problems in the quality improvement process, SPC etc.
6. Diagnose problems in the production planning, control and decision making.

UNIT I INTRODUCTION**9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management (TQM), Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II TQM PRINCIPLES**9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDCA Cycle, 5S Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy and Performance Measures.

UNIT III STATISTICAL PROCESS CONTROL**9**

The seven QC tools, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV TQM TOOLS**9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS**9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dale H Besterfield	Total Quality Management	Pearson Education, Inc., New Delhi	2003
2	Narayana, V. and Sreenivasan, N.S	Quality Management – Concepts and Tasks	New Age International, New Delhi - reprint	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	James R Evans and William M Lidsay	The Management and Control of Quality	South–Western Thomson Learning, United States – 8 th edition	2011

WEBSITE

www.management.about.com

Course Objectives

- To study about the concept of intellectual property laws.
- To study about the trade marks and copy rights.
- To study trade marks and its importance
- To get the knowledge of principles of copyrights and the legal process
- To acquire the knowledge of Trade secrets and its security
- To gain various practical case studies of patent programme

Course Outcomes

At the end of the course the student will be able to

- understand the concepts of IPR.
- understand need of trade marks and its importance
- understand principles of copyrights and the legal process
- understand trade secrets and its security
- analysis various practical case studies of patent programmes
- handling higher level management legality in patent and trading

UNIT I INTRODUCTION**9**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit Para - Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right.

UNIT II TRADE MARK**9**

Introduction to Trade mark – Trade mark Registration Process – Post registration Procedures – Trade mark maintenance - Transfer of Rights - Inter partes Proceeding – Infringement - Dilution Ownership of Trade mark – Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law.

UNIT III COPY RIGHTS**9**

Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act.

UNIT IV TRADE SECRET**9**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee

Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

UNIT V CASE STUDIES

9

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.Ashok Kumar and Mohd.Iqbal Ali	Intellectual Property Right	Serials Publications	2008

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Arindam Ghosh, and Gerard Ledwich	Power Quality Enhancement using Custom Power Electronic Devices	Springer, USA	2002

WEBSITES

1. www.iitk.ac.in/infocell/announce/electric_power
2. powerquality.eaton.com/india/?cx=203

Course Objectives

- To study the production of voltages sags, over voltages and harmonics and methods of control.
- To study various methods of power quality monitoring.
- To understand the concept of power and power factor in single phase and three phase systems supplying non linear loads
- To understand the conventional compensation techniques used for power factor correction and load voltage regulation.
- To understand the active compensation techniques used for power factor correction.
- To understand the active compensation techniques used for load voltage regulation.

Course Outcomes

- At the end of the course the student will be able to
- 1.Evaluate the characteristics of ac transmission
 - 2.Reproduce the effect of shunt and series reactive compensation.
 - 3.Justify the working principles of FACTS devices and their operating characteristics.
 - 4.Reproduce the basic concepts of power quality.
 - 5.Rewrite the concept of Harmonics
 - 6.Reproduce and justify the working principles of devices to improve power quality.

UNIT I INTRODUCTION TO POWER QUALITY**9**

Terms and definitions: Overloading, under voltage, sustained interruption; sags and swells; waveform distortion, Total Harmonic Distortion (THD), Computer Business Equipment Manufacturers Associations (CBEMA) curve.

UNIT II VOLTAGE SAGS AND INTERRUPTIONS**9**

Sources of sags and interruptions, estimating voltage sag performance, motor starting sags, estimating the sag severity, mitigation of voltage sags, active series compensators, static transfer switches and fast transfer switches.

UNIT III OVER VOLTAGES**9**

Sources of over voltages: Capacitor switching, lightning, ferro resonance; mitigation of voltage swells: Surge arresters, low pass filters, power conditioners – Lightning protection, shielding, line arresters, protection of transformers and cables, computer analysis tools for transients, PSCAD and EMTP.

UNIT IV HARMONICS**9**

Harmonic distortion: Voltage and current distortion, harmonic indices, harmonic sources from commercial and industrial loads, locating harmonic sources; power system response characteristics, resonance, harmonic distortion evaluation, devices for controlling harmonic distortion, passive filters, active filters, IEEE and IEC standards.

UNIT V POWER QUALITY MONITORING**9**

Monitoring considerations: Power line disturbance analyzer, power quality measurement equipment, harmonic / spectrum analyzer, flicker meters, disturbance analyzer, applications of expert system for power quality monitoring.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Roger C Dugan, Mark, F., McGranaghan, Surya Santoso, Wayne Beaty, H	Electrical Power Systems Quality	McGraw Hill, New York	2003
2	C. Sankaran	Power Quality	CRC Press, Florida	2002

Course Objectives

- The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance
- To study about instruments for physiological measurements
- To study about devices of non-electrical devices.
- To study about modern methods of imaging techniques.
- To study about nervous system
- To study about medical assistance / techniques and therapeutic equipment.

Course Outcomes

At the end of the course the student will be to

- Acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Methods of different transducers used.
- Understand the student to the various sensing and measurement devices of electrical origin.
- Analysis the latest ideas on devices of non-electrical devices.
- Analysis the important and modern methods of imaging techniques.
- Analysis latest knowledge of medical assistance / techniques and therapeutic equipment.
- Analysis the real time application of it

UNIT I PHYSIOLOGY AND TRANSDUCERS**9**

Cell and its structure – Action and resting potential – Potential propagation of action potential – Sodium pump – Nervous system – CNS – PNS – Nerve cell – Synapse – Cardio pulmonary system – Physiology of heart and lungs – Circulation and respiration – Transducers – Different types – Piezo electric, ultrasonic, resistive, capacitive and inductive transducers – Selection criteria.

UNIT II ELECTRO – PHYSIOLOGICAL MEASUREMENTS**9**

Basic components of a biomedical system – Electrodes – Micro, needle and surface electrodes – Amplifiers – differential, chopper, Isolation and Pre-amplifiers. ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms.

UNIT III NON-ELECTRICAL PARAMETER MEASUREMENTS**9**

Measurement of blood pressure – Cardiac output – Cardiac rate – Heart sound – Respiratory rate Gas volume – Flow rate of CO₂, O₂ in exhaust air – pH of blood, ESR and GSR measurements Plethysmography.

UNIT IV MEDICAL IMAGING AND PATIENT MONITORING SYSTEM**9**

X-ray machine – Radiographic and fluoroscopic techniques – Computer Tomography – MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Electrical safety.

UNIT V ASSISTING AND THERAPEUTIC EQUIPMENT**9**

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy – Heart- Lung machine – Audio meters – Dializers.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Leslie Cromwell, Fred J Weibell, Erich A Pfeiffer	Bio–Medical Instrumentation and Measurements	Pearson Education, India	2002
2	Khandpur, R. S	Handbook of Bio–Medical instrumentation	Tata McGraw Hill Publishing Co. Ltd., India	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Arumugam, M	Bio–Medical Instrumentation	Anuradha Agencies, Kumbakonam	2003
2	Webster, J	Medical Instrumentation	John Wiley and Sons, New York	1995
3	Rajarao.C. and Guha, S.K	Principles of Medical Electronics and Bio–medical Instrumentation	Universities Press India Ltd., India	2000
4	Khandpur, R. S	Biomedical Instrumentation: Technology and Applications	McGraw–Hill Education, Europe	2004

WEBSITES

1. www.biopac.com
2. www.britannica.com/EBchecked/topic/674616/transducer

Course Objectives

- To study and gain knowledge about various sensors.
- To study and gain knowledge about controllers.
- To study the concept of sensors,
- To study the concept of actuators
- To study the various tuning controllers
- To study the application of SCADA.

Course Outcomes (COs)

At the end of the course the student will be able to

1. Understand the concept of sensors,
2. Understand the concept of actuators
3. Analyse the various tuning controllers
4. Analyse the various advanced control techniques used in industrial automation.
5. Understand the application of SCADA.
6. Analyse the SCADA usage in Industries.

UNIT I SENSORS, ACTUATORS**9**

Sensors, Actuators and Signal conditioning
Sensors: Displacement sensors, Force sensors, Ultrasonic sensors, Temperature sensors, Pressure sensors etc
Actuators: Dc motors, Servo motors, Stepper motors, Piezo electric actuators, Pneumatic actuators etc.
Signal Conditioning: Filtering, Amplifying, Isolation, ADC, DAC, Sensor protection circuits, Signal transmission and noise suppression, Estimation of errors and calibration.

UNIT II CONTROLLER TUNING**9**

PI controller, PD controller, PID controller and tuning methods: Ziegler-Nichols tuning method, Cohen coon tuning method, Implementation of PID controllers (digital and analog).

UNIT III AUTOMATION**9**

PLC (Programmable logic controllers): Overview, operation and architecture, PLC programming, Application examples. DCS (Distributed control systems): Overview, Advantages, Functional requirements of Distributed control systems, Communication for distributed control

UNIT IV APPLICATIONS**9**

Application examples SCADA (supervisory control and data acquisition): Introduction to SCADA, SCADA system components, architecture and communication, SCADA applications.

UNIT V ADVANCED CONTROL TECHNIQUES**9**

Feed forward control, Ratio control, Cascade control, Adaptive control, Duplex or split range control, Override control, internal mode control.

TOTAL: 45 HOURS

TEXT BOOKS

	Author (s) Name	Title of the Book	Publisher	Year of Public ation
	Krishna Kant	Computer-Based Industrial Control	2nd edition Prentice Hall of India Ltd	2003
2	Stephanopoulous	Chemical Process Control – Theory and Practice	Prentice Hall of India Ltd	2014
3	William C. Dunn	Fundamentals of Industrial Instrumentation and Process Control	TataMcGrawHill	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Muhammad Abdelati	Modern Automation Systems	University Science Press	2009
2	Ogata	Modern Control Engineering	5 th edition, , Prentice Hall of India	2010

Course Objectives

- To study the structure and behaviour of processors, memories and input and output units and to study their interactions.
- To get basic knowledge on geometric modeling
- To study the graphic transformation needs
- To study about the basics of parametric design and object representation
- To get basic knowledge in product design and development.
- To study about 3D design introduction

Course Outcomes

At the end of the course the student will be able to

- draw electrical drawings using CAD.
- Acquire basic knowledge on geometric modeling
- Acquire knowledge on graphic transformation needs
- Gaining CAD software application in engineering
- Gaining basics of parametric design and object representation
- Understand the real time application of it

UNIT I INTRODUCTION

9

Conventional design methodology overview – Computer aided design aspects – Need for CAD – Nature of design problems- Analysis and synthesis approaches-advantages.

UNIT II FINITE ELEMENT ANALYSIS

9

Mathematical formulation – Discretisation – Shape functions – Stiffness matrix – Solution techniques – Post processing.

UNIT III CAD PACKAGES

9

Recent developments – Preprocessing – Modeling - Meshing – Boundary conditions -Material characteristics – Problem formulation – Solution – Post processing.

UNIT IV CAD SOFTWARE

9

Program files – Installation – Screen menu structure_ Fixing the size of a drawing – Set up option- On line help- Text fonts, Shapes – Blocks – Copy – Array- Erasing facilities -Editing – Fill – Zoom pan – Hatching – Isoplane – Elevation – View point – Dimension techniques – Introduction to 3D drawing.

UNIT V DESIGN EXAMPLES

9

Design of actuator – Solenoid -Transformer - Induction motor – Synchronous machines - Switched reluctance motor.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	P.P. Silvester and Ferrari	Finite Element for Electrical Engineers	Cambridge University Press, 3 rd edition	2012
2	D.A. Lowther and P.P. Silvester	Computer Aided Design in Magnetics	Springer; Softcover reprint of the original 1st ed. 1986 edition	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sham Tickoo	AutoCAD 2002 with applications	Tata McGraw Hill Publishing Company limited, New Delhi	2001

Course Objectives

- To learn about the controlling of excitation system and speed governing system.
- To impart knowledge on dynamic modeling of a synchronous machine in detail
- To describe the modeling of excitation and speed governing system in detail.
- To understand the fundamental concepts of stability of dynamic systems and its classification.
- To understand and enhance small signal stability problem of power systems. Model different power system components for the study of stability
- To Study the methods to improve stability.

Course Outcomes

- At the end of this course, students will demonstrate the ability to
1. Understand the problem of power system stability and its impact on the system.
 2. Analyse linear dynamical systems and use of numerical integration methods.
 3. Model different power system components for the study of stability.
- Understand the methods to improve stability.
4. Understand real time difficulties in machine analysis
 5. To get known about modeling system and its control
 6. To understand the transient and dynamic stability of power systems.

UNIT I INTRODUCTION**9**

Concept and importance of stability in power system operation and design- distinction between transient and dynamic stability- complexity of stability problem in large system- Need for reduced models- stability of interconnected systems.

UNIT II MACHINE MODELING**9**

Park's transformation- flux linkage equations, current space model- per unit conversion- normalizing the equations- equivalent circuit- flux linkage state space model- Simplified models (one axis and constant flux linkage)- steady state equations and phasor diagrams.

UNIT III MACHINE CONTROLLERS**9**

Exciter and voltage regulators- function of excitation systems, types of excitation systems- typical excitation system configuration-block diagram and state space representation of IEEE type 1 excitation system- saturation function- stabilizing circuit- Function of speed governing systems-block diagram and state space representation of IEEE mechanical hydraulic governor and electrical hydraulic governors for hydro turbines and steam turbines.

UNIT IV TRANSIENT STABILITY**9**

State equation for multi machine simulation with one axis model- transient stability simulation of multi machine power system with one axis machine model including excitation system and speed governing system using R-K method of fourth order (Gill's technique)- power system stabilizer.

UNIT V DYNAMIC STABILITY**9**

System response to small disturbances- Linear model of the unregulated synchronous machine and its modes of oscillation- regulated synchronous machine- distribution of power impact- linearization of the load equation for the one machine problem – Simplified linear model- effect

of excitation on dynamic stability- approximate system representation- supplementary stabilizing signals- dynamic performance measure- small signal performance measures.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Anderson.P.M and Fouad.A.A	Power System Control and Stability	Galgotia Publications, New Delhi	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Pai. M.A and Sauer.W	Power System Dynamics and Stability	Pearson Education Asia, India	2002

Course Objectives

- To introduce the technology and concepts of VLSI.
- To introduce MOS theory / Manufacturing Technology.
- To introduce FPGA architecture / principles / system design
- To study inverter / counter logic / stick / machine diagram
- To introduce sequential circuits / address / memory / arithmetic circuits
- To get familiarized with VHDL programming behavioral/Structural / concurrent / process.

Course Outcomes

At the end of the course the Outcomes will be able

- Fabrication of MOS Transistor
- Design of combinational circuits
- Program using VLSI for MOS Transistor
- Program using VLSI for NMOS and CMOS Inverter
- Program using VLSI for Subsystem design

UNIT I BASIC MOS TRANSISTOR**9**

Enhancement mode and Depletion mode – Fabrication (nMOS, pMOS, CMOS, BiCMOS) Technology – nMOS transistor current equation – second order effects – MOS Transistor Model.

UNIT II NMOS AND CMOS INVERTER**9**

nMOS and CMOS inverter – Determination of pull up / pull down ratios – stick diagram – λ based rules – super buffers – BiCMOS and steering logic.

UNIT III SUB SYSTEM DESIGN AND LAYOUT**9**

Structured design of combinational circuits – Dynamic CMOS and clocking – Tally circuits – (NAND–NAND, NOR–NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

UNIT IV DESIGN OF COMBINATIONAL ELEMENTS AND REGULAR ARRAY LOGIC**9**

nMOS PLA – Programmable Logic Devices – Finite State Machine – PLA – Introduction to FPGA.

UNIT V VHDL PROGRAMMING**9**

RTL Design – combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs – Test benches. (Examples: address, counters, flip–flops, FSM, Multiplexers / Demultiplexers).

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Pucknell, D. A., Eshraghian, K.	Basic VLSI Design	Prentice Hall of India, New Delhi	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Weste, N. H.	Principles of CMOS VLSI Design	Pearson Education, India - 4 th edition	2010
2	Charles. H, jr. Roth	Fundamentals of Logic Design	Cengage Learning; 7 Har/Cdr edition	2013
3	Douglas Perry	VHDL Programming by Example	Tata McGraw Hill, New Delhi – 4 th edition	2002
4	Bob Zeidmin	Introduction to Verilog	Swiss Creek Publications	2000

WEBSITES

1. esd.cs.ucr.edu
2. vhdlguru.blogspot.com/

Course Objectives

- To learn generation of electrical power from different types of power plants like thermal nuclear and hydro power stations.
- To understand the concepts of generation of electrical power using non conventional energy resources.
- To learn the economics connected with power generation.
- To understand the measurements of various parameter in power plant and their control.
- To study about Powerplant instrumentation
- To acquire knowledge of renewable power system

Course Outcomes

- At the end of the course the student will gain knowledge about economics of power generation, layout and working of thermal, nuclear and hydropower plants.
- The student also gain knowledge about distributed generation, boiler turbine monitoring system.
- To get knowledge in Powerplant instrumentation
- Students acquire knowledge of renewable power system
- Acquire knowledge about economics in power generation
- Knowledge in Load demand and factor

UNIT I ECONOMICS OF GENERATION**9**

Load and load duration curve – Load, demand and diversity factors – Plant capacity and plant use factors – choice of type of generation – choice of size and number of unit – cost of energy generated – Tariffs.

UNIT II THERMAL, NUCLEAR AND HYDRO POWER PLANTS**9**

Location, Layout and working of steam, diesel and gas power plants - Principles of nuclear power generation, Types of nuclear power plants and their comparison, Layout and working of nuclear power plants, Advantages and disadvantages of nuclear energy- Layout and working, Types of hydroelectric power plants, Advantages of hydro generation, Environmental issues.

UNIT III POWERPLANT INSTRUMENTATION**9**

Importance of instrumentation in power plants, UP & I diagram of boiler- Measurements of non electrical parameters, flow of feed water, air, steam, radiation detector, smoke density measurement-analyzers, flue gas oxygen analyzer, chromatography, PH meter, pollution monitoring instruments.

UNIT IV BOILER, TURBINE-MONITORING AND CONTROL**9**

Combustion control - furnace draft control-drum level control- de-aerator control- boiler interlocks-speed, vibration, temperature monitoring control of turbine lubrication and cooling system of turbine.

UNITV DISTRIBUTED GENERATION AND NON CONVENTIONAL PLANTS 9

Introduction to the concept of distributed generation –basics on distributed generation Technologies- Effect on system operation. Basic concepts, Principle of working and layout of MHD, Solar, Wind, Tidal, Biomass and Geothermal Power Generation Systems.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Nagpal.G.R	Power plant engineering	Khanna Publishers, New Delhi	2001

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Wadhwa, C.L	Generation, Distribution and Utilization of Electric Energy	New Age International Ltd.,3rd edition	2011
2	Nagrath.I.J,and Kothari.D.P	Modern Power System Analysis	Tata Mc Graw Hill,3rd edition	2003
3	Anne-Marie Borbely, Jan F.Kreider	Distributed Generation	CRC Press LLc	2001
4	Gupta.B.R	Generation of Electrical energy	Eurasia Publishing House(p) Ltd,New Delhi	2003

Course Objectives

- To study the power semiconductor switches.
- To study about the characteristics and applications of Power diode, power BJT, Thyristor, GTO, IGBT, MOSFET.
- To study the real time application of it.
- To study the basics of thyristor technologies
- To study the new semiconductor material of power devices
- To study the safe operating area of the power devices

Course Outcomes

At the end of the course the student will be able to

- Understand the concepts of modern semiconductor devices
- Understand the different characteristics of conductor devices
- Analysis the real time application of it.
- To learn deep knowledge of thyristor technologies
- To study about real time applications of inverters and rectifiers
- To learn about protection of device circuits

UNIT I OVERVIEW OF POWER SEMICONDUCTOR SWITCHES 9

Introduction - Diodes, Thyristors, BJTs, JFETs, MOSFETs, GTOs, IGBTs, Comparison of these as switching devices, Drive and Protection circuit for these devices – New Semiconductor materials for Power devices.

UNIT II POWER DIODE AND POWER BJT 9

Basic structure and I-V & Switching characteristics of Power diode, Schottky diode - Structure and switching characteristics of Power BJT - Breakdown voltage considerations - Safe operating area - Drive circuits for BJT – Snubber design for Power diode.

UNIT III THYRISTORS AND GTOs 9

Basic structures - I-V characteristics - Physics of device operation - Switching characteristics of Thyristors and GTOs – Drive circuits - Snubber circuits for Thyristors and GTOs - Over current protection of GTO.

UNIT IV IGBT AND POWER JFET & MOSFETS 9

Basic structures - I-V characteristics, physics of device operation - Switching characteristics – Safe operating area of IGBT and Power JFET & MOSFET - Drive circuits and Protection.

UNIT V APPLICATIONS 9

Single phase rectifiers and Three phase rectifiers using Diodes and Thyristors, Choppers, Inverters using GTOs-IGBTs and power JFETs & MOSFETs.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mohan. Net al	Power Electronics: Converters, Applications and Design	John Wiley and Sons, New York, Third Edition	2002
2	Rashid M.H	Power Electronics Circuits, Devices and Applications	Prentice Hall India, Third edition, New Delhi	2004

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.D. Singh and K.B.Khanchandani	Power Electronics	Tata McGraw Hill, New Delhi, Second Edition	2008
2	Donald A.Neamen	Semiconductor Physics and Devices	Tata McGraw Hill, New Delhi, Fourth Edition	2011
3	Kassakian,J.G.et.al	Principles of Power Electronics	Pearson Education India	2010

Course Objectives

- To have knowledge on optimization techniques applied to power systems
- To understand the different evolutionary computation techniques
- To study about optimal power flow problems
- To study about evolution computation techniques
- To study about the basics of MOOP
- To study about the solution of OPF

Course Outcomes

- At the end of the course the students will be able to understand the various optimization techniques.
- To get knowledge in optimization problems
- Acquire knowledge about power flow problem and solutions
- Experience in various algorithm and programming
- Gaining knowledge in velocity updation principle
- Gain knowledge about Economic emission dispatch

UNIT I OPTIMIZATION FUNDAMENTALS**9**

Definition- Classification of optimization problems- Unconstrained and Constrained optimization-Optimality conditions- Classical Optimization techniques.

UNIT II OPTIMAL POWER SYSTEM OPERATION**9**

Economic Dispatch problem-Unit commitment-Optimal Power Flow Problem- Solution Using Classical methods

UNIT III EVOLUTIONARY COMPUTATION TECHNIQUES**9**

Evolution in nature-Fundamentals of Evolutionary algorithms-Working Principles of Genetic Algorithm- Evolutionary Strategy and Evolutionary Programming-Genetic Operators-Selection, Crossover and Mutation-Issues in GA implementation-GA solution of economic dispatch and unit commitment.

UNIT IV PARTICLE SWARM OPTIMIZATION**9**

Fundamental principle-Velocity Updating-Advanced operators-Hybrid approaches Implementation issues-Solution of OPF problem

UNIT V MULTI Course Objectives OPTIMIZATION**9**

Concept of pareto optimality-Conventional approaches for MOOP-Multi Course Objectives GA-Fitness assignment-Sharing function-Economic Emission dispatch using MOGA

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kalyanmoy Deb	Multi Course Objectives optimization using Evolutionary Algorithms	John Wiley and Sons	2008
2	D.P.Kothari and J.S.Dhillon	Power System Optimization	2nd Edition, PHI learning private limited	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen	Evolutionary Algorithms for solving Multi Course Objectives Problems	2 nd Edition, Springer	2007
2	Kwang Y.Lee,Mohammed A.El Sharkawi	Modern heuristic optimization techniques	John Wiley and Sons	2008

Course Objectives

- To create an awareness on Operating Systems.
- To introduce devices and buses used for embedded networking.
- To study about task management
- To study about memory management
- To study about integration of hardware and software
- To know about application procedures of RTOS

Course Outcomes

At the end of the course the students will be able to

- Understand overview of embedded systems architecture
- Acquire knowledge on embedded system, its hardware and software.
- Gain knowledge on overview of Operating system
- Discuss about task Management
- Gain knowledge about semaphore management and message passing.
- Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM**9**

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) -Categories of Embedded Systems - Embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - Hardware/software partitioning - Iterations and implementation - Hardware software integration - Product testing techniques – ARM 7.

UNIT II OPERATING SYSTEM OVERVIEW**9**

Introduction –Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-pre-emptive Kernels - Pre-emptive Kernels – Re-entrancy- Re-entrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues

Interrupts - Task Management – Memory Management -Time Management – Clock Ticks.

UNIT III TASK MANAGEMENT**9**

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks –Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialisation. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List.

UNIT IV SEMAPHORE MANAGEMENT**9**

Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a

Mailbox- Status of Mailbox Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT V MEMORY MANAGEMENT

9

Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II -
 μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP Books, II Edition	2002
2	Colin Walls,	Building a Real Time Operating System	Elsevier Science	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	David Seal	ARM Architecture Reference Manual	Addison Wesley	2000
2	Steve Furbe ,	ARM System-on-Chip Architecture	Pearson Education, II Edition	2001

15BEEE8E17 ADVANCES IN SOFT COMPUTING L T P C 3 0 0 3

Course Objectives

- To study basics of Fuzzy logic and modeling.
- To study various Genetic algorithms
- To educate how to use Soft Computing to solve real-world problems
- To study about the perception concept in design
- To study basics of various Neural networks.
- To expose the students to Neuro fuzzy modeling and its applications.

Course Outcomes

- At the end of the course the students will gain knowledge in various soft computing techniques and also analyse the genetic algorithm approach.
- The students will know the applications of various soft computing techniques.
- Gaining knowledge about use of Soft Computing to solve real-world problems
- Acquire knowledge about the perception concept in design
- Experience in fuzzy models preparation
- Experience about automobile fuel efficiency improvements

UNIT I FUZZY LOGIC

9

Introduction to Neuro – Fuzzy and soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic operations – Member Function Formulation and parameterization – Fuzzy Rules and Fuzzy Reasoning - Extension principle and Fuzzy Relations

Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models- Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II GENETIC ALGORITHM

9

Derivative-based Optimization – Descent Methods – The Method of steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS

9

Introduction -Supervised Learning Neural Networks – Perceptrons - Adaline – Back propagation Multilayer perceptrons – Radial Basis Function Networks – Unsupervised Learning and Other Neural Networks – Competitive Learning Networks – Kohonen Self – Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEUROFUZZY MODELING

9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro-Fuzzy Modeling –

Framework – Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS

9

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel

Efficiency prediction – Soft Computing for Color Recipe Prediction.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	J.S.R.Jang, C.T.Sun and E.Mizutani	Neuro-Fuzzy and Soft Computing	PHI, Pearson Education	2004
2	Davis E.Goldberg	Genetic Algorithms:Search, Optimization and Machine Learning	Addison Wesley, N.Y	2004

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	S.Rajasekaran and G.A.V.Pai	Neural Networks, Fuzzy Logic and Genetic Algorithms	PHI, Pearson Education	2003

Course Objectives

- To introduce design concept and VHDL.
- To study implementation techniques using various PLDs.
- To study the design of various combinational, synchronous and asynchronous circuits.
 - To study about design combinational and sequential circuits.
- To study about CAD tools
- To expose the students to design and testing.

Course Outcomes

- At the end of the course the student will be able to understand the VHDL principles.
- Students will be able to design combinational and sequential circuits.
- Understand the implementation techniques using various PLDs.
- To analysis the design of various combinational, synchronous and asynchronous circuits.
- To analysis the students to design and testing.
- Analysis the real time application of it

UNIT I INTRODUCTION TO DESIGN**9**

Design concepts – Design Process, design of Digital hardware, Variables and functions, truth tables, Boolean Algebra – Synthesis using Gates – Introduction to CAD Tools – VHDL.

UNIT II IMPLEMENTATION TECHNOLOGY**9**

MOS Logic gates – PLDs – practical aspects, implementation details for SPLDs, CPLDs and FPGAs, optimized implementation of logic functions - multilevel synthesis, analysis of multilevel circuits – minimization techniques.

UNIT III DESIGN OF COMBINATIONAL CIRCUITS**9**

Number representation – signed, unsigned, combinational circuits – adder, multiplier, multiplexer, decoder and encoder, code converters - using signal assignment statements - concurrent and sequential – process and case statements, operators.

UNIT IV DESIGN OF SEQUENTIAL CIRCUITS**9**

Latch – Flip-flops, registers and counters, finite state machines using CAD tools. Basic design steps with examples - Design of simple processor, vending machine controller.

UNIT V DIGITAL SYSTEM DESIGN**9**

Building block circuits – Design examples – clock synchronization, testing of logic circuits – fault model, test set – path sensitizing, testing of sequential circuits.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Stephen Brown, Zvonko Vranesic	Fundamentals of digital logic design with VHDL	Tata McGraw-Hill Publishing company limited	2009
2	Volnei.A.Pedroni	Circuit design with VHDL	PHI Learning Private Limited	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Douglas L. Perry	VHDL Programming by example	Tata McGraw-Hill Publishing company limited	2009
2	J.Bhasker	A VHDL primer	Prentice-Hall India Learning Private Limited	2003

Course Objectives

- To introduce concepts of Labview software.
- To study graphical programming, interfacing instruments and its protocols.
- To introduce data acquisition methods.
- To introduce signal processing and network automation tools.
- To study about data cards in instrumentation
- To study the interface bus and signals

Course Outcomes

- At the end of the course the student will be able understand the concepts of virtual instrumentation.
- Knowledge about VI programming
- Gain experience in Standards and protocols of instrumentation
- Real time automation activity in instrumentation
- DSP based instrumentation control and its applications
- Gain Knowledge of automated control in instrumenation

UNIT I REVIEW OF DIGITAL INSTRUMENTATION**9**

Representation of analog signals in the digital domain – Review of quantization in amplitude and time axes, sample and hold, sampling theorem, ADC and DAC.

UNIT II GRAPHICAL PROGRAMMING AND LABVIEW**9**

Concepts of graphical programming – LABVIEW software – Concept of VIs and sub VI - Display types – Digital – Analog – Chart and Graphs. Loops - structures - Arrays – Clusters. Local and global variables – String and file I/O. Timers and dialog controls.

UNIT III INSTRUMENT INTERFACES AND PROTOCOLS**9**

RS232, RS 422, RS 485 and USB standards - IEEE 488 standard – Introduction to bus protocols of MOD bus and CAN bus. Electronic standards for signals – noise and EMI effects. Signal conditioning chassis and extension modules. Image acquisition cards.

UNIT IV PC BASED DATA ACQUISITION**9**

Concept of PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency - analog inputs and outputs – Single-ended and differential inputs –DAQ cards terminal boxes - Use of timer-counter and analog outputs on the universal DAQ card.

UNIT V SIGNAL PROCESSING AND NETWORK BASED AUTOMATION**9**

Mathematical tools for statistical calculation – Signal processing tools- Windowing and filtering tools –Control system tools – PID controller – CRO – function generator –illustration and case study – Web publishing tool –configuring VI server.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sanjeev Gupta	Virtual Instrumentation using LabVIEW'	TMH	2004
2	Jovitha Jerome	Virtual Instrumentation using LabVIEW	Prentice Hall	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gary W. Johnson, Richard Jennings	Lab-view Graphical Programming	Tata McGraw Hill Professional Publishing, IV Edition	2006
2	Robert H. Bishop	Learning with Lab-view	Prentice Hall	2009
3	Kevin James	PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control	Newness	2000

LIST OF OPEN ELECTIVE

LIST OF OPEN ELECTIVES OFFERED BY OTHER

DEPARTMENTS DEPARTMENT OF SCIENCE AND HUMANITIES

15BESHOE01

INDUSTRIAL MATHEMATICS – I

L T P C 3 0 0 3

Course Objectives

- To develop analytical skills for solving engineering problems
- To teach the students the basic concepts of LPP,
- To learn the techniques to solve transportation and Assignment problems
- To make the students to study about the Integer Programming and Network Analysis
- Analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

- To define and formulate linear programming problems and appreciate their limitations.
- To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To be able to build and solve Transportation Models, Assignment Models,
- To construct linear integer programming models and discuss the solution techniques.
- To formulate and solve problems as networks and graphs.
- To be able to solve problems in different environments and develop critical thinking

UNIT I LINEAR PROGRAMMING PROBLEM

9

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method .

UNIT II TRANSPORTATION PROBLEM

9

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM

9

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING

9

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS

9

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
2. www.mit.edu
3. www.nptel.com

Course Objectives

- To kindle analytical skills for solving engineering problems
- To impart the knowledge about inventory models
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making.
- To analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To learn the knowledge about application of it

Course Outcomes

The students will

- To be able to solve simple models in Inventory problems and Replacement problems.
- To understand different queuing situations and find the optimal solutions using models for different situations.
- Simulate different real life probabilistic situations using Monte Carlo simulation technique.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and solve the practical situations into replacement mod
- To understand how to model and solve problems using non integer programming.

UNIT-1 INVENTORY MODELS 9

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT – II NON LINEAR PROGRAMMING 9

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT – III SIMULATION MODELS 9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT –IV DECISION MODELS 9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT –V REPLACEMENT MODELS 9

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time-Replacement of items that fail suddenly and completely.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons, New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarsi A	Operations Research	Pearson Education, New Delhi.	2005
2	Srinivasan G	Operations Research: Principles and Applications	PHI Private Limited, New Delhi.	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning India Pvt. Ltd, New Delhi.	2004

WEBSITES

1. www.mathworld.Wolfram.com
2. www.mit.edu
3. www.nptel.com

Course Objectives

- To gain knowledge in measures of central tendency.
- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of correlation and spectral densities.
- To learn the knowledge about application of it

Course Outcomes

- Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- The students will have an exposure of various distribution functions, correlation and spectral densities.
- To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- To apply the concept random processes in engineering disciplines.
- To understand and apply the concept of correlation and spectral densities.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY 9

Measures of central tendency – Mean, Median, Mode - Standard Deviation

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT II STANDARD DISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma(one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – **Chebyshev's inequality**.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT IV CLASSIFICATION OF RANDOM PROCESS 9

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES

9

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Veerarajan,T.	Probability, Statistics and Random process	Tata McGraw-Hill Education pvt. Ltd., New Delhi	2008
4	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002

WEBSITES

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

Course Objectives

- To gain knowledge in measures of central tendency and probability.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To introduce the basic concepts of classifications of design of experiments
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments and statistical quality control.
- Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY 12

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration. Probability - Random variable - Axioms of probability - Conditional probability Total probability – Baye’s theorem - Probability mass function - Probability density function.

UNIT II STANDARD DISTRIBUTIONS 12

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 12

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT IV TESTING OF HYPOTHESIS 12

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT V DESIGN OF EXPERIMENTS 12

Analysis of variance – One way classification – CRD – Two way classification – RBD -

Latin square.

Note: Use of approved statistical tables permitted in the examination.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios	Probability Random	McGraw-Hill	2002
	Papoulis and S Unnikrishna Pillai	variables and Stochastic Processes	Publications, New Delhi.	

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Walpole, R.E., Myers, R.H., Myers, S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearson Education Inc., Delhi.	2007
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education Inc., Delhi.	2014
4	Johnson, R.A, Irwin Miller	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEBSITES

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)

Course Objectives

- To understand the fundamental knowledge of probability theory.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To introduce the concepts of random processes and Markov chain
- To understand the different Queuing models and solve problems
- To learn the knowledge about application of it

Course Outcomes

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Understand the concepts of random process and markov chains
- They will be able to solve the Queuing models
- The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT I PROBABILITY AND RANDOM VARIABLE**9**

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS**9**

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES**9**

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT I RANDOM PROCESS AND MARKOV CHAINS**9**

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT QUEUEING THEORY**9**

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ross,S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2 nd Edition, New Delhi.	2008
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross, D., Shortle, J. F., Thompson J.M. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons Inc., New Jersey.	2008
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006

WEBSITES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

Course Objectives

- Be able to understand basic knowledge of fuzzy sets and fuzzy logic
- Be able to apply basic knowledge of fuzzy operations.
- To know the basic definitions of fuzzy relations
- Be able to apply basic fuzzy inference and approximate reasoning
- To know the applications of fuzzy Technology.
- To learn the knowledge about application of it

COURSE OUTCOME:

- To gain the main subject of fuzzy sets.
- To understand the concept of fuzziness involved in various systems and fuzzy set theory.
- To gain the methods of fuzzy logic.
- To comprehend the concepts of fuzzy relations.
- To analyze the application of fuzzy logic control to real time systems.
- The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZY SETS

9

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – F u z z y functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZY SETS

9

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZY RELATIONS

9

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZY MEASURES

9

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZY INFERENCE

9

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall of India, New Delhi.	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Zimmermann H.J.	Fuzzy Set Theory and its Applications	Kluwer Academic publishers, USA.	2001
2	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer-Verlag publishers, Heidelberg	2008

WEBSITES

1. www.mathcentre.ac.uk
2. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
3. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

Course Objectives

- To know the fundamentals of Tensors.
- To know the series solutions to differential equations.
- To introduce the concepts of special functions.
- To study about Calculus of variations and integral equations
- To learn the knowledge about application of it

Course Outcomes

- Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- Learn about special type of matrices that are relevant in physics and then learn about tensors.
- Get introduced to Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
- Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
- Students will master in calculus of variations and linear integral equations.
- The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS**8**

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation – example

UNIT III SPECIAL FUNCTIONS 8

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre , Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS**9**

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS**12**

Introduction – conversion of a linear differential equation to an integral equations and vice versa

15BESHOE07

MATHEMATICAL PHYSICS

L T P C 3 0 0 3

– conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations – integro-differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	Khanna Publishers, New Delhi	2013
2	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEBSITES

1. www.mathcentre.ac.uk
2. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)
3. www.nptel.ac.in

Course Objectives

- To introduce the concepts of special functions.
- To find the solutions to partial differential equations and their applications
- To study about mathematical physics and perturbation techniques
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making
- To learn the knowledge about application of it

Course Outcomes

- Students know the concepts of improper integrals, Beta and Gamma functions.
- The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
- Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and **solve** the practical situations into replacement models.
- To understand how to model and solve problems using non integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS**9**

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS**9**

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT III PERTURBATION TECHNIQUES**9**

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT IV SIMULATION MODELS

9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT V DECISION MODELS

9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig,E	Advan ced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES

1. www.mathworld.wolfram.com
2. www.efunda.com
3. www.nptel.ac.in

Course Objectives

- To introduce the basic concepts of vector space
- To know the fundamentals of linear Algebra
- To solve system of linear equations
- To study about the linear transformations
- To introduce the concepts of inner product spaces
- To learn the knowledge about application of it

Course Outcomes

The student will be able to

- To explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- To apply the fundamental concepts in their respective engineering fields
- To visualize linear transformations as matrix form
- To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- To articulate the importance of Linear Algebra and its applications in branches of Mathematics
- To analysis the real time application

UNIT I VECTOR SPACES**9**

General vector spaces, real vector spaces, Euclidean n -space, subspaces, linear independence, basis and dimension, row space, column space and null space, UNIT II EIGEN VALUES AND EIGEN VECTORS

Eigen values and Eigen vectors - Diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS**9**

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS**9**

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES**9**

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

• **TOTAL: 45 HOURS**

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition, New Delhi.	2012
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill, New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. www.nptel.ac.in
3. www.mathworld.wolfram.com

Course Objectives

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the basic concepts of PDE for solving standard partial differential equations
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

Course Outcomes:

- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- The learners can equip themselves in the transform techniques and solve partial differential equations
- Understand how to solve the given standard partial differential equations.
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES**10**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM**9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS**9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS 8

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Outcomess. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P., Manish Goyal	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd., New Delhi	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEBSITES

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. www.nptel.ac.in

Course Objectives

- To Develop abilities to write technically and expressively,
- To Recognize writing as a constructive, meaningful process,
- To Practise using reading strategies for effective writing.
- To equip them to write for academic as well as work place context.
- To enable students to be familiar with structure and style of formal written communication
- To learn the knowledge about application of it

Course Outcomes

- Construct simple sentences, correct common grammatical errors in written English.
- Build confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.
- Know the value of LSRW skills in document writing.
- Understand the structure, content and format of technical documents.
- Improve their writing skills and be ready with documents related ideas and notions.

UNIT I BASICS OF WRITING**7**

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT 2 PARAGRAPHS AND ESSAYS**9**

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT 3 MEMOS AND EMAIL**9**

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS**9**

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT 5 REPORTS AND RESEARCH ARTICLES**11**

Discussion of newspaper articles -Course Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
	V.N. Arora & Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	David Morley	The Cambridge Intro. to Creative Writing	CUP, New Delhi.	2010
2	Graham King	Collins Improve Your Writing	Collins; First edition, UK	2009
3	Crème, P. and M. Lea.	Writing at University: A guide for Outcomess.	OUP, New Delhi.	2003

WEBSITES

1. <http://www.stevepavlina.com/blog/2006/08/10-ways-to-improve-your-technical-skills/> - Unit-I
2. <http://www.nyu.edu/classes/keefer/brain/net2.html> - Unit-I, II, & III
3. <https://www.udemy.com/technical-writing-and-editing/> - Unit-IV & V
4. <http://techwhirl.com/what-is-technical-writing/> - All Units

Course Objectives

- To inculcate the basics of brief history of Earth sciences
- To divulge knowledge on the basics of structure of earth and earth's gravitational field.
- To disseminate the fundamentals of magnetic field and thermal distribution of earth.
- To introduce the concepts of seismology and seismic waves .
- To impart the basic knowledge of oceans
- To learn the knowledge about application of it

Course Outcomes

- Gain knowledge on the basics of history of Earth sciences.
- Acquire knowledge on concepts of structure of earth and earth's gravitational field.
- Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
- Obtain knowledge on the basics of seismic waves.
- Understand the basics of oceans and properties of sea water.
- Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNIT I ORIGIN OF EARTH**9**

A brief history of the development of Earth Sciences . An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition.

UNIT II STRUCTURE OF EARTH**9**

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy.

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH**9**

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle.

UNIT IV SEISMOLOGY**9**

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS**9**

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A. Jacobs, R.D. Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES

1. www.ocw.mit.edu
2. www.physicsclassroom.com
3. www.nptel.ac.in
4. www.physics.org

Course Objectives

- To disseminate the fundamentals of acoustic waves. (K)
- To inculcate the characteristics of radiation and reception of acoustic waves. (K)
- To divulge knowledge on the basics of pipe resonators and filters.(S)
- To introduce the features of architectural acoustics.(S)
- To impart the basic knowledge of transducers and receivers.(K)
- To learn the knowledge about application of it

Course Outcomes

- Develop the idea of the fundamentals of acoustic waves.
- Apply the concepts of radiation and reception of acoustic waves.
- Explain the basic ideas of pipe resonators and filters.
- Illustrate the basics of architectural acoustics..
- Illustrate the transducers and receivers and its applications in various electronic devices.
- Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION**9**

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves - Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES**9**

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient.

UNIT III PIPES RESONATORS AND FILTERS**9**

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS**9**

Sound in endosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION**9**

Transducer as an electives network – canonical equation for the two simple transducers transmitters – moving coil loud speaker– horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Lawerence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	John Wiley & Sons	4th edition 2000

REFERENCE

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	F. AltonEverest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	6 th edition 2014

WEBSITES

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

Course Objectives

- To understand about the fuel
- To study about the alcohols and its importance in engine
- To gain knowledge on the fuel gas and oils
- To get the information on fuel cell
- To understand electric, hybrid and solar cars
- To learn the knowledge about application of it

Course Outcomes

- Students will know about the basic concepts of alternate fuels
- Students will know about the basic concepts of alcohols.
- Students will understand about fuel gas and oils
- Students can enrich their knowledge about the alternate fuels and energy systems
- Develop their knowledge in studies of vegetable oils
- Students knows about the importance of electric, hybrid and solar cars

UNIT I INTRODUCTION

9

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS

9

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

10

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications.

UNIT IV VEGETABLE OILS

8

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

9

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Jain, P.C. and Monika Jain	Engineering Chemistry	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
2	Richard.L.Bechfold	Alternative Fuels	SAE International , USA	2002

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2 nd edition.	Gulf Professional Publisher, USA	2012
2	Nagpal G.R	Power Plant Engineering	Khanna Publishers, Delhi.	2002

WEBSITES

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. <http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
3. <http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

Course Objectives

- To make the students conversant with basics of Solid wastes and its classification.
- To make the student acquire sound knowledge of different treatments of solid wastes.
- To acquaint the student with concepts of waste disposals.
- To develop an understanding of the basic concepts of Hazardous waste managements.
- To acquaint the students with the basics of energy generation from waste materials.
- To get the information on energy conservation.

Course Outcomes

- Property – Collection – Transfer Stations – Waste Minimization and Recycling of Outline the basic principles of Solid waste and separation of wastes (K)
- Identify the concepts of treatment of solid wastes (S)
- Identify the methods of wastes disposals. (S)
- Examine the level of Hazardousness and its management. (S)
- Examine the possible of the energy production using waste materials. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLID WASTE 9

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Municipal Waste.

UNIT II WASTE TREATMENT 9

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration.

UNIT III WASTE DISPOSAL 9

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation.

UNIT IV HAZARDOUS WASTE MANAGEMENT 9

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE 9

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, Energy recovery systems. Biological & Chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dara.S.S,Mishra.D.D	A Text book of Environmental Chemistry and Pollution Control	S.Chand and Company Ltd., New Delhi.	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Naomi B. Klinghoffer and Marco J. Castaldi	Waste to Energy Conversion Technology (Woodhead Publishing Series in Energy)	Woodhead Publishing Ltd., Cambridge, UK	2013
2	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management-	McGraw Hill Publishing Ltd., Newyork, 2 nd edition	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall (P) Ltd., New Delhi.	1999

WEBSITES

1. www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2. <http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
3. www.alternative-energy-news.info/technology/garbage-energy/
4. nzic.org.nz/ChemProcesses/environment/

Course Objectives

- To make the students conversant about the green chemistry
- To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
- To acquaint the student with concepts of green technology.
- To develop an understanding of the basic concepts of renewable energy resources.
- To acquaint the students with the basic information on catalysis.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of green chemistry (K)
- Examine the different atom efficient process and synthesis elaborately (S)
- Apply the concepts combustion of green technology (S)
- Identify and apply the concepts of renewable energy (S) Apply the concepts of green catalysts in the synthesis (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)
- Analysis the real time application of it

UNIT I INTRODUCTION TO GREEN CHEMICAL PRINCIPLES**9**

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorosolvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES**9**

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis.

UNIT III BIOTECHNOLOGY AND GREEN CHEMISTRY**9**

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES**9**

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion.

UNIT V CATALYSIS IN GREEN CHEMISTRY**9**

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press , London	2010
2	Ahluwalia V. K. and M.Kidwai	New Trends in Green Chemistry	Anamaya publishers., New Delhi. 2 nd edition	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons., New Delhi.	2012
2	Mukesh Doble. Ken Rollins, Anil Kumar	Green Chemistry and Engineering, 1 st edition	Academic Press, Elsevier., New Delhi.	2007
3	Desai K. R.	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
4	Matlack A. S.	Introduction to Green Chemistry	Marcel Dekker: New York	2001

WEBSITES

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>
5. <http://www.amazon.in/Green-Chemistry-Catalysis>

Course Objectives

- To make the students conversant with **the information on electrochemical material**.
- To make the student acquire sound knowledge of **conducting polymers**.
- To acquaint the student with concepts of Energy storage devices.
- To develop energy storage devices.
- To impart knowledge on basic principles of solar cells and its application.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic principles of chemistry in **electrochemical material (K)**
- Examine the properties of conducting polymers (S)
- Apply the concepts of electrochemistry in storage devices. (S)
- Identify the concepts of storage devices and its applications. (S)
- Apply the suitable materials for the manufacturing of storage devices. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METAL FINISHING**9**

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning.

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS**9**

lectropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I**9**

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II**9**

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE**9**

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elsevier., UK	2007
2	D.Pletcher and F.C.Walsh	Industrial Electrochemistry	Chapman and Hall, London	1990

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M. Barak	Electrochemical Power Sources	IEEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
2	Bruno Scrosati	Applications of Electroactive Polymers	Chapman & Hall, London	1993
3	K.L. Chopra and I. Kaur	Thin Film Devices and their Application	Plenum Press, New York.	1983
4	M.M.Baizer	Organic Electrochemistry	Dekker Inc. New York	1983

WEBSITES

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

Course Objectives

- To make the students conversant with **cement and lime** and its uses.
- To make the student acquire sound knowledge of abrasives and refractories.
- To acquaint the student with concepts of inorganic chemicals.
- To develop an understanding of the basic concepts **explosives**.
- To acquaint the students with the basics of **agriculture chemicals**.
- To learn the knowledge about application of it

Course Outcomes

- Outline the basic chemistry of **cement and lime (K)**
- Examine the uses of abrasives and refractories (S)
- Identify the usage of the inorganic chemicals. (S)
- Identify the concepts of explosives and smoke screens (S)
- Identify the usage of the **agriculture chemicals (S)**
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME**9**

Manufacture of Portland cement – setting and hardening of portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES**9**

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS**9**

Common salt and soda ash – manufacture – different grades – products – alkalis – Na_2CO_3 , caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES**9**

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS**9**

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harikrishan	Industrial Chemistry	Goel Publishing House, Meerut.	2014
2	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut.	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	James A. Kent	Hand Book of Industrial Chemistry, 9 th edition	Van Nostrand Reinhold, New York.	1992
3	R.N. Sherve	Chemical Process Industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
4	S.D. Shukla and G.N. Pandey	A Text book of Chemical Technology	Vikas Publishing House (P) Ltd, New Delhi.	1979

WEBSITES

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>
4. <http://toxics.usgs.gov/topics/agchemicals.html>

COMPUTER SCIENCE ENGINEERING

15BEC SOE01

PYTHON PROGRAMMING

L T P C 3 0 0 3

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
- Structure simple Python programs for solving problems
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python Programs
- Understand various program object and graphics based on python

UNIT I FUNDAMENTALS

9

The Universal Machine-Program power- What is Computer Science?-Hardware Basics- Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II DECISION STRUCTURES AND LOOPS

9

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III FUNCTIONS

9

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV SEQUENCES

9

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V OBJECTS AND GRAPHICS

9

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Zelle	Python Programming: An Introduction to Computer Science	2 nd Edition, Franklin & Associates	2009
2	Mark Lutz	Learning Python	OReily	2013
3	David Beazly & Brian K. Jones	Python Cookbook	OReily	2013

COURSE OBJECTIVES:

- To study concepts of Internet, IP addresses and protocols
- To explain the concept of web page development through HTML
- To introduce the PERL and explore its current strengths and Weaknesses
- To write working Java code to demonstrate the use of applets for client-side programming
- To study Internet telephony and various multimedia applications
- To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

- Learn the advanced concepts & techniques of Internet and Java.
- Analyze the requirements for and create and implement the principles of web page development
- Understand the concepts of PERL
- Implement client-side programming using java applets
- Generate internet telephony based upon advanced concepts
- Develop applications on internet programming based on java applets and scripts

UNIT I INTRODUCTION**9**

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML**9**

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, IFrame, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL**9**

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV CLIENT-SERVER PROGRAMMING**9**

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V INTERNET TELEPHONY**9**

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP-

Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning, Delhi	2013
2	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011

COURSE OBJECTIVES:

- To impart the fundamental concepts of Computer Animation and Multimedia
- To study the graphic techniques and algorithms using flash
- Explain various concepts available in 3D animation
- Explain various devices available for animation
- To study the multimedia concepts and various I/O technologies for concept development
- To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

- Develop their creativity using animation and multimedia
- Understand the concepts of Flash and able to develop animation using it
- Understand about various latest interactive 3D animation concepts
- Know the various devices and software available in motion capture
- Understand the concept development process
- Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I**INTRODUCTION****9**

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II CREATING ANIMATION IN FLASH**9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D ANIMATION & ITS CONCEPTS**9**

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV MOTION CAPTION**9**

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V CONCEPT DEVELOPMENT**9**

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ranjan Parekh	Principles of Multimedia	TMH	2007
2	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning PVt Ltd	2010
3	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011

15BEC SOE04 PC HARDWARE AND TROUBLE SHOOTING L T P C 3 0 0 3

COURSE OBJECTIVES:

- To study the basic parts of computer in detail
- Introduce various peripheral devices available for computer and its detailed working concepts
- Overview of various interfaces and other hardware overview
- Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
- To study basic concepts and methods in troubleshooting
- To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

- Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
- Identify various peripheral devices available and its working
- Understand various concepts of hardware and its interface and control
- Perform basic installation of PC. Importance of maintenance is understood
- Understand Various faults and failures are identified and troubleshooting in detail
- Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I INTRODUCTION

9

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES

9

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD

– Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW

9

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE

9

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification– Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL: 45 HOURS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	2/E, TMH	2002
2	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	PHI Learning, Delhi	2011
3	Scott Mueller	Repairing PC's	PHI	1992

COURSE OBJECTIVES:

- To understand the basic requirements, installation and structure of gaming using Java
- Discuss various aspects of safe cracker projects
- Discuss various aspects of match game projects
- Discuss various aspects of pizza delivery projects
- Discuss various aspects of moon landing projects
- Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Interpret various concepts of gaming based on Java
- Design the frame and code to develop safe cracker project
- Design the frame and code to develop match game project
- Design the frame and code to develop pizza delivery project
- Design the frame and code to develop moon landing project
- Design and develop various games using Java

UNIT I INTRODUCTION**9**

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II SAFECRACKER PROJECT**9**

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III MATCH GAME PROJECT**9**

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV PIZZA DELIVERY PROJECT**9**

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V MOON LANDING PROJECT**9**

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

TOTAL: 45 HOURS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Philip Conrod, Lou Tylee	Programming Games with Java		2013
2	Timothy M.Right	Fundamental 2D Game Programming with Java	Cengage Learning PTR	2013
3	Wayne Holder,Doug Bell	Java Game Programming for Dummies		

Course Objectives

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To study about task management
- To learn about semaphore management and message passing
- To study about memory management
- To imparts knowledge on

Course Outcomes

At the end of the course the students will be able to

- Understand overview of embedded systems architecture
- Acquire knowledge on embedded system, its hardware and software.
- Gain knowledge on overview of Operating system
- Discuss about task Management
- Gain knowledge about semaphore management and message passing.
- Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM**9**

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT II OPERATING SYSTEM OVERVIEW**9**

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT III TASK MANAGEMENT**9**

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING**9**

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT V MEMORY MANAGEMENT

9

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

•REFERENCES

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

Course Objectives

- To study about various speakers and microphone
- To learn the fundamental of television systems and standards
- To learn the process of audio recording and reproduction
- To study various telephone networks
- To discuss about the working of home appliances
- To familiarize with TV services like ISDN.

Course Outcomes

At the end of the course the students will be able to

- Understand working of various type of loud speakers
- Acquire knowledge on various types of picture tubes
- Demonstrate the working of various optical recording systems
- Distinguish various standards for color TV system
- Acquire knowledge on various telecommunication networks
- Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES**9**

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDS AND SYSTEMS**9**

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III OPTICAL RECORDING AND REPRODUCTION**9**

Audio Disc – Processing of the Audio signal –read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT IV TELECOMMUNICATION SYSTEMS**9**

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT V HOME APPLIANCES**9**

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

TOTAL: 45 HOURS

TEXT BOOK

S.NO	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.P.Bali	Consumer Electronics	Pearson Education	2005

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I LIMITATIONS OF CMOS**9**

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – **Structures of MOS devices:** SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.

UNIT II MICRO AND NANO FABRICATION**9**

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.

UNIT III CHARACTERIZATION EQUIPMENTS**9**

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV NANO DEVICES – I**9**

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V NANO DEVICES – II**9**

Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TOTAL: 45 HOURS

TEXT BOOK

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3 rd Edition	2012

REFERENCES

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

Course Objectives

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study the image compression procedures.
- To study the image segmentation and representation techniques.
- To study the video processing fundamentals
- To know the concepts of motion estimation

Course outcomes

- Understand the image fundamentals and mathematical transforms necessary for image processing.
- Understand the image enhancement techniques
- Understand the image compression procedures.
- Understand the image segmentation and representation techniques.
- Understand the video processing fundamentals
- Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 9

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES 9

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION 9

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING 9

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION 9

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TOTAL: 45 HOURS

TEXTBOOKS

1. Gonzalez and Woods ,”Digital Image Processing “, 3rd edition Pearson.
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, ”Video processing and communication “,1st edition PHI.

REFERENCES

1. M. Tekalp ,”Digital video Processing”, Prentice ll International.
2. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", JohnWiley & Sons.
3. Chris Solomon, Toby Breckon , "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley & Sons.

Course Objectives

- To learn the processing steps in fabrication of VLSI devices.
- To learn the concepts of assembling and packaging for VLSI devices.
- To impart a good knowledge in reactive plasma etching techniques and equipment.
- To familiarize the students with the NMOS and CMOS IC technology.
- To make the student acquire reactive Plasma Etching techniques and Equipment.
- To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

- List out various fabrication techniques
- Understand the etching principle in IC fabrication
- Gain knowledge on deposition and diffusion methods
- Understand the process simulation and integration.
- Assembling and packing techniques
- various technologies used for fabricating VLSI devices

UNIT 1**9**

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds} - V_{ds} relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II**9**

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III**9**

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IV**9**

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V**9**

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TOTAL: 45 HOURS

TEXT BOOKS

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	K. Eshraghian Eshraghian. D, A.Pucknell	Essentials of VLSI Circuits and Systems	PHI	2005
2	Wayne Wolf	Modern VLSI Design	Pearson Education, 3rd edition	1997

REFERENCES

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

15BEECOE06 FUNDAMENTALS OF MEMS L T P C 3 0 0 3

Course Objectives

- To study materials used for MEMS and its working
- To study the fabrication process used for MEMS
- To study the packaging process used for MEMS
- To familiarize the students with various micro actuators and micro sensors.
- To learn the survey of materials central to micro engineering.
- To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

- Appreciate the underlying working principles of MEMS devices.
- Understand the working of Micro sensors and actuators
- Explain the IC fabrication processes
- Gain knowledge on bulk manufacturing
- Understand the Design of Micro systems.
- Design and model MEMS devices.

UNIT I INTRODUCTION TO MEMS AND MICRO FABRICATION

9

History of MEMS Development, Characteristics of MEMS-Miniaturization - Micro electronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS

9

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION

9

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors- Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS AND ACTUATOR

9

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V POLYMER AND OPTICAL MEMS**9**

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP)- PDMS – PMMA – Parylene - Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TOTAL: 45 HOURS**TEXT BOOK**

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS**9**

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks.

UNIT II LEARNING PROCESS**9**

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION**9**

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm.

UNIT IV ATTRACTOR NEURAL NETWORK AND ART**9**

Hopfield model-BAM model- BAM stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP.

UNIT V SELF ORGANIZATION**9**

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements.

TOTAL: 45 HOURS

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Simon Haykin	Neural Networks and Learning Machines	-3/E - Pearson/ Prentice Hall	2009
2	Satish Kumar	Neural Networks : A Classroom Approach	TMH	2008
3	Freeman J.A., Skapura D.M	Neural networks, algorithms, applications, and programming techniques	Addition Wesley	2005
4	Laurene Fausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/ Prentice Hall	2000
5	Robert J Schalkoff	Artificial Neural Networks	McGraw Hill	1997

Course Objectives

- To introduce the basic concepts of Fuzzy logic and its applications in various domain
- To educate how to use Fuzzy computation to solve real-world problems
- To have a solid understanding of Basic fuzzy models.
- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- To learn about applications on Fuzzy based systems
- To familiarize with fuzzy inference and defuzzy inference procedures

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control
- Ability to develop how to use Fuzzy computation to solve real- world problems
- Design fuzzy based model for any application

UNIT I**9**

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT II**9**

Theory Of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT III**9**

Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT IV**9**

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V**9****FUZZY BASED SYSTEMS**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TOTAL: 45 HOURS

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. Diankar, H. Hellendoom and M. Reinfrank	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G. J. Klir and T. A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

Course Objectives

- To impart basic knowledge in bioprocess Engineering
- To design the bioreactors for various operations.
- To understand the principle and working of heat transfer equipment.
- To extend the knowledge in principle of heat transfer inside a bioreactor
- To construct the equipment's used in mass transfer operations.
- To learn the equipment's used in separation process.

Course Outcomes

- Summarize the basic concepts in bioprocess Engineering.
- Ability to design the bioreactors for various operations.
- Ability to develop the heat transfer equipment's for Bioprocess Engineering.
- Ability to construct the equipment's used in mass transfer operations.
- To acquire the knowledge of regulatory constraints in bioprocess
- Categorize the equipment's used in separation process.

UNIT I ENGINEERING PROPERTIES AND STORAGE TANK**9**

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II REACTOR DESIGN**9**

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III HEAT TRANSFER EQUIPMENTS**9**

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV MASS TRANSFER EQUIPMENTS**9**

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V SEPERATION EQUIPMENTS**9**

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker crystallizer.

TEXT BOOKS

S. No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering	McGraw-Hill	2007

2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw-Hill Companies	2008
---	-------------------------------	--------------------------------	---------------------------	------

REFERENCES

S. No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

Course Objectives

- To learn the scope and importance of food processing.
- To impart basic knowledge in different food processing methods carried out in the food tech companies.
- To extend the brief knowledge in food conservation operations.
- To study the methods of food preservation by cooling.
- To familiarize the students on the concepts of preservation methods for fruits.
- To create deeper understanding on preservation methods for vegetables.

Course Outcomes

- Describe the scope and importance of food processing.
- Outline the various processing methods for foods.
- Extend the knowledge in food conservation operations.
- Describe the methods of food preservation by cooling.
- Summarize the preservation methods for fruits.
- Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING**9**

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS**9**

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS**9**

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING**9**

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES**9**

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services	1995

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

COURSE OBJECTIVES

1. To understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. To use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. To study reaction mechanisms, relative free energies and structural dynamics
4. To compute different experimental properties and spectra using computational techniques.
5. To understand how to construct, interpret and utilise potential energy surfaces.
6. To understand the theoretical and practical challenges associated with computational modeling.

COURSE OUTCOMES

1. Understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. Can use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. Study reaction mechanisms, relative free energies and structural dynamics
4. Compute different experimental properties and spectra using computational techniques.
5. Understand how to construct, interpret and utilise potential energy surfaces.
6. Understand the theoretical and practical challenges associated with computational modeling.

UNIT I MOLECULAR MODELLING**9**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima.

UNIT II QUANTUM MECHANICS**9**

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semi empirical methods.

UNIT III MOLECULAR MECHANICS**9**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non – bonded interactions; force field parameterization and transferability; energy minimization; derivative and non – derivative methods, applications of energy minimization.

UNIT IV MOLECULAR DYNAMICS**9**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamic simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT V MODELLING AND DRUG DESIGN**9**

Macromolecular modeling, design of ligands for known macro molecular target sites, Drug-receptor interaction, classical SAR /QSAR studies and their implications to the 3 D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TOTAL: 45 HOURS**TEXTBOOKS**

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Yvonne C. Martin, editor, Peter Willett	Designing bioactive molecules : three- dimensional techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; Har	1998

COURSE OBJECTIVES

1. To understand the basics of biology
2. To gain knowledge about different biomolecules
3. To get familiarize with human diseases.
4. To learn about DNA & RNA.
5. To learn about different clinical investigations
6. To know the recent advances in biology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non-communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the concept of biomechanics

UNIT I OVERVIEW OF BIOREMEDIATION**9**

Pollution : Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT II BIOFILM PROCESSES**9**

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes.

UNIT III BIOREMEDIATION FOR SOIL ENVIRONMENT**9**

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination.

UNIT IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMEN**9**

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream-Biofiltration, Biotrickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters.

UNIT V BIOREMEDIATION OF METALS**9**

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Biobenification, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann, B.E., and McCarty, P.L.,	Environmental Biotechnology : Principles and Applications.	McGraw Hill,	2001
2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill	1995

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Prescott, L. M., Harley, and Klein, D. A	Microbiology	McGraw- Hill Higher Education	2008

COURSE OBJECTIVES

1. To study selected biological phenomena using physical principles.
2. To understand the biological and environmental sciences.
3. To gain the knowledge on technical enormous impact of the biological sciences.
4. To acquire the knowledge about molecular structure of biological systems.
5. To know the uses of proteins and its functions.
6. To understand the biological structure & function: Size and shape of macromolecules.

COURSE OUTCOMES

1. Study selected biological phenomena using physical principles.
2. Understand the biological and environmental sciences.
3. Gain the knowledge on technical enormous impact of the biological sciences.
4. Acquire the knowledge about molecular structure of biological systems.
5. Know the uses of proteins and its functions.
6. Understand the biological structure & function: Size and shape of macromolecules.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS 9

Intramolecular bonds – covalent – ionic and hydrogen bonds – biological structures -general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS 9

Primary structure – the bases – sugars and the phosphodiester bonds- double helical structure – A, B and Z forms – properties of circular DNA – topology – polymorphism and flexibility of DNA – structure of ribonucleic acids – hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS 9

Conformation of the peptide bond – secondary structures – ramachandran plots – use of potential functions – tertiary structure – folding – hydration of proteins – hydrophathy index.

UNIT IV ENERGETICS & DYNAMICS OF BIOLOGICAL SYSTEMS 9

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bi molecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES 9

Techniques for the study of biological structure & function: Size and shape of macromolecules – methods of direct visualization macromolecules as hydrodynamic particles – macromolecules diffusion – ultra centrifugation – viscometry x-ray crystallography determination of molecular structures, X-ray fibre diffraction electron microscopy neutron scattering – light scattering.

TOTAL: 45 HOURS

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Roland Glaser	Biophysics	Springer Science & Business Media	2001
2	Michel Daune	Molecular Biophysics: Structures in Motion	Oxford University Press	1999
3	Charles R. Cantor	Biophysical Chemistry, Part 2: Techniques for the Study of Biological Structure and Function	W. H. Freeman and Company	1980

COURSE OBJECTIVES

1. To understand the available tools and databases for performing research in bioinformatics.
2. To expose students to sequence alignment tool in bioinformatics.
3. To construct the phylogenetic trees for evolution.
4. To get familiar with the 3D structure of protein and classification.
5. To acquire basic knowledge in protein secondary structure prediction.
6. To extend the brief knowledge in Micro array data analysis.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.

UNIT I OVERVIEW OF BIOINFORMATICS**9**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**9**

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**9**

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**9**

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS**9**

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharmainformatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TOTAL: 45 HOURS**TEXTBOOK**

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayme	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCES

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

COURSE OBJECTIVES

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nano devices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nano devices.
6. Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION**9**

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANO PARTICLES**9**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS**9**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**9**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinyl chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**9**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TOTAL: 45 HOURS

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	FreitasJr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

Course Objective

1. To explain to the students about MEMS Technology, Present, Future and Challenges.
2. To gain a knowledge of basic approaches for microsystem design.
3. To gain a knowledge of state-of-the-art lithography techniques for microsystems.
4. To learn new materials, science and technology for microsystem applications.
5. To understand materials science for microsystem applications.
6. To understand state-of-the-art micromachining and packaging technologies.

Course Outcome

1. Students will explain MEMS Technology, Present, Future and Challenges.
2. Gain a knowledge of basic approaches for microsystem design
3. Gain a knowledge of state-of-the-art lithography techniques for microsystems
4. Learn new materials, science and technology for microsystem applications
5. Understand materials science for microsystem applications
6. Understand state-of-the-art micromachining and packaging technologies

UNIT I INTRODUCTION**9**

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I**9**

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II**9**

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING**9**

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistraction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS**9**

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Education Inc	2006
2	Stephen D Senturia	Microsystem Design	Springer Publication	2000
3	Tai Ran Hsu	MEMS & Micro systems Design and Manufacture	Tata McGraw Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nadim Maluf	An Introduction to Micro Electro Mechanical System Design	Artech House	2000
2	Mohamed Gad-el-Hak	The MEMS Handbook	CRC press Baco Raton	2000
3	Julian w. Gardner, Vijay K. Varadan, Osama O. Awadelkarim	Micro Sensors MEMS and Smart Devices	John Wiley & Son LTD	2002
4	James J.Allen	Micro Electro Mechanical System Design	CRC Press Publisher	2010
5	Thomas M.Adams and Richard A.Layton	Introduction MEMS, Fabrication and Application	Springer	2012

Course Objective

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

Course Outcome

1. Develop the student's knowledge in various robot structures and their workspace.
2. Develop student's skills in performing spatial transformations associated with rigid body motions.
3. Develop student's skills in perform kinematics analysis of robot systems.
4. Provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. Provide the student with some knowledge and analysis skills associated with trajectory planning.
6. Provide the student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT 9

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS 9

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS 9

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION 9

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS 9

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., Chmielewski T.A and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig J.J	Introduction to Robotics Mechanics and Control	Pearson Education	2008
2	Deb S.R	Robotics Technology and Flexible Automation	Tata McGraw Hill Book Co	1994
3	Koren Y	Robotics for Engineers	Mc Graw Hill Book Co	1992
4	Fu.K.S.,Gonzalz R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	Mc Graw Hill Book Co	1987
5	Janakiraman P.A	Robotics and Image Processing	Tata McGraw Hill	1995
6	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company	2008
7	Surender Kumar	Industrial Robots and Computer Integrated Manufacturing	Oxford and IBH Publishing Co. Pvt. Ltd	1991

Course Objective

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS**9**

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN**9**

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS**9**

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES**9**

Structuring the SC, SC and new products, functional roles in SC - SC design frame- work - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM**9**

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain management	The St. Lencie press	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement	Lean production, customer focused quality, McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

Course Objective

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

Course Outcome

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS**9**

General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS**9**

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT**9**

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT**9**

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometries in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT**9**

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion- Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

TOTAL: 45 HOURS

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. <https://laulima.hawaii.edu/portal>

Course Objective

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

Course Outcome

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION**9**

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS**9**

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY**9**

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION**9**

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM**9**

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

Course Objectives:

- To impart knowledge on the constructional details and principle of operation of various automobile components.
- To learn the function and working of various components in transmission and drive lines.
- To study the concept and working of steering and suspension systems in an automobile.
- To give knowledge on the wheels, tyres and brakes of automobiles.
- To provide information on the current and future trends in automobiles.
- Identify and explain the types of steering system.

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Demonstrate the operating principles and constructional details of various automobile components.
- Explain the function and working of components in transmission and drive lines.
- Identify and explain the types of steering system.
- Identify and explain the types of suspension system.
- Classify and describe the types of wheels, tyres and brakes of automobiles.
- Discuss the current and future trends in the automobiles.

UNIT I	ENGINE AND FUEL FEED SYSTEMS	9
---------------	-------------------------------------	----------

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI).

UNIT II TRANSMISSION SYSTEMS 9

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propellar Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III SUSPENSION SYSTEM 9

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV BRAKES 9

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM 9

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment”, 3rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

Course Objectives

- The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
- Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION**9**

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS**9**

2 stroke and 4 stroke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION**9**

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES**9**

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS**9**

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

Course Objectives

- The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems in Automobile.
- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.
- Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES**9**

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE**9**

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE**9**

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE**9**

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY**9**

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	John Doke	Fleet Management	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

LTPC3003

- To impart knowledge on trends in the vehicle power plants.
- To learn the various advanced driver assistance systems.
- To study the working of advanced suspension and braking systems in an automobile.
- To give information about motor vehicle emission and noise pollution control.
- To provide knowledge of the vehicle telematics.
- To give information about the noise control techniques

- Distinguish and describe the various modern vehicle power plant systems.
- List and explain the various driver assistant mechanisms.
- Identify and describe the working of advanced suspension and braking systems.
- Apply the knowledge of motor vehicle emission and noise pollution control.
- Describe the noise control techniques
- Describe the vehicle telematics and its applications.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems Progress in Technology	Automotive Electronics Series,SAE, USA	1998

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1.	William B Riddens	“Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3.	Robert Bosch,	“Automotive HandBook”, 5 th Edition	SAE	2000

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES**9**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS**9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN**9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS**9**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION**9**

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2		Handbook for Building Engineers in Metric systems	NBC, New Delhi	2005

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London, 2005.
3. National Building Code.

OBJECTIVES:

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

OUTCOMES:

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

UNIT I COASTAL ZONE

9

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVE DYNAMICS

9

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES

9

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES

9

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS

9

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Richard Sylvester	Coastal Engineering, Volume I and II	Elseiner Scientific Publishing Co	2006
2	Quinn, A.D	Design & Construction of Ports and Marine Structures	McGraw-Hill Book Co	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Ed. A.T. Ippen	Coastline Hydrodynamics	McGraw-Hill Inc., New York	2002
2	Dwivedi, S.N., Natarajan, R and Ramachandran, S	Coastal Zone Management in Tamilnadu	Wiley – 2 nd edition	2012

15BECEO04 EXPERIMENTAL METHODS AND MODEL ANALYSIS L T P C 3 0 0 3

OBJECTIVE:

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

OUTCOMES:

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS

9

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING

9

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES

9

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES

9

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE

9

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dally J W and Riley W.F	Experimental stress Analysis	McGraw-Hill, Inc. New York	2005
2	Srinath L S et al	Experimental Stress Analysis	Tata McGraw-Hill Publishing co., Ltd., New Delhi	2006

REFERENCE BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rangan C S et al	Instrumentation – Devices and Systems	Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2002
2	Sadhu Singh	Experimental Stress Analysis	Khanna Publishers, New Delhi	2006

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector._

UNIT I IRRIGATION SYSTEM REQUIREMENTS**9**

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II IRRIGATION SCHEDULING**9**

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation.

UNIT III MANAGEMENT**9**

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV OPERATION**9**

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study.

UNIT V INVOLVEMENT OF STAKE HOLDERS**9**

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000
2	R.T. Gandhi, et. al	Hand book on Irrigation Water Requirement	Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi	

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000
2. Maloney, C. and Raju, K.V., “Managing Irrigation Together”, Practice and Policy in India, Stage Publication, New Delhi, India, 2000

OBJECTIVE

At the end of this course, the students should have learnt the fundamentals of CAD, computer graphics, fundamentals of finite elements analysis, design and optimization and expert systems.

UNIT I INTRODUCTION**9**

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS**9**

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards – Drafting packages

UNIT III STRUCTURAL ANALYSIS**9**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION**9**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V EXPERT SYSTEMS**9**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables – Inference mechanisms - Simple applications.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Groover M.P. and Zimmers E.W. Jr	CAD/CAM, Computer Aided Design and Manufacturing	Prentice Hall of India Ltd, New Delhi	2005
2	Krishnamoorthy C.S.Rajeev S	Computer Aided Design	Narosa Publishing House, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Harrison H.B	Structural Analysis and Design	Part I and II Pergamon Press, Oxford	2002
2	Rao S.S	Optimisation Theory and Applications	Wiley Eastern Limited, New Delhi	2002
3	Richard Forsyth (Ed)	Expert System Principles and Case Studies	Chapman and Hall, London	2000

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM**9**

Introduction - Pavement as layered structure - Pavement types - rigid and flexible - Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS**9**

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS**9**

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE**9**

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS**9**

Stabilisation with special reference to highway pavements - Choice of stabilisers - Testing and field control – Stabilisation for rural roads in India - use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Kadiyali, L.R	Principles and Practice of Highway Engineering	Khanna tech. Publications, New Delhi	2007

2	Croney, D	Design and Performance of Road Pavements	HMO Stationary Office	2005
3	Wright, P.H	Highway Engineers	John Wiley & Sons, Inc., New York	2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 2003.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2001, The Indian Roads Congress, New Delhi.
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001.

OBJECTIVES:

1. To understand the role of geology in the design and construction process of underground openings in rock.
2. To apply geologic concepts and approaches on rock engineering projects
3. To identify and classify rock using basic geologic classification systems.
4. To use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. To sequential design process used in geotechnical engineering practice.
6. To Require civil engineering students to read and summarize geologic literature for site specific projects.

OUTCOMES:

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Geologic concepts and approaches on rock engineering projects
3. Identify and classify rock using basic geologic classification systems.
4. Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. Sequential design process used in geotechnical engineering practice.
6. Require civil engineering students to read and summarize geologic literature for site specific projects.

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 9

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA 9

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS 9

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING 9

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Goodman P.E	Introduction to Rock Mechanics	John Wiley and Sons	2005
2	Stillborg B	Professional User Handbook for rock Bolting	Tran Tech Publications	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Brow E.T	Rock Characterisation Testing and Monitoring	Pergaman Press	2002
2	Arogyaswamy R.N.P	Geotechnical Application in Civil Engineering	Oxford and IBH	2000
3	Hock E. and Bray J	Rock Slope Engineering	Institute of Mining and Metallurgy	1991

OBJECTIVE:

1. To learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. To design the storage structures.
3. To gain knowledge of steel water tanks and their design.
4. To get a brief idea about concrete water tanks.
5. To design steel bunkers and silos
6. To design pre stressed concrete water tanks

OUTCOMES:

1. The design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and pre stressed concrete water tanks
2. Design the storage structures.
3. Gain knowledge of steel water tanks and their design.
4. Get a brief idea about concrete water tanks.
5. Design steel bunkers and silos
6. Design pre stressed concrete water tanks

UNIT I STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation

UNIT II CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS**9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rajagopalan K	Storage Structures	Tata McGraw-Hill, New Delhi	2002

2	Krishna Raju N	Advanced Reinforced Concrete Design	CBS Publishers and Distributors, New Delhi	2000
---	----------------	-------------------------------------	--	------

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	R.G.Hopkinson and J.D.Kay	The Lighting of buildings	Faber and Faber, London	2000
2	William H.Severns and Julian R.Fellows	Air-conditioning and Refrigeration	John Wiley and Sons, London	2000

OBJECTIVES:

1. To understand the need of energy conversion and the various methods of energy storage
2. To explain the field applications of solar energy
3. To identify Winds energy as alternate form of energy and to know how it can be tapped
4. To explain bio gas generation and its impact on environment
5. To understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. To illustrate the concepts of Direct Energy Conversion systems & their applications.

OUTCOMES:

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. Illustrate the concepts of Direct Energy Conversion systems & their applications.

UNIT I INTRODUCTION**9**

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES**9**

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES**9**

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN**9**

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL**9**

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peter Sachs	Wind Forces in Engineering	Pergamon Press, New York	2002
2	Lawson T.V	Wind Effects on Buildings, Vols. I and II	Applied Science and Publishers, London	2005

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottawa, 2003
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 2002.

15BECEO11 ADVANCED CONSTRUCTION TECHNOLOGY L T P C 3 0 0 3

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.

UNIT I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines.

UNIT III MODERN CONSTRUCTION EQUIPEMENTS -I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting.

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS -II 9

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant.

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and

Design of Formwork, Scaffolding, Operation and maintenance of construction equipments.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Peurifoy , R. L., , Ledbetter, W.B	Construction Planning , Equipment and Methods	Mc Graw Hill Co	2000
2	Antill J.M	PWD, Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Varma.M	Construction Equipment and its Planning & Applications	Metropolitian Book Co	2000
2	Nunnally, S.W	Construction Methods and Management	Prentice – Hall	2000
3	Ataev, S.S	Construction Technology	MIR , Pub	2000

**LIST OF OPEN ELECTIVES OFFERED BY
ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT**

15BEEEOE01

ELECTRIC HYBRID VEHICLE

L T P C 3 0 0 3

Course Objectives

- To understand the basic concepts of electric hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives
- To understand and gain the knowledge about various energy storage devices

Course Outcomes:

- Summarize the basic concepts in bioprocess Engineering.
- Explain the concept of Hybrid Electric Vehicles.
- Understand the concept of Hybrid Electric Drive-Trains.
- Identify the different Energy Management Strategies.
- Understand the concept of different Energy Storage devices.
- Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press – 2 nd edition	2010

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	Standardsmedia – 2 nd edition	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley – 2 nd edition	2012

15BEEEOE02 ENERGY MANAGEMENT AND ENERGY AUDITING L T P C 3 0 0 3

Course Objectives:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT

9

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS

9

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT

9

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS

9

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS

9

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL: 45 HOURS

TEXT BOOK

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	▪ Lulu Enterprises, Inc. - 8th Edition Volume II	2013

Course Objectives

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

Course Outcomes (COs)

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
- 3 Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS**9**

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS**9**

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS**9**

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER**9**

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLEANEOUS TRANSDUCERS**9**

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and	18th Edition,	2007

		Electronics Measurements and Instrumentation	Dhanpat Rai & Company Private Limited	
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	London : McGraw-Hill Higher Education 5 th edition	2003
2	Patranabi. D	Sensors and Transducers	PHI Learning Pvt. Ltd – 2 nd edition	2003
3	John. P, Bentley	Principles of Measurement Systems	4th Edition, Prentice Hall	2004
4	Murthy.D.V.S	Transducers and Instrumentation	PHI Learning Pvt. Ltd 2 nd edition	2010

Course Objectives

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flowcharts of ladder and spray process system
- To understand the principles of PID.

Course Outcome

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students known about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION**9**

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING**9**

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS**9**

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS**9**

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES**9**

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL: 45 HOURS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, 5 th Edition	2009

WEBSITE

<http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm,-> Introduction to programmable Logic controller

Course Objectives

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

- Analyze the Energy Scenario in India
- Understand the concept of Solar Energy
- Understand the concept of Wind Energy
- Understand the concept of Hydro Energy
- Analyze the different energy sources
- Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION**9**

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY**9**

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY**9**

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY**9**

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES**9**

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL: 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional sources of energy	Khanna publishers	2011
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Eleventh Reprint	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis – 3 rd edition	2015

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objectives

- To study the state variable analysis
- To provide adequate knowledge in the phase plane analysis and also describing function analysis.
- To study the analysis discrete time systems using conventional techniques.
- To analyze the stability of the systems using different techniques.
- To study the design of optimal controller.
- To study the types of compensators

Course Outcomes

At the end of the course the student will be able to

- understand the state variable analysis, Z- transform, state equation
- Construct the frequency response of the system using various plots
- Correlate the time and frequency domain specifications and effect of compensation
- Design the different types of compensators using frequency response plots to stabilize the control system
- Explain the state variable representation of physical systems with the effects of
 - state feedback its assessment for linear-time invariant systems.

UNIT 1 STATE VARIABLE ANALYSIS**9**

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement –State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS**9**

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearizing non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM**9**

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM**9**

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL**9**

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL 45 HOURS

TEXT BOOKS

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers – 4 th edition	2006
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press – 2 nd edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the Book	Publisher	Year of Publication
1	M.Gopal	Modern control system theory	New Age International Publishers	2002
2	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Prentice Hall, 7 th edition	2014
3	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University Press,	2002

B. E. MECHANICAL ENGINEERING

CURRICULUM AND SYLLABI
(2015 AND ONWARDS)

(REGULAR PROGRAMME)

Department of Mechanical Engineering
FACULTY OF ENGINEERING



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University Established Under Section 3 of UGC Act 1956)

Eachanari Post, Coimbatore 641 021, India

B. E. MECHANICAL ENGINEERING (REGULAR)

COURSE OF STUDY AND SCHEME OF EXAMINATIONS

(2015 and onwards)

SEMESTER I

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
THEORY										
15BECC101	Communicative English –I	1	1,2,3	3	0	0	3	40	60	100
15BECC102	Engineering Mathematics – I	1	1,2,8,9	3	2	0	4	40	60	100
15BECC103	Engineering Physics	1, 3	1,2,3,5,8,9	3	0	0	3	40	60	100
15BECC104	Engineering Chemistry	1, 2	1,2,3,8,9,12	3	0	0	3	40	60	100
15BEME105	Basic Electrical and Electronics Engineering	1, 3	1,2,3,8,9,11	3	0	0	3	40	60	100
PRACTICAL										
15BECC111	Engineering Physics and Chemistry Laboratory	1	1,2,5, 10	0	0	3	2	40	60	100
15BEME112	Engineering Practice Laboratory	1, 2	1,2,3,5	0	0	3	2	40	60	100
15BEME113	Engineering Graphics - I	1, 2	1,2,3,5,9	1	0	4	3	40	60	100
TOTAL				16	2	10	23	320	480	800
VALUE ADDED COURSE										
15BECC151	Human Values	-	-	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER II

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
THEORY										
15BECC201	Communicative English –II	2	4,5, 10	3	0	0	3	40	60	100
15BECC202	Engineering Mathematics – II	1	1,2,8,9	3	2	0	4	40	60	100
15BECC203	Material Science	1, 3	1,2,3,5,8,9	3	0	0	3	40	60	100
15BECC204	Environmental Studies	1	1,2,3,4,10	3	0	0	3	40	60	100
15BEME205	Basic Civil Engineering	1, 3	1,2,3,8,9,11	3	0	0	3	40	60	100
15BEME206	Computer Fundamentals and C Programming	1	1,2,5, 10	3	0	0	3	40	60	100
PRACTICAL										
15BEME211	Computer Practices and Programming Laboratory	1	1,2,9	0	0	3	2	40	60	100
15BEME212	Engineering Graphics - II	1, 2	1,2,3,5,9	1	0	4	3	40	60	100
TOTAL				19	2	7	24	320	480	800
VALUE ADDED COURSE										
15BECC251	Elementary Biology	-	-	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER III

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
THEORY										
15BEME301	Methods of Applied Mathematics	1	1,3,5,6,7,8	3	2	0	4	40	60	100
15BEME302	Engineering Mechanics	1	1,2,3,4,10,11	3	1	0	4	40	60	100
15BEME303	Manufacturing Technology – I	1	1,2,3,4,10	3	0	0	3	40	60	100
15BEME304	Fluid Mechanics and Machinery	1	1,2,3,4,10	3	1	0	4	40	60	100
15BEME305	Electrical Drives and Controls	1,2	1,2,3,4,6,9,10	3	0	0	3	40	60	100
PRACTICAL										
15BEME311	Fluid Mechanics and Machinery Laboratory	1	1,2,3,4,5,6,9	0	0	3	2	40	60	100
15BEME312	Machine Drawing	1	1,2,3,4,10	0	0	3	2	40	60	100
15BEME313	Electrical Drives and Control Laboratory	1,2	1,2,3,4,6,9,12	0	0	3	2	40	60	100
TOTAL				15	4	9	24	320	480	800
VALUE ADDED COURSE										
15BEME351	Aptitude Training			1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER IV

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	THEORY									
15BEME401	Strength of Materials	1	1,2,3,4,10	3	2	0	4	40	60	100
15BEME402	Manufacturing Technology – II	1	1,2,3,6,8,9	3	0	0	3	40	60	100
15BEME403	Engineering Thermodynamics	1	1,2,3,4,10	3	2	0	4	40	60	100
15BEME404	Industrial Metallurgy	1	1,2,3,4,10	3	0	0	3	40	60	100
15BEME405	Kinematics of Machinery	1	1,2,3,4,10	3	0	0	3	40	60	100
15BEME406	Engineering Metrology and Measurements	1	1,2,3,6,8,9	3	0	0	3	40	60	100
	PRACTICAL									
15BEME411	Strength of Materials and Metallurgy Laboratory	1	1,2,3,5,9,10	0	0	3	2	40	60	100
15BEME412	Manufacturing Technology Laboratory	1	1,2,3,6,8,9,12,14	0	0	3	2	40	60	100
TOTAL				18	4	6	24	320	480	800
	VALUE ADDED COURSE									
15BEME451	Personality Development	-	--	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER V

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	THEORY									
15BEME501	Heat Power Engineering	1	1,2,3,4,10	3	0	0	3	40	60	100
15BEME502	Design of Machine Elements	1	1,2,3,4,9	3	2	0	4	40	60	100
15BEME503	Automobile Engineering	1	1,2,3,4,9,12	3	0	0	3	40	60	100
15BEME504	Dynamics of Machinery	1	1,2,3,4,10	3	1	0	4	40	60	100
15BEME5E--	Departmental Elective I	--	--	3	0	0	3	40	60	100
	PRACTICAL									
15BEME511	Scientific Computing Laboratory	1	1,3,5,6,7,8,10	2	0	2	3	40	60	100
15BEME512	Dynamics and Metrology Laboratory	1	1,2,3,4,6,9,12	0	0	3	2	40	60	100
15BEME513	Thermal Engineering Laboratory– I	1	1,2,3,4,7,11	0	0	3	2	40	60	100
TOTAL				17	3	8	24	320	480	800
	VALUE ADDED COURSE									
15BEME551	In–plant training	-	--	-	-	-	1	100	0	100
15BEME552	Geometrical Dimensioning and Tolerance	-	--	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER VI

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	THEORY									
15BEME601	Operations Research	1	1,3,5,6,7,8	3	1	0	4	40	60	100
15BEME602	Design of Transmission System	1	1,2,3,4,8,9,10	3	0	0	3	40	60	100
15BEME603	Heat and Mass Transfer	1	1,2,3,4,5	3	1	0	4	40	60	100
15BEME604	Engineering Economics and Financial Management	1	1,2,3,5,7	3	0	0	3	40	60	100
15BEME6E--	Department Elective II	--	--	3	0	0	3	40	60	100
15BEME6E--	Department Elective III	--	--	3	0	0	3	40	60	100
	PRACTICAL									
15BEME611	Computer Aided Modeling and Simulation Laboratory	1	1,2,3,4,5,8,9	0	0	3	2	40	60	100
15BEME612	Thermal Engineering Laboratory II	1	1,2,3,4,7,11	0	0	3	2	40	60	100
TOTAL				18	2	6	24	320	480	800
	VALUE ADDED COURSE									
15BEME651	Mini Project	-	--	0	0	2	1	100	0	100
15BEME652	Technical Presentation	-	--	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER VII

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	THEORY									
15BEME701	Professional Ethics, Principles of Management and Entrepreneurship Development	1	1,2,3,4,5,10,11	3	0	0	3	40	60	100
15BEME702	Finite Element Methods	1	1,2,3,4,5	3	2	0	4	40	60	100
15BEME703	Mechatronic Systems	--	--	3	0	0	3	40	60	100
15BEME7E--	Department Elective IV	--	--	3	0	0	3	40	60	100
15BEME7E--	Department Elective V	--	--	3	0	0	3	40	60	100
15-----OE--	Open Elective	--	--	3	0	0	3	40	60	100
	PRACTICAL									
15BEME711	CAE / CAM Laboratory	1	1,2,3,4,8,9	0	0	4	2	40	60	100
15BEME712	Mechatronics Laboratory	1	1,2,3,4,5,7	0	0	4	2	40	60	100
TOTAL				18	2	8	23	320	480	800
	VALUE ADDED COURSE									
15BEME751	Robotics and Automation (or) Pumps and Motors	-	--	1	1	0	1	100	0	100
TOTAL CONTACT HOURS / WEEK				30						

SEMESTER VIII

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	THEORY									
15BEME801	Total Quality Management	1	1,2,3,4,5,8,9	3	0	0	3	40	60	100
15BEME8E--	Department Elective VI	--	--	3	0	0	3	40	60	100
15BEME8E--	Department Elective VII	--	--	3	0	0	3	40	60	100
	PROJECT									
15BEME891	Project Work and Viva Voce	--	--	0	0	24	12	120	180	300
TOTAL				9	0	20	21	240	360	600
TOTAL CONTACT HOURS / WEEK				33						

LIST OF ELECTIVES

DEPARTMENT ELECTIVES

SEMESTER V

Elective I

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEME5E01	Computer Aided Design	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME5E02	Computer Integrated Manufacturing	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME5E03	Advanced Manufacturing Processes	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME5E04	Hydraulics and Pneumatics Power Control	1	1,2,3,7,9,12	3	0	0	3	40	60	100

SEMESTER VI

Elective II & III

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEME6E01	Power Plant Engineering	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME6E02	Design of Jigs, Fixtures and Press Tools	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME6E03	Computational Fluid Dynamics	1,3	1,2,3,7,9,12	3	0	0	3	40	60	100
15BEME6E04	Failure Analysis and Design	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME6E05	Renewable Energy Sources	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME6E06	Precision Engineering	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME6E07	Entrepreneurship Development	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME6E08	Industrial Engineering	1	1,2,3,7,13,15	3	0	0	3	40	60	100

SEMESTER VII**Elective IV & V**

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEME7E01	Design for Manufacture and Assembly	1,3	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME7E02	Gas Dynamics and Jet Propulsion	1,2	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME7E03	Industrial Robotics	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME7E04	Design and Analysis of Experiments	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME7E05	Advanced I.C. Engines	1,3	1,2,3,7,9,12	3	0	0	3	40	60	100
15BEME7E06	Additive Manufacturing	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME7E07	Manufacture and Inspection of Gears	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME7E08	Refrigeration and Air Conditioning	1	1,2,3,7,9,13	3	0	0	3	40	60	100

SEMESTER VIII**Elective VI & VII**

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEME8E01	Machine Tool Design	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME8E02	Computer Aided Drafting And Cost Estimation	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME8E03	Quality Control and Reliability Engineering	1	1,2,3,7,9,12	3	0	0	3	40	60	100
15BEME8E04	Composite Materials	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME8E05	Production Planning and Control	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEME8E06	Cogeneration and Waste Heat Recovery Systems	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEME8E07	Energy Conservation Methods and Energy Audit	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEME8E08	Non Destructive Testing	1	1,2,3,7,13,15	3	0	0	3	40	60	100

OPEN ELECTIVES**COURSES OFFERED BY OTHER DEPARTMENTS**

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
	SCIENCE AND HUMANITIES									
15BESH0E01	Industrial Mathematics I	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E02	Industrial Mathematics II	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BESH0E03	Probability and Random Process	1,3	1,2,3,7,9,12	3	0	0	3	40	60	100
15BESH0E04	Probability and Statistical Methods	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E05	Probability and Queuing Theory	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E06	Fuzzy Mathematics	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BESH0E07	Mathematical Physics	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E08	Advanced Engineering Mathematics	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E09	Linear Algebra	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E10	Transforms and Partial Differential Equations	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E11	Technical Writing	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BESH0E12	Geophysics	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E13	Engineering Acoustics	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E14	Alternate Fuels and Energy Systems	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E15	Solid Waste Management	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E16	Green Chemistry	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BESH0E17	Applied Electrochemistry	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BESH0E18	Industrial Chemistry	1	1,2,3,7,9,13	3	0	0	3	40	60	100
	COMPUTER SCIENCE AND ENGINEERING									
15BEC0E01	Python Programming	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEC0E02	Internet Programming	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEC0E03	Multimedia and Animation	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEC0E04	PC Hardware and Trouble shooting	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEC0E05	Game Programming	1	1,2,3,7,9,15	3	0	0	3	40	60	100
	ELECTRICAL AND ELECTRONICS ENGINEERING									
15BEE0E01	Electric Hybrid Vehicles	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEE0E02	Energy Management & Energy Auditing	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEE0E03	Sensors & Transducers	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEE0E04	Programmable Logic Controller	1	1,2,3,7,9,12	3	0	0	3	40	60	100
15BEE0E05	Renewable Energy Resources	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEE0E06	Advanced Control Systems	1	1,2,3,7,9,15	3	0	0	3	40	60	100

ELECTRONICS AND COMMUNICATION ENGINEERING		PEO	PO								
15BEECOE01	Real Time Embedded Systems	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BEECOE02	Consumer Electronics	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BEECOE03	Fundamentals of Nanotechnology	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BEECOE04	Image & Video Processing	1	1,2,3,7,9,12	3	0	0	3	40	60	100	
15BEECOE05	VLSI Technology	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BEECOE06	Fundamentals of MEMS	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BEECOE07	Neural Networks and its Applications	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BEECOE08	Fuzzy Logic and its Applications	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
BIOTECHNOLOGY											
15BEBTOE01	Bioreactor Design	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BEBTOE02	Food Processing and Preservation	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BEBTOE03	Molecular Modeling	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BEBTOE04	Bioremediation	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BEBTOE05	Biophysics	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BEBTOE06	Basic Bioinformatics	1	1,2,3,7,9,12	3	0	0	3	40	60	100	
15BEBTOE07	Fundamentals of Nano Biotechnology	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
AUTOMOBILE ENGINEERING											
15BEAEOE01	Automobile Engineering	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BEAEOE02	Basics of Two and Three Wheelers	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BEAEOE03	Automobile Maintenance	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BEAEOE04	Introduction to Modern Vehicle Technology	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
CIVIL ENGINEERING											
15BECEOE01	Housing, Plan and Management	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE02	Building Services	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BECEOE03	Coastal Zone Management	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BECEOE04	Experimental Method and Model Analysis	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE05	Management of Irrigation Systems	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE06	Computer Aided Design of Structures	1	1,2,3,7,13,15	3	0	0	3	40	60	100	
15BECEOE07	Pavement Engineering	1	1,2,3,7,9,13	3	0	0	3	40	60	100	
15BECEOE08	Rock Engineering	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE09	Storage Structures	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE10	Wind Engineering	1	1,2,3,7,9,15	3	0	0	3	40	60	100	
15BECEOE11	Advanced Construction Technology	1	1,2,3,7,9,15	3	0	0	3	40	60	100	

COURSES OFFERED TO OTHER DEPARTMENTS

SUB. CODE	TITLE OF THE COURSE	PEO	PO	L	T	P	C	CIA	ESE	TOTAL
15BEMEOE01	Introduction to MEMS	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEMEOE02	Robotics	1	1,2,3,7,13,15	3	0	0	3	40	60	100
15BEMEOE03	Industrial Safety and Environment	1	1,2,3,7,9,13	3	0	0	3	40	60	100
15BEMEOE04	Transport Phenomena	1	1,2,3,7,9,15	3	0	0	3	40	60	100
15BEMEOE05	Introduction to Biomechanics	1	1,2,3,7,13,15	3	0	0	3	40	60	100

Total number of credits: 187

L: Lecture Hour

T: Tutorial Hour

CIA: Continuous Internal

Assessment P: Practical Hour

C: No. of Credits

ESE: End Semester Examinations

Note:

- The passing minimum for value added course is 50 marks out of 100 marks. There will be two tests, of which one will be class test covering 50% of syllabus for 50 marks and other for 50 marks.
- Credits for value added courses are not counted for computation of CGPA.
- Interested students can opt one self study course in eighth semester from open electives which will be reflected in the mark sheet only if he / she passes.

Programme Educational Objectives (PEO's)

- 1:** Graduates will more conscious about their profession with social awareness and responsibility.
- 2:** Graduates will be engineering experts, who would help solve industry's technological problems.
- 3:** Graduates will be engineering professionals, consultants or entrepreneurs engaged in technology development.
- 4:** Graduates will interact with their peers in other disciplines in industry and society and contribute to the economic growth of the country.

Programme Outcomes (PO's)

- 1:** Ability to apply knowledge of mathematics and science in solving engineering problems.
- 2:** In-depth knowledge on the fundamental principles, construction and auxiliary systems of mechanical sciences.
- 3:** To understand the principles involved in evaluating the structural, functional and safety requirements of mechanical systems.
- 4:** Hands on knowledge to develop analytical skills for designing and analyzing various mechanical components and processes.
- 5:** To understand and apply appropriate techniques and IT tools for the design and analysis of mechanical systems.
- 6:** Understanding the mechanism of pollutant formation and its control techniques.
- 7:** Understanding of human and ethical responsibilities towards the profession and society.
- 8:** Ability to understand the economics and cost analysis in order to take economically sound decisions.
- 9:** Ability to apply modern techniques and tools necessary for engineering practice with appropriate considerations for public health, safety, cultural and environmental limitations.
- 10:** Understand the impact of engineering solutions in a societal context and to be able to respond effectively to the needs for sustainable development.
- 11:** Function effectively as an individual, and as a member or a leader in diverse teams, and in multi-disciplinary situations.
- 12:** To recognize the need for, and have the ability to engage in independent and lifelong learning.

Programme Specific Outcomes (PSO's)

- 13:** Ability to design a mechanical system, component, or process to meet desired needs of the nation, industries, institutions within realistic constraints such as economic, environmental, social, political, ethical, health care, and safety, manufacturability, and sustainability.
- 14:** Ability to develop and use of software tools and Information Technology for mechanical engineering domain.
- 15:** Ability to perform effectively first level managerial responsibilities for large or medium engineering organizations.

Programme Educational Objectives	Programme Objectives														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1			✓			✓	✓	✓	✓	✓			✓		
2	✓	✓	✓	✓	✓				✓					✓	
3	✓	✓	✓	✓	✓				✓		✓	✓		✓	
4								✓			✓				✓

COURSE OBJECTIVES

1. To enable students to attain fluency and accuracy to inculcate proficiency in professional communication.
2. To make the students to meet the growing demand in the field of Global communication.
3. To help students acquire their ability to speak effectively in real life situations.
4. To inculcate the habit of reading and to develop their effective reading skills.
5. To ensure that students use dictionary to improve their active and passive vocabulary.
6. To enable students to improve their lexical, grammatical and communicative competence.

COURSE OUTCOMES

Students undergoing this course will be able to

1. Use English language for communication: verbal & non-verbal.
2. Enrich comprehension and acquisition of speaking & writing ability.
3. Ensure students proficiency in professional communication.
4. Developed their active and passive vocabulary.
5. Gain confidence in using English language in real life situations.
6. Improve word power: lexical, grammatical and communication competence.

UNIT I

9

Listening – Types of listening - Listening to class reading - Video tapes/ audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic – My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions – Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

UNIT II

10

Listening – Understanding the passage in English – Pronunciation Practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical Reading – Finding key information in a given text (Skimming - scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar** – Parts of Speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary** – Compound Nouns/Adjectives – Irregular verbs.

UNIT III

10

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction Writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

UNIT IV

8

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate, Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence Pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

UNIT V

8

Listening -Listening to different accents, speeches/presentations. **Speaking**- Extempore talk –Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices –Writing proposal. **Grammar**–Direct and Indirect speech–Conditionals sentences-Auxiliary verbs. **Vocabulary**– Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

TOTAL**45 PERIODS****TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sangeeta Sharma, Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP	2015

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEB REFERENCES

1. www.learnerstv.com – Listening/ Speaking/Presentation
2. www.usingenglish.com – Writing/Grammar
3. www.englishclub.com – Vocabulary Enrichment/Speaking

COURSE OBJECTIVES

The objective of this course is

1. To familiarize the prospective engineers with techniques in calculus, and multivariate analysis.
2. To familiarize the prospective engineers with techniques in linear algebra.
3. To equip the students with standard concepts and tools at an intermediate to advanced level.
4. To equip the students will serve them to wards tackling more advanced level of mathematics.
5. To make the students will serve them to find the useful applications in their disciplines.
6. To make the students to solve the real time problems using standard concepts and tools.

COURSE OUTCOMES

The students will learn:

1. To apply differential and integral calculus to notions of curvature and to improper integrals.
2. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
3. The tool of power series and Fourier series for learning advanced Engineering Mathematics.
4. To deal with functions of several variables that are essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.
6. Students can solve real time problems using standard concepts and tools.

UNIT I MATRICES**12**

Review of Matrix Algebra - Characteristic equation – Eigenvalues and Eigenvectors of a real matrix – Properties – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form – Quadratic forms – Reduction to canonical form through orthogonal reduction.

UNIT II DIFFERENTIAL CALCULUS**12**

Overview of Derivatives - Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes- Evolutes as Envelope of normals – Maxima and Minima of functions of two or more Variables – Method of Lagrangian Multipliers

UNIT III SEQUENCES AND SERIES**13**

Sequences: Definition and examples – Series: Types and Convergence – Series of positive terms – Tests of convergence: Comparison test, Integral test and D'Alembert's ratio test – Alternating series – Leibnitz's test – Series of positive and negative terms – Absolute and conditional convergence.

UNIT IV HYPERBOLIC FUNCTIONS, BETA AND GAMMA FUNCTIONS**12**

Hyperbolic functions: Hyperbolic functions and Inverse Hyperbolic functions – Identities – Real and imaginary parts – solving problems using hyperbolic functions.

Beta And Gamma Functions : Definitions – Properties – Relation between beta and gamma integrals – Evaluation of definite integrals in terms of beta and gamma functions.

UNIT V DIFFERENTIAL EQUATIONS**11**

Linear Differential equations of second and higher order with constant coefficients - Euler's form of Differential equations – Method of variation parameters.

TOTAL 60 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics	McGraw Hill Education (India) Private Limited, New Delhi	2014
2	Sundaram, V and Balasubramanian, R.	Engineering Mathematics for first year.	Vikas Publishing Home , New Delhi	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewel . B. S.	Higher Engineering Mathematics	Khanna Publications, New Delhi.	2014
2	Bhaskar Rao. P. B, Bhujanga Rao. M	Engineering Mathematics I	BS Publications, India.	2010
3	Ramana. B.V	Higher Engineering Mathematics	Tata McGraw Hill Publishing Company, New Delhi.	2007
4	Shahnaz Bathul	Text book of Engineering Mathematics	PHI Publications, New Delhi.	2009
5	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEB REFERENCES

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.intmath.com/matrices-determinants

COURSE OBJECTIVES

1. To introduce the basic physics concepts relevant to different branches of Engineering and Technology.
2. To acquire the knowledge of Electromagnetic field theory.
3. To make the student to learn scientific, mathematical and engineering principles.
4. To make the students to understand the basics of vacuum science.
5. To make the students to understand the process of production and measurement.
6. To make the students to understand the working of Gauges like Pirani, McLeod and Penning

COURSE OUTCOMES

1. Formulate potential problems within electrostatics, magneto statics.
2. Formulate stationary current distributions in linear, isotropic media.
3. Acquire knowledge on properties of matter, quantum physics.
4. Understand the basics of vacuum science.
5. Understand the process of production and measurement.
6. Understand the working of Gauges like Pirani, McLeod and Penning.

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS 9

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS 9

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER -CO₂, Semiconductor LASER Applications of LASER in industry and Medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle – derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (Block diagram)

UNIT III QUANTUM PHYSICS 9

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box. Scanning electron microscope.

UNIT IV CRYSTAL PHYSICS 9

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects

UNIT V NUCLEAR PHYSICS 9

Introduction – basics about nuclear fission and fusion, nuclear composition – stable nuclei- liquid drop model, Radiation detectors – scintillation counter, semi conductor detector, cloud chamber. Reactors – essentials of nuclear reactor- power reactor, pressurized water reactor, Fast breeder reactor.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2015

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	2010
2	Gaur, R.K. and Gupta. S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	2011

WEB REFERENCES

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

COURSE OBJECTIVES

1. To understand the terminologies of atomic and molecular structure
2. To study the basics of Periodic properties, Intermolecular forces
3. To study about spectroscopic technique
4. To understand the working of electromagnetic spectrum and spectroscopic techniques
5. To understand the thermodynamic functions
6. To comprehend the basic organic chemistry and to synthesis simple drug.

COURSE OUTCOMES

1. Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
3. Understand the ranges of the electromagnetic spectrum used for exciting different molecular energy levels.
4. Understand the concept of various spectroscopic techniques.
5. Rationalise bulk properties and processes using thermodynamic considerations.
6. List major chemical reactions that are used in the synthesis of molecules.

UNIT I WATER TECHNOLOGY**9**

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES**9**

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode – Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) – Batteries - Primary batteries - Leclanche cell - Secondary batteries - Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS**9**

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, H_2 - O_2 Fuel Cell - Rocket engines - Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE**9**

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electroless plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY**9**

Introduction - Adsorption - Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms - Freundlich adsorption isotherm - Langmuir adsorption isotherm - Industrial adsorbent materials - Role of adsorbents in catalysis and water softening - Emulsion - Types - water/oil, oil/water - Applications of adsorption.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr.S.Vairam	Engineering chemistry	Gems publishers	2014
2	Ravikrishnan, A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai.	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Raman Sivakumar	Engineering Chemistry I &II	McGraw-Hill Publishing Co.Ltd., 3 rd Reprint NewDelhi.	2013
2	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010

WEB REFERENCES

1. <http://www.studynotes.ie/leaving-cert/chemistry/>
2. <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>
3. <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>

COURSE OBJECTIVES

1. To impart the basic knowledge about the Electric circuits.
2. To understand the working of Electrical Machines and Transformers.
3. To understand the working of Power Converters and components of low-voltage electrical installations.
4. To understand and analyze basic electric and magnetic circuits.
5. To study the working principles of electrical machines and power converters.
6. To introduce the components of low-voltage electrical installations.

COURSE OUTCOMES

1. Gain the basic knowledge about the Electric circuits.
2. Understand the working of Electrical Machines and Transformers.
3. Understand the working of Power Converters and components of low-voltage electrical installations
4. Understand and analyze basic electric and magnetic circuits.
5. Acquire knowledge on the working principles of electrical machines and power converters.
6. Understand the components of low-voltage electrical installations.

UNIT I ELECTRIC CIRCUITS & MEASUREMENTS 9

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II ELECTRICAL MACHINES 9

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.

UNIT III MEASURING INSTRUMENTS 9

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV SEMICONDUCTOR DEVICES AND APPLICATIONS 9

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics

UNIT V DIGITAL ELECTRONICS 9

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts).

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	Sedha R.S	Applied Electronics	S. Chand & Co	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Muthusubramanian R, and Muraleedharan K A	Basic Electrical, Electronics and Computer Engineering	Tata McGraw Hill, Second Edition	2006
2	Nagsarkar T K and Sukhija M S	Basics of Electrical Engineering	Oxford press	2005
3	Mahmood Nahvi and Joseph A. Edminister	Electric Circuits	Schaum' Outline Series, McGraw Hill	2002
4	Premkumar N	Basic Electrical Engineering	Anuradha Publishers	2003

COURSE OBJECTIVES

1. To learn the basic concepts in physics relevant to different branches of Engineering and Technology.
2. To study the concept of semiconductor and conductivity.
3. To learn the properties of materials.
4. To understand the working of electromagnetic spectrum and spectroscopic techniques.
5. To understand the thermodynamic functions.
6. To comprehend the basic organic chemistry and to synthesis simple drug.

COURSE OUTCOMES

1. Understand the basic concepts in physics relevant to different branches of Engineering and Technology.
2. Understand the concept of semiconductor and conductivity.
3. Acquire knowledge on the properties of materials.
4. Understand the concept of various spectroscopic techniques.
5. Rationalize bulk properties and processes using thermodynamic considerations.
6. List major chemical reactions that are used in the synthesis of molecules.

LIST OF EXPERIMENTS**PHYSICS**

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of Chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Determination of molecular weight and degree of polymerization using viscometry.
6. Conductometric Titration (Simple acid base).
7. Conductometric Titration (Mixture of weak and strong acids).
8. Conductometric Titration using BaCl_2 vs Na_2SO_4 .
9. pH Titration (acid & base).
10. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Estimation of Ferric ion by spectrophotometry.
13. Determination of Chemical Oxygen Demand.

TOTAL**45 PERIODS**

COURSE OBJECTIVES

1. To prepare the students to design a system, component, or process.
2. To meet desired needs within realistic constraints such as economic, environmental, social, and ethical.
3. To make the component with health and safety, manufacturability, and sustainability
4. To prepare the students to communicate effectively and to use the techniques, and skills.
5. To make the students to use modern engineering tools necessary for engineering practice.
6. To make the students to assemble different components.

COURSE OUTCOMES

1. The students will gain knowledge of the different manufacturing processes.
2. To fabricate components using different materials.
3. Students will be able to fabricate components with their own hands.
4. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances
5. By assembling different components with different processes.
6. They will be able to produce small devices of their interest.

PART – A (CIVIL & MECHANICAL)

- | | | |
|-----------|--|----------|
| 1. | WELDING | 6 |
| | i. Preparation of arc welding of butt joints, lap joints and tee joints. | |
| 2. | BASIC MACHINING | 6 |
| | i. Simple Turning and Tap turning | |
| | ii. Drilling and Tapping | |
| 3. | SHEET METAL WORK | 6 |
| | i. Model making – Trays, funnels, etc. | |
| 4. | DEMONSTRATION | 4 |
| | i. Smithy operations | |
| | ii. Foundry operations | |
| | iii. Plumbing Works | |
| | iv. Carpentry Works | |

PART – B (ELECTRICAL & ELECTRONICS)

- | | | |
|-----------|---|-----------|
| 5. | ELECTRICAL ENGINEERING | 10 |
| | i. Study of electrical symbols and electrical equipments. | |
| | ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring. | |
| | iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energymeter. | |
| | iv. Measurement of electrical quantities – voltage, current, power & power factor in R load. | |
| | v. Measurement of energy using single phase energymeter. | |
| 6. | ELECTRONICS ENGINEERING | 13 |
| | i. Study of Electronic components – Resistor (color coding), capacitors and inductors. | |
| | ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB. | |
| | iii. Study of logic gates AND, OR, NOT, NOR and NAND. | |
| | iv. Study of HWR and FWR. | |

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jeyachandran, K. and Balasubramanian, S	A Premier on Engineering Practices Laboratory	Anuradha Publications, Kumbakonam	2007
2	Jeyapoovan, T., Saravanapandian, M	Engineering Practices Lab Manual	Vikas Puplishing House Pvt. Ltd, Chennai	2006
3	Bawa, H.S	Workshop Practice	Tata McGraw – Hill Publishing Company Limited, New Delhi	2007

COURSE OBJECTIVES

1. To make the students to design a system, component, or process to meet desired needs.
2. To prepare the students to design the components with realistic constraints.
3. To make the students to consider economic, environmental, ethical, health and safety when they design.
4. To make the students to design the components with considering manufacturability, and sustainability
5. To prepare the students to communicate effectively using the techniques, skills, and modern engineering tools.
6. To make the students to understand to use necessary for engineering practice.

COURSE OUTCOMES

The student will also learn:

1. Introduction to engineering design and its place in society
2. Exposure to the visual aspects of engineering design and engineering graphics standards
3. Exposure to engineering communication effectively.
4. Exposure to 3D free hand sketching.
5. Acquired the knowledge of projections of points, lines and plane surfaces.
6. Understand the basic concept of projection of solids.

UNIT I INTRODUCTION**3 + 10**

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES**3 + 10**

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale. Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING**3 + 12**

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES**3 + 12**

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS**3 + 12**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam)**0 + 4**

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL 15 + 60 = 75 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venugopal K and Prabhu Raja V	Engineering Graphics	New Age International Publishers	2007
2	VTU	A Primer on Computer Aided Engineering Drawing	Belgaum	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kumar M S	Engineering Graphics	D D Publications, Chennai	2007
2	Bureau of Indian Standards	Engineering Drawing Practices for Schools and Colleges SP 46-2003	BIS, New Delhi	2003
3	Luzadder W J	Fundamentals of Engineering Drawing	Prentice Hall Book Co., New York	1998

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawingsheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation –Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technicaldrawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of TechnicalDrawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – ProjectionMethods.

COURSE OBJECTIVES

1. To know the value of being a human being and the value of being a useful citizen
2. To develop a critical ability to distinguish between essence and form, or between what is of value and what is superficial, in life.
3. To move from discrimination to commitment.
4. To recognize and determine the role of engineers in the economic and social development of the society.
5. To develop social responsibility & human professional ethics.
6. To develop the knowledge of social impact of economic liberalization and technology.

COURSE OUTCOMES

1. Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
2. Identify the multiple ethical interests at stake in a real-world situation or practice
3. Articulate what makes a particular course of action ethically defensible Assess their own ethical values and the social context of problems
4. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
5. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
6. Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

UNIT I**4**

Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT II**4**

Self Development :Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT III**5**

Individual Qualities– Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism– Tolerance - Scientific Vision – Regulating Desire

UNIT IV**4**

Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT V**3**

Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings

TOTAL**20 PERIODS**

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S,	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

SEMESTER II

15BECC201

COMMUNICATIVE ENGLISH-II

3 0 0 3100

COURSE OBJECTIVES

1. To enable students to attain fluency and accuracy to inculcate proficiency in professional communication.
2. To make the students to meet the growing demand in the field of Global communication.
3. To help students acquire their ability to speak effectively in real life situations.
4. To inculcate the habit of reading and to develop their effective reading skills.
5. To ensure that students use dictionary to improve their active and passive vocabulary.
6. To enable students to improve their lexical, grammatical and communicative competence.

COURSE OUTCOMES

Students undergoing this course will be able to

1. Use English language for communication: verbal & non-verbal.
2. Enrich comprehension and acquisition of speaking & writing ability.
3. Ensure students proficiency in professional communication.
4. Developed their active and passive vocabulary.
5. Gain confidence in using English language in real life situations.
6. Improve word power: lexical, grammatical and communication competence.

UNIT I

10

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a Covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentence - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT II

8

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome Address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT III

9

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid Reading – Skimming, Scanning and Surveying. (SQ3R) **Writing**- Essay writing -Minutes of Meeting - Agenda – **Grammar** - Active and Passive voice - Purpose Expression. **Vocabulary** - Same words used as noun and verb - often misspelt and confused words.

UNIT IV

8

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non-verbal communication. **Reading** – Reading Comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job Application - Resume Writing - Checklist Preparation. **Grammar** - Numerical Expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns)

UNIT V

10

Listening – Types of Listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - voice, quality, volume, pitch etc., **Reading** -Note Making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation Writing – Short Essays Writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabulary with their meanings.

TOTAL 45 PERIODS

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sangeeta sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP	2015

SEMESTER II

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
2	Rutherford Andrea,J.	Basic Communication Skills for Technology 2 nd Edition	Pearson Education, New Delhi.	2006
3	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008

WEB REFERENCES

1. www.learnerstv.com
2. www.usingenglish.com
3. www.englishclub.com

COURSE OBJECTIVES

The objective of this course is

1. To familiarize the prospective engineers with techniques in Multivariate integration.
2. To familiarize the concept of ordinary and partial differential equations and complex variables.
3. To equip the students to deal with advanced level of mathematics and applications.
4. To make the students to formulate and solve problems involving random variables.
5. To equip the students to Understand the basic concepts of one- and two-dimensional random variables.
6. To understand the concept of testing of hypothesis for small and large samples in real life problems.

COURSE OUTCOME

The students will learn:

1. The mathematical tools needed in evaluating multiple integrals and their usage.
2. The effective mathematical tools for the solutions of differential equations that model physical processes.
3. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering Problems.
4. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
5. They can also formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data
6. Apply the concept of testing of hypothesis for small and large samples in real life problems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS**11**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II MULTIPLE INTEGRALS**11**

Double integral – Cartesian coordinates – Polar coordinates – Change of order of integration – Triple integration in Cartesian co-ordinates – Area as double integrals.

UNIT III VECTOR CALCULUS**13**

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem, Gauss divergence theorem and Stoke's theorems (Statement Only)- Surfaces : hemisphere and rectangular parallelepipeds.

UNIT IV ANALYTIC FUNCTIONS**12**

Analytic functions - Cauchy-Riemann equations in Cartesian and polar forms – Sufficient condition for an analytic function (Statement Only) - Properties of analytic functions – Constructions of an analytic function - Conformal mapping: $w = z+a$, az , $1/z$, z^2 and bilinear transformation.

UNIT V COMPLEX INTEGRATION**13**

Complex Integration - Cauchy's integral theorem and integral formula (Statement Only) – Taylor series and Laurent series - Residues – Cauchy's residue theorem (Statement Only) - Applications of Residue theorem to evaluate real integrals around unit circle and semi circle (excluding poles on the real axis).

TOTAL 60 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi	2014
2	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2011
2	Venkataraman, M. K.	Engineering Mathematics.	The National Publishing Company, Chennai	2005
3	Narayanan. S, and Ramaniah.G	Advanced Mathematics for Engineering Students.	Viswanathan S.(Printers and Publishers) Pvt. Ltd. Chennai.	2002
4	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2009

WEB REFERENCES

1. www.efunda.com
2. www.mathcentre.ac.uk
3. www.sosmath.com/diffeq/laplace/basic/basic.html
4. www.mathworld.wolfram.com

COURSE OBJECTIVES

1. To impart knowledge on metallurgical aspects of metals.
2. To understand heat treatment processes on different grades of steel.
3. To familiarize on selection of ferrous and non-ferrous materials for various applications.
4. To impart knowledge on non-metallic materials.
5. To learn about the strengthening mechanisms for Non-ferrous alloys.
6. To comprehend the significance of Non Destructive Testing (NDT) methods.

COURSE OUTCOMES

Learners should be able to

1. Identify the metallurgical aspects of metals.
2. Identify suitable heat treatment processes for various applications.
3. Select appropriate ferrous and non-ferrous materials for various applications.
4. Identify and select suitable non-metallic materials.
5. Identify suitable strengthening mechanisms for Non-ferrous alloys.
6. Work with non destructive testing methods.

UNIT I CONDUCTING MATERIALS**9**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Drawbacks of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS**9**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS**9**

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications. Superconductivity : properties - Types of super conductors – BCS theory of superconductivity (Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS**9**

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Clausius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS**9**

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application. Composite materials, Aircraft materials and non-metallic materials. Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2015

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley and Sons Inc., , New York,	2013
2	James F Shackelford	Introduction to materials Science for Engineers	Macmillan Publication Company, New York	2014
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	2005

WEB REFERENCES

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

COURSE OBJECTIVES

1. To create the awareness about environmental problems among people.
2. To develop an attitude of concern for the environment.
3. To motivate public to participate in environment protection and improvement.
4. To demonstrate proficiency in quantitative methods, qualitative analysis, and critical thinking.
5. To develop writing and oral communication needed to conduct high-level work as interdisciplinary scholars and / or practitioners.
6. To Learn about the systems concepts and methodologies to analyze and understand interactions.

COURSE OUTCOME

1. Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
6. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources- Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM 9

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, food web and ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY 9

Introduction to biodiversity, Definition- Genetic diversity, Species diversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity - Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION 9

Definition – Causes, effects and control Measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management- Causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management:-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT 9

From unsustainable to Sustainable development, Urban problems related to energy sources, water conservation, Rain water harvesting and watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and global warming, acid rain, ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights-Value Education, Role of Information Technology in Environment and human health-Population growth, variation of population among nations-Population explosion.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2	Anubhakaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (p) Ltd., New Delhi.	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Limited, New Delhi.	2005
2	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004

WEB REFERENCES

1. <http://people.eku.edu/ritchisong/envscinotes1.html>
2. <http://nptel.ac.in/courses.php?disciplineId=1203>.www.newagepublishers.com/samplechapter/001281.
3. www.unesco.org/ext/field/beijing/scienceb.htm,
4. www.infinitepower.org/education.htm

COURSE OBJECTIVES

1. To know about different materials and their properties
2. To know about engineering aspects related to buildings
3. To know about importance of surveying and the transportation systems
4. To get exposed to the rudiments of engineering related to dams, water supply, and sewage disposal
5. To know about importance of drawings
6. To know about importance of electrical fittings.

COURSE OUTCOMES

1. Students are able to understand the property, use, advantage and disadvantage of different material used in construction
2. Students are able to understand the component of building with their function
3. Students are able to understand construction procedure of different components
4. After completion of this students will be able to understand basic principles of building design and planning.
5. They will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings.
6. Students will identify suitable method of irrigation and drainage of waterlogged area.

UNIT I BUILDING MATERIALS**9**

Introduction – Civil Engineering – Materials: Bricks – composition – classifications – properties – uses. Stone – classification of rocks – quarrying – dressing – properties – uses. Timber – properties – uses – ply wood. Cement – grades – types – properties – uses. Steel – types – properties – uses – market forms. Concrete – grade – properties – uses.

UNIT II BUILDING COMPONENTS**9**

Building – selection of site – classification – components. Foundations – functions – classifications – bearing capacity. Flooring – requirements – types – cement concrete – marble – terrazzo floorings. Roof – types and requirements.

UNIT III SURVEYING**9**

Surveying – objectives – classification – principles of survey – survey instruments, their care and adjustments – Ranging and Chaining. Compass – types – Prismatic Compass. Bearing – types. Levelling – Levels and staves – types. Contouring

UNIT IV WATER SUPPLY AND SEWAGE DISPOSAL**9**

Dams – purpose – selection of site – types – gravity dam (cross section only). Water supply – objective – quantity of water – sources – standards of drinking water – distribution system. Sewage – classification – septic tank – components and functions.

UNIT V BUILDING DRAWING**9**

Types of drawing with appropriate scale & Uses of index map, key plan, village map, site plan, Layout plan – Types of Projection adopted in Building Drawing – Scales for various types of Drawings – Working drawing, large scale drawing – Symbols, Conventions and Abbreviations for – Electrical fittings, water supply, sanitary fittings, materials of construction – Sizes of various standard papers.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Raju K.V.B, Ravichandran P.T	Basics of Civil Engineering	Ayyappa Publications, Chennai	2012
2	V. B. Sikka	Civil engineering drawing	B. D. Kataria Sons, Ludhiana	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Civil Engineering	Ramesh Babu	VRB Publishers, Chennai	2010
2	-	Building Materials	National Building Code of India, Part V	2005
3	Engineering Materials	Rangwala S.C	Charotar Publishing House, Anand	2012

COURSE OBJECTIVES

1. Identify and understand the working of key components of a computer program.
2. Identify and understand the various kinds of keywords and different data types of C programming
3. Understand, analyze and implement software development tools like algorithm,
4. pseudo codes and programming structure
5. Study, analyze and understand logical structure of a computer program, and different construct to develop a program in "C" language
6. Programming to solve matrix addition and multiplication problems and searching and sorting problems.

COURSE OUTCOMES

The course will enable the students

1. To formulate simple algorithms for arithmetic and logical problems
2. To translate the algorithms to programs (in C language)
3. To test and execute the programs and correct syntax and logical errors
4. To implement conditional branching, iteration and recursion
5. To decompose a problem into functions and synthesize a complete program using divide and conquer approach
6. To use arrays, pointers and structures to formulate algorithms and programs

UNIT I OVERVIEW OF COMPUTER**8**

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types- Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II OVERVIEW OF 'C'**8**

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators-Hierarchy and associativity

UNIT III SELECTION AND ITERATION**9**

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop- break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV FUNCTIONS**10**

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V ARRAYS AND STRINGS**10**

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays- Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Character

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E. Balagurusamy	Computing Fundamentals and C Programming	TMH Education	2014
2	Yashavant Kanetkar	Let us C	BPB Publications	2013
3	H. M. Deitel and D. J. Deitel	C: How to Program'	Prentice Hall	2012
4	E. Balagurusamy	Programming in ANSI C	TMH Education	2012

COURSE OBJECTIVES

1. To provide an awareness to Computing and C Programming
2. To know the correct and efficient ways of solving problems
3. To learn to develop algorithm for simple problem solving.
4. To Study, analyze and understand logical structure of a computer program
5. To be able to declare pointers of different types and use the mind defining self-referential structures.
6. To be able to create, read and write to and from simple textfiles.

COURSE OUTCOMES

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at runtime
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program

LIST OF EXPERIMENTS

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and funct

TOTAL 45 PERIODS

COURSE OBJECTIVES

1. To prepare the students to make section of solids like Prism, Cylinder, and Pyramid.
2. To prepare true shape of section.
3. To gain the knowledge on lateral surfaces.
4. To acquire the knowledge about development of surfaces like Prisms, pyramids, cylinders and cones.
5. To gain the knowledge on 2D drawing using CAD software.
6. To acquire the knowledge on basics of 3D modeling packages.

COURSE OUTCOMES

1. The students to draw section of solids like Prism, Cylinder, and Pyramid.
2. Students can prepare true shape of section.
3. Students gain the knowledge on lateral surfaces.
4. Students acquire the knowledge about development of surfaces like Prisms, pyramids, cylinders and cones.
5. Students gain the knowledge on 2D drawing using CAD software.
6. Students acquire the knowledge on basics of 3D modeling packages.

UNIT I SECTION OF SOLIDS**3 + 12**

Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

UNIT II DEVELOPMENT OF SURFACES**3 + 12**

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT III ISOMETRIC PROJECTIONS**3 + 12**

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones.

UNIT IV PERSPECTIVE PROJECTIONS**3 + 12**

Perspective projection of prisms, pyramids, cylinders and cone by visual ray method and vanishing point method.

UNIT V COMPUTER GRAPHICS**3 + 12**

Introduction to 3D modeling packages. Drafting practices - modeling of simple engineering components, sections and extraction of 2D drawings.

TOTAL 15 + 60 = 75 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venugopal K and Prabhu Raja V	Engineering Graphics	New Age International Publishers	2007
2	VTU	A Primer on Computer Aided Engineering Drawing	Belgaum	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kumar M S	Engineering Graphics	D D Publications, Chennai	2007
2	Bureau of Indian Standards	Engineering Drawing Practices for Schools and Colleges SP 46-2003	BIS, New Delhi	2003
3	Luzadder W J	Fundamentals of Engineering Drawing	Prentice Hall Book Co., New York	1998

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawingsheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation –Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

COURSE OBJECTIVES

1. To understand the basics of biology
2. To gain knowledge about different biomolecules
3. To get familiarize with human diseases.
4. To learn about DNA & RNA.
5. To learn about different clinical investigations
6. To know the recent advances in biology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non-communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the concept of biomechanics

UNIT I BASICS OF CELL BIOLOGY

4

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT II BIOMOLECULES

4

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins-classification and functions; Nucleic acids-basic structure; Hormones-definition, importance; Vitamins.

UNIT III HUMAN ANATOMY AND PHYSIOLOGY

5

Levels of Structural organization, the eleven systems of human body, central nervous system- cardiovascular system and immune system.

UNIT IV GENETICS AND GENETIC DISORDERS

4

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information- gene mutation, disorders due to mutant genes.

UNIT V TECHNOLOGICAL ADVANCES IN BIOLOGY

3

Biopharmaceuticals, Gene therapy, genetically modified crops, probiotics.

TOTAL**20 PERIODS****TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Verma, P. S., Agarwal, V. K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S. Chand & Company Ltd.,	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nelson, D. L. and Cox, M. M	Lehninger Principles of Biochemistry	Freeman, W. H. & Company	2004
2	Tortora, G. J., Derrickson, B	Principles of Anatomy and Physiology,	John Wiley & Sons	2006

WEB REFERENCE

1. <http://www.biotechnonweb.com/Application-of-biotech-in-Medical.html>

SEMESTER III**15BEME301****METHODS OF APPLIED MATHEMATICS****3 2 0 4100****COURSE OBJECTIVES**

1. To introduce the basic concepts of PDE for solving standard partial differential equations
2. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
3. To provide an overview of probability and statistics to engineers
4. To introduce the basic concepts of two-dimensional random variables
5. To acquaint the knowledge of testing of hypothesis for small and large samples.
6. To apply testing of hypothesis in important role in real life problems.

COURSE OUTCOMES

After successfully completing the course, the student will have a good understanding of the following topics and their applications

1. The fundamental concepts of partial differential equations and the various solution procedures for solving the first order non-linear partial differential equations.
2. Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations.
3. Understand the basic concepts of one knowledge of the concepts of probability and have knowledge of standard distribution which can describe real life phenomenon.
4. Understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
5. They can also formulate and solve problems involving random variables and apply statistical methods for analyzing experimental data
6. Apply the concept of testing of hypothesis for small and large samples in real life problems

UNIT I LAPLACE TRANSFORM**13**

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems. Inverse Laplace transforms – Convolution theorem (statement only) – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions

UNIT II FOURIER SERIES**12**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT III FOURIER TRANSFORM**12**

Fourier integral theorem (Statement Only) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity – Relation between Fourier and Laplace transforms

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**12**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded)

UNIT V Z-TRANSFORM AND DIFFERENCE EQUATIONS**11**

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

TOTAL 60 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	John Wiley & Sons. Singapore	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd.	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEB REFERENCE

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx>

COURSE OBJECTIVES

1. To develop capacity to predict the effect of force and motion.
2. To understand the importance of free body diagram for complex machine structure.
3. To perform force analysis using law of mechanics.
4. To introduce the concepts of static equilibrium condition for particles and rigid bodies
5. To Understand the concepts of kinematics of particles and friction.
6. To make the students conversant to solve the problems using equation of motions.

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand the basic concepts of force and laws of mechanics.
2. Develop free body diagram for complex machine structure and to perform force analysis.
3. Apply static equilibrium condition for particles and rigid bodies.
4. Locate the center of gravity and moment of inertia for planes and solids.
5. Understand the concepts of kinematics of particles and friction.
6. Solve the problems using equation of motions.

UNIT I STATICS OF PARTICLES**9 +3**

Forces – system of forces – concurrent forces in plane and space– resultant – problems involving the equilibrium of a particle–free body diagram–equilibrium of particle in space.

UNIT II STATICS OF RIGID BODIES IN TWO DIMENSIONS**9 +3**

Rigid bodies–moment of force about an axis–moments and couples–equivalent system of coplanar forces–
Rigid body in equilibrium–problems involving equilibrium of rigid body–types of supports–reactions of beams.

UNIT III CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA**9 +3**

Centroids of areas, composite areas, determination of moment of inertia of plane figures, polar moment of inertia – radius of gyration – mass moment of inertia of simple solids.

UNIT IV KINEMATICS OF PARTICLES**9 +3**

Introduction – plane, rectilinear motion – time dependent motion – rectangular coordinates – projectile motion.

IMPULSE AND MOMENTUM: Concept of conservation of momentum – Impulse–Momentum principle– Impact – Direct central impact – Oblique central impact – Impact of elastic bodies.

UNIT V KINETICS OF PARTICLES AND FRICTION**9 +3**

KINETICS OF PARTICLES: Equations of motion–rectilinear motion–Newton's II law – D'Alembert's principle – Energy – potential energy–kinetic energy–conservation of energy–work done by a force – work energy method.

Laws of friction – coefficient of friction–problems involving dry friction – wedge and ladder friction.

TOTAL 45 + 15 = 60 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Beer F P and Johnson E.R	Vector Mechanics for Engineers– Statics and Dynamics	Tata Mc–Graw Hill Publishing Co. Ltd., New Delhi	2012
2	Rajasekaran.S and Sankarasubramanian G	Engineering Mechanics–Statics and Dynamics	Vikas Publishing House Pvt. Ltd., New Delhi	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Bansal R K	Engineering Mechanics	Laxmi Publications Pvt. Ltd., New Delhi	2006
2	Young D H and Timoshenko S	Engineering Mechanics	Tata McGraw–Hill, New Delhi	2006
3	JivanKhachane and Ruchi Shrivastava	Engineering Mechanics: Statics and Dynamics	ANE Books, New Delhi	2006

WEB REFERENCES

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_mechanics/index.htm
2. <http://nptel.iitm.ac.in/video.php?subjectId=112103108>
3. <http://web.mit.edu/emech/dontindex-build/index.html>
4. <http://www.indiabix.com/engineering-mechanics/questions-and-answers/>

COURSE OBJECTIVE

1. To familiarize the students to apply suitable molding and casting methods for producing components.
2. To develop an understanding of types of metal joining processes.
3. To explain types of deformation processes.
4. To understand the concept of sheet metal operations and metal forming processes.
5. To provide an overview of various plastic component manufacturing processes for various applications.
6. To Study and acquire knowledge of process variables to manufacture defect free products.

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Apply suitable molding and casting methods for producing components.
2. Decide the type of metal joining processes.
3. Select the type of deformation processes.
4. Work with various sheet metal operations and metal forming processes.
5. Select the various plastic component manufacturing processes for various applications.
6. Identify the effect of process variables to manufacture defect free products.

UNIT I METALCASTING PROCESSES**9**

Introduction to Sand casting – Sand moulds – Type of patterns – Pattern materials – Pattern allowances – Types of Moulding sand – Properties – Core making – Types – CO₂ process - Moulding machines – Types of moulding machines – Types of melting furnaces (cupola, induction) – Working principle of Special casting processes – Shell moulding, Investment casting, Pressure die casting, Centrifugal casting – Casting defects – Inspection methods.

UNIT II JOINING PROCESSES**9**

Fusion welding processes – Types of Gas welding – Equipments used – Flame characteristics – Filler and Flux materials and properties – Arc welding equipments – Electrodes – Coating and specifications – Principles of Resistance welding – Gas metal arc welding – Submerged arc welding – TIG, MIG welding – Friction Stir Welding – Weld defects – Brazing and soldering process.

UNIT III BULK DEFORMATION PROCESSES**9**

Hot working and cold working of metals – Ingots – Forging processes – Open, impression and closed die forging – Types of Forging Machines – Rolling of metals – Types of Rolling mills – Defects in rolled parts – Principle of rod and wire drawing – Tube drawing – Principles of Extrusion – Types of Extrusion – Hot and Cold extrusion – Equipments used.

UNIT IV SHEET METAL PROCESSES**9**

Sheet metal characteristics – Press – Types of press – Principle of punching, blanking, coining, piercing, notching, embossing – Typical shearing operations, bending, drawing and deep drawing operations – Metal spinning, Stretch forming operations – Formability of sheet metal – Test methods.

UNIT V MANUFACTURING OF PLASTIC COMPONENTS**9**

Types of plastics – Characteristics of the forming and shaping processes – Moulding of Thermoplastics – Working principles and typical applications of – Injection moulding – Plunger and screw machines – Compression moulding, Transfer moulding – Typical industrial applications – Introduction to Blow moulding – Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of Thermoplastics.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serope Kalpajian, Steven R. Schmid	Manufacturing Engineering and Technology (Second Indian Reprint)	Pearson Education, Inc., New Delhi	2002
2	S. Gowri, P. Hariharan, and A. Suresh Babu	Manufacturing Technology 1	Pearson Education, Inc., New Delhi	2008

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	P.N. Rao	Manufacturing Technology Second Edition	Tata McGraw–Hill Publishing Limited, New Delhi	2013
2	P.C. Sharma	A text book of production technology Fourth Edition	S. Chand and Company, New Delhi	2007
3	Begman	Manufacturing Process Eighth Edition	John Wiley and Sons	2005

WEB REFERENCES

1. www.themetalcasting.com
2. www.industrialmetalcastings.com
3. www.purolator-lp.com
4. www.manufacturercompanies.com/manufacturers

COURSE OBJECTIVES

1. To enrich the understanding of fluid properties
2. To make the students conversant with types of flow and calculate Major and minor losses in pipes.
3. To acquaint the student with the concepts of Buckingham's π theorem.
4. To explain the working of different pumps
5. To explain the working of different turbines.
6. To equip students with skills to produce analytical solutions to various simple problems

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Demonstrate basic knowledge of fluid properties
2. Find types of flow and calculate Major and minor losses in pipes.
3. Apply Buckingham's π theorem for problem solving.
4. Understand the working of different pumps
5. Understand the working of different turbines.
6. produce analytical solutions to various simple problems

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS**9 +3**

Fluid properties: Mass density, weight density, specific gravity, viscosity, compressibility, surface tension and capillarity. Buoyancy and floatation – metacentre and metacentric height (definition only)

Flow characteristics: concepts of system and control volume, application of control volume to continuity equation, energy equation, momentum equation and moment of momentum equation.

UNIT II FLOW THROUGH CIRCULAR PIPES**9 +3**

Hydraulic and energy gradient – Types of fluid flow – Laminar flow through circular conduits – Boundary layer concepts – types of boundary layer thickness – Darcy Weisbach equation – friction factor – Moody diagram – commercial pipes – minor losses – Flow through pipes in series and parallel.

UNIT III DIMENSIONAL ANALYSIS**9 +3**

Dimension and units, dimensional homogeneity, applications of Buckingham's π theorem, model and similitude, similarity laws.

UNIT IV HYDRAULIC TURBINES**9 +3**

Classification of turbines – heads and efficiencies – velocity triangles. Axial, radial and mixed flow turbines. Pelton wheel, Francis turbine and Kaplan turbines- working principles - work done by water on the runner – draft tube. Specific speed - unit quantities – performance curves for turbines – governing of turbines.

UNIT V HYDRAULIC PUMPS**9 +3**

Classification of pumps – centrifugal pump – working principle – head, discharge, efficiencies and losses – performance curves – specific speed. Reciprocating pump – components and working – slip – indicator diagram – air vessel – Jet pump – Gear pump – Submersible pump.

TOTAL 45 + 15 = 60 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Streeter V.L, Wylie E.B	Fluid Mechanics	McGraw-Hill, New Delhi	1998
2	Kumar K.L	Engineering Fluid Mechanics	S. Chand	2004

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Bansal. R.K	Fluid Mechanics and Hydraulics Machines	Laxmi publications (P) Ltd, New Delhi	2005
2	White. F.M	Fluid Mechanics	Tata McGraw–Hill, New Delhi	2008
3	Fox and McDonald	Fluid Mechanics	John Wiley	2006

WEB REFERENCES

1. www.imeche.org
2. openlibrary.org
3. nptel.iitg.ernet.in
4. www.tecquipment.com

COURSE OBJECTIVES

1. To understand the basic concepts of different types of electrical machines and their performance.
2. To study the different methods of starting D.C motors and induction motors.
3. To study the conventional and solid-state drives
4. To expose students to the operation, application and control of power conversion systems employing electric drive to cater to industrial needs.
5. To familiarize the operation principles, and design of starting, braking, and speed control arrangements for electric motors and their applications.
6. To provide strong foundation to assess performance of different industrial drives considering issues such as, energy efficiency, power quality, economic justification, environmental issues, and practical viabilities.

COURSE OUTCOMES

1. Examine various applications in industrial and domestic areas where use of electric drives is essential.
2. Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability.
3. Combine concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of automations in industries.
4. Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power.
5. Identify the critical areas in application levels, and derive typical solutions.
6. Design and justify new control and power conversion schemes for implementing alternative solutions considering the critical and contemporary issues.

UNIT I INTRODUCTION**9**

Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors. Multi quadrant operation.

UNIT II DRIVEMOTOR CHARACTERISTICS**9**

Mechanical and electrical characteristics of various types of load and drive motors – Braking of Electrical motors – DC Shunt, series Motors – Three phase induction motors.

UNIT III STARTING METHODS**9**

Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

UNIT IV SPEED CONTROL OF D.C. DRIVES**9**

Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system – Using controlled rectifiers and DC choppers – applications.

UNIT V SPEED CONTROL OF A.C. DRIVES**9**

Speed control of three phase induction motor – Voltage control, voltage / frequency control, Rotor resistance control – slip power recovery scheme – Using inverters, Cyclo converter and AC voltage regulators – static slip power recovery schemes – applications.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Vedam Subramaniam	Electric Drives (concepts and applications)	Tata McGraw-Hill, New Delhi.	2001
2	Nagrath I.J. and Kothari D.P,	Electrical Machines	Tata McGraw- Hill, New Delhi	2004

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pillai.S.K,	A first course on Electric drives	Wiley Eastern Limited, New Delhi.	1998.
2	Singh M.D and Khanchandani K.B,	Power Electronics	Tata McGraw-Hill, New Delhi.	2003
3.	Gopal K.Dubey	Fundamentals of Electrical drives	Narosa Publishing House	2003

COURSE OBJECTIVE

1. To supplement the theoretical knowledge gained in Fluid Mechanics and Machinery with practical testing
2. To understand the concepts of coefficient of discharge for Orifice meter and Venturi meter.
3. To explain the Calibration of Rotameter.
4. To understand the importance of friction factor for flow through pipes.
5. To impart knowledge on the performance of various pumps.
6. To impart knowledge on the performance of turbines.

COURSE OUTCOMES

1. Calculate the coefficient of discharge for Orifice meter and Venturimeter.
2. Calibrate the Rotameter
3. Estimate the friction factor for flow through pipes.
4. Asses the performance of centrifugal pump and submergible pump.
5. Asses the performance of reciprocating pump and gear pump.
6. Asses the performance of turbines.

LIST OF EXPERIMENTS

1. Determination of the Coefficient of discharge of given Orificemeter.
2. Determination of the Coefficient of discharge of givenVenturimeter.
3. Calculation of the rate of flow using Rotameter.
4. Determination of friction factor for a given set ofpipes.
5. Conducting experiments and drawing the characteristic curves of centrifugalpump
6. Conducting experiments and drawing the characteristic curves of submersiblepump.
7. Conducting experiments and drawing the characteristic curves of reciprocatingpump.
8. Conducting experiments and drawing the characteristic curves of Gearpump.
9. Conducting experiments and drawing the characteristic curves of Peltonwheel.
10. Conducting experiments and drawing the characteristics curves of Francisturbine.

TOTAL 45PERIODS

COURSE OBJECTIVES:

1. To explain the surfaces for sheet metal working applications.
2. To Understand the representation of details in machine drawing.
3. To introduce tolerances and fits of machine elements.
4. To equip them with skills to Construct an assembly drawing using part drawings of machine components.
5. To equip them with skills to Construct an assembly drawing of machine components using 2D drafting.
6. To equip them with skills to develop employability.

COURSE OUTCOMES:

Learners should be able to

1. Express the importance of machine drawing and GD&T.
2. Interpret drawings of machine components.
3. Create assembled machine drawings.
4. Make part drawings from an assembly drawing.
5. Interpret the details of complex parts in cross section views.
6. Sketch production drawing from assembly drawing.

INTRODUCTION

3

Introduction to machine drawing. Importance of sectional views. Computer-aided drafting.

CONVENTIONS

6

Code of practice for engineering drawing-conventional representation of details- drilled and tapped holes, countersunk and counter bored holes, internal and external threads, undercuts, grooves, chamfers, fillet radii and keyways. Conventions to represent standard components-bolts, nuts, washers, screws, cotters, pins, circlips, bearings, gears, springs and flanges.

FITS AND TOLERANCES

6

Limits, fits and tolerances-need, types, representation of tolerances on drawing, calculation of minimum and maximum clearances and allowances. Geometric tolerance-uses, types of form and position tolerances, symbols, method of indicating geometric tolerances on part drawings. Surface finish symbols- methods of indicating the surface roughness. Blue print reading exercises.

ASSEMBLY DRAWING PRACTICE

15

Making free hand sketches of typical subassemblies-flange coupling, stuffing box, journal bearings, rolling element bearings, keyed joints, cotter joints, C clamp.

ASSEMBLY USING 2D DRAFTING

15

Assembly drawing with sectioning and bill of materials from given detailed drawings of assemblies: Lathe Tail stock, Machine vice, Pedestal bearing and Drill jigs and Milling fixture.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gopalakrishna K R	Machine Drawing	Subhas Stores, Bangalore	2003
2	Bhatt N. D and Panchal V.M	Machine Drawing	Charotar Publishing House, Chennai	2007
3	ASME Y 14.5M-1994	Dimensioning and Tolerancing	ASME, New York	1995

COURSE OBJECTIVES

1. To understand the basic concepts of different types of electrical machines and their performance.
2. To study the different methods of starting D.C motors and induction motors.
3. To study the conventional and solid-state drives
4. To expose students to the operation, application and control of power conversion systems employing electric drive to cater to industrial needs.
5. To familiarize the operation principles, and design of starting, braking, and speed control arrangements for electric motors and their applications.
6. To provide strong foundation to assess performance of different industrial drives considering issues such as, energy efficiency, power quality, economic justification, environmental issues, and practical viabilities.

COURSE OUTCOMES

1. Examine various applications in industrial and domestic areas where use of electric drives is essential.
2. Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability.
3. Combine concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of automations in industries.
4. Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power.
5. Identify the critical areas in application levels, and derive typical solutions.
6. Design and justify new control and power conversion schemes for implementing alternative solutions considering the critical and contemporary issues.

LIST OF EXPERIMENTS

1. Load Test on DC Shunt Motor
2. Load Test on DC Series Motor
3. Load Test on DC Compound Motor
4. Speed control of D.C. motor. (Armature and Field control)
5. Speed control of D.C. motor. (Ward–Leonard Method)
6. Speed control of three phase Induction motor. (Voltage Control)
7. Speed control of three phase Induction motor. (Voltage / frequency Control)
8. Load test on single phase Induction Motor.
9. Load test on three phase Induction Motor.
10. Speed control of three phase slip ring Induction Motor.

TOTAL 45 PERIODS

COURSE OBJECTIVES

1. To understand the basic concepts of QUANTITATIVE ABILITY
2. To understand the basic concepts of LOGICAL REASONING Skills
3. To acquire satisfactory competency in use of VERBAL REASONING
4. To solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
5. To solve off-campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
6. To compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

COURSE OUTCOMES

1. Understand the basic concepts of QUANTITATIVE ABILITY
2. Understand the basic concepts of LOGICAL REASONING Skills
3. Acquire satisfactory competency in use of VERBAL REASONING
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
5. Solve off-campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability.
6. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT I**6**

Introduction, Speed Math's, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT II**6**

Percentage, Data Interpretation, Profit and loss, Simple and Compound Interest

UNIT III**8**

Time Speed and Distance, Time and Work, Pipes and Cistern, Geometry, Probability, Permutation and Combination

TOTAL 20PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Agarwal.R.S	Quantitative Aptitude for Competitive Examinations	S.Chand Limited	2011
2	Abhijit Guha	Quantitative Aptitude for Competitive Examinations	Tata McGraw Hill	2011
3	Edgar Thrope	Test Of Reasoning for Competitive Examinations	Tata McGraw Hill, 4th Edition	2012

SEMESTER IV

15BEME401

STRENGTH OF MATERIALS

3 2 0 4100

COURSE OBJECTIVES

1. To understand the concepts of stress and strain on deformation of solids.
2. To introduce the Concepts of safe working stresses and load carrying capacity of beams.
3. To enrich the understanding of deflection in beams and columns in engineering applications.
4. To understand the importance of the effect of torsion on shafts and springs.
5. To provide knowledge on principal stresses and analyze thin cylinders and shells subjected to pressure forces.
6. To provide knowledge on components subjected to various loadings with the help of various theories of failures.

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Determine stress and strain on deformation of solids.
2. Compute safe working stresses and load carrying capacity of beams.
3. Estimate the deflection in beams and columns in engineering applications.
4. Analyze the effect of torsion on shafts and springs.
5. Determine principal stresses and analyze thin cylinders and shells subjected to pressure forces.
6. Design the components subjected to various loadings with the help of various theories of failures.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

9 + 3

Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

UNIT II BEAMS – LOADS AND STRESSES

9 + 3

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Relationship between load, shear force and bending moment – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow.

UNIT III BEAM DEFLECTION

9 + 3

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope: Macaulay Method – Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankine's formula for columns

UNIT IV TORSION

9 + 3

Analysis of torsion of circular bars – Torsional Shear stress – Bars of solid and hollow circular section – Stepped shaft – Torsional rigidity – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

UNIT V ANALYSIS OF STRESSES IN TWO DIMENSIONS

9 + 3

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr's circle for biaxial stresses – Maximum shear stress – Strain energy in bending and torsion.

TOTAL 45 + 15 = 60 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Punmia B.C and Jain A.K	Strength of Materials and Theory of Structures – Vol.1	Laxmi Publications New Delhi	1992
2	Ramamrutham S and Narayan R	Strength of Materials	Dhanpat Rai and Sons., New Delhi	2008

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jindal U C	Textbook on Strength of Materials	Asian Books Pvt, Ltd, Chennai	2007
2	Don H Morris, and Leroy D Sturges	Mechanics of Materials	John Wiley and Sons Inc	2001
3.	Bedi D S	Strength of Materials	S Chand and Co. Ltd., New Delhi	1984

WEB REFERENCES

1. www.engineersedge.com
2. <http://en.wikiversity.org>
3. www.globalsources.com
4. www.dspspace.cusat.ac.in

COURSE OBJECTIVE

1. To Explain the mechanics of metal cutting, cutting tool materials, tool wear and cutting fluids.
2. To understand the concept of constructional features of different types of lathe and their operations.
3. To provide knowledge on construction & working of shaping, milling & drilling machines and gear cutting & finishing process.
4. To expose students to various types of grinding machines and broaching machines.
5. To Explain the construction features of different types of CNC machine and manual part programming for a given component.
6. To Perform part programming for CNC machines.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Explain the mechanics of metal cutting, cutting tool materials, tool wear and cutting fluids.
2. Discuss about the constructional feature of different types of lathe and their operations.
3. Describe the construction & working of shaping, milling & drilling machines and gear cutting & finishing process.
4. Illustrate the various types of grinding machines and broaching machines.
5. Explain the construction feature of different types of CNC machine and manual part programming for a given component.
6. Perform part programming for CNC machines.

UNIT I THEORY OF METAL CUTTING AND CUTTING TOOLS**9**

Introduction: material removal processes, types of machine tools – theory of metal cutting: chip formation, orthogonal cutting, oblique cutting – Cutting tool materials, tool wear, tool life, surface finish, cutting fluids, heat generation, Merchant circle.

UNIT II CENTRE LATHE AND SEMIAUTOMATIC LATHES**9**

Centre lathe– constructional features, various operations, taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes – automats – single spindle, Swiss type, automatic screw type, multi spindle – Tool layout for Capstan, Turret and Automats.

UNIT III RECIPROCATING MACHINE TOOLS & MILLING MACHINES**9**

Shaper – construction, working, work and tool holding device, quick return mechanism, planer – construction, working, mechanism, operations. **Slotter – construction, working.**

Milling machine – constructions, types, Indexing mechanism, operations, milling cutter, gear hobbing – principle.

UNIT IV OTHER MACHINE TOOLS**9**

Drilling – types, radial drilling machine, construction, operations, Boring, types, Jig boring machine – construction, operations, Broaching – types, construction, **Grinding – grinding wheel, specifications and selection, cylindrical grinding, surface grinding, centreless grinding – honing, lapping, super finishing, polishing and buffing.**

UNIT V CNC MACHINES**9**

CNC Machines – Construction – Types of control systems, Manual Part Programming – Computer assisted part programming – Computer aided part programming, Machining centers – principle, Turning centers – principle, CAD/CAM & Integration, Application of CNC Machines.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hajra Choudhury	Elements of Workshop Technology Vol– II	Media Promotors Pvt Ltd., Mumbai	2002
2	HMT	Production Technology	Tata McGraw–Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	P.C. Sharma	A text book of production technology	S. Chand and Co. Ltd	2008
2	Shrawat N.S. and Narang J.S	CNC Machines	Dhanpat Rai and Co	2002
3.	P.N.Rao	CAD/CAM Principles and Applications'	TATA Mc Craw Hill	2011
4	Milton C.Shaw	Metal Cutting Principles Second Edition	Oxford University Press	2005

WEB REFERENCES

1. www.steelonline.co.in
2. <http://mmu.ic.polyu.edu.hk>
3. www.waterjetindiana.com
4. www.teskolaser.com
5. www.cncinformation.com
6. www.cncmachineprogramming.net

COURSE OBJECTIVES

1. To understand the Model of physical systems into relevant thermodynamic system and apply energy balance equation for closed and open system.
2. To provide knowledge on entropy change in thermodynamic processes.
3. To Study and acquire knowledge on various thermodynamic properties of pure substances in real time problems.
4. To establish the basic thermodynamic relations and properties of ideal and real gases for physical systems.
5. To facilitate the understanding of properties of air using psychometric chart.
6. To acquaint the student with the concepts and applications of the thermodynamics to the various real-life systems.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Model the physical systems into relevant thermodynamic system and apply energy balance equation for closed and open system.
2. Determine entropy change in thermodynamic processes.
3. Identify the various thermodynamic properties of pure substances in real time problems.
4. Establish the basic thermodynamic relations and properties of ideal and real gases for physical systems.
5. Calculate the properties of air using psychometric chart.
6. Explain the basic principles and applications of the thermodynamics to the various real life systems..

UNIT I BASIC CONCEPTS AND FIRST LAW**9 + 3**

Basic concepts - Classical and Statistical approaches - Thermodynamic systems - closed, open, isolated. Property – State - Process-adiabatic - Quasi-static process – Cycle - Point and Path function – Energy - Work transfer - Concept of temperature and heat- Zeroth law of thermodynamics - Concept of ideal gases - First law of thermodynamics –PMM1, internal energy, specific heat capacities, enthalpy, and its application to closed system and open system-steady flow energy equation.

UNIT II SECOND LAW AND ENTROPY**9 + 3**

Physical description of the second law - Kelvin-Planck and Clausius statements –Equivalence - Reversible processes and cycles- Carnot cycle – Corollaries - Absolute temperature scale – Clausius Theorem, inequality - **Entropy- Principle, transfer, generation, balance - Third law of thermodynamics**

UNIT III PROPERTIES OF PURE SUBSTANCE AND GAS MIXTURES**9 + 3**

Pure substance-Phase change process-Property diagrams-PVT surface-Steam-types, dryness fraction-Avogadro's law - Ideal Gas - Equations of state-Vander Waal's equation - Real Gas - Compressibility and its chart - Mixtures of Gases – Properties.

UNIT IV THERMODYNAMIC AVAILABILITY AND RELATIONS**9 + 3**

Basics-Dead state, quality of energy, degradation of energy - Reversible processes – Maximum work - Exergy – Closed system - Steady flow system – **Irreversibility - Exergy Balance - Second law efficiency – Exact differentials - Tds Relations - Maxwell's Relation – Clausius – Clapeyron Equation - Joule-Thompson Coefficient.**

UNIT V PSYCHROMETRY**9 + 3**

Psychrometry - Psychrometric charts - Property calculations of air vapour mixtures- Psychrometric process-Adiabatic mixing - Evaporative cooling.

TOTAL 45 + 15 = 60 PERIODS

(Permitted to use standard thermodynamic table, Mollier diagram, and Psychometric chart in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nag P K	Engineering Thermodynamics	Tata McGraw-Hill, New Delhi	1998
2	Cengel	Thermodynamics-An Engineering Approach	Tata McGraw-Hill, New Delhi	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Holman J P	Thermodynamics	McGraw-Hill, NewDelhi	1988
2	Venwylen and Sontag	Classical Thermodynamics	Wiley Eastern, New Delhi	1987
3.	Kothandaraman C P and Domkundwar S	Engineering Thermodynamics	Dhanpatrai& Sons, New Delhi	2004

WEB REFERENCES

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_mechanics/index.htm
2. <http://nptel.iitm.ac.in/video.php?subjectId=112103108>
3. <http://web.mit.edu/emech/dontindex-build/index.html>
4. <http://www.indiabix.com/engineering-mechanics/questions-and-answers/>

COURSE OBJECTIVES

1. To impart knowledge on metallurgical aspects of metals.
2. To understand heat treatment processes on different grades of steel.
3. To familiarize on selection of ferrous and non-ferrous materials for various applications.
4. To impart knowledge on non-metallic materials
5. To learn about the strengthening mechanisms for Non-ferrous alloys.
6. To comprehend the significance of Non-Destructive Testing (NDT) methods

COURSE OUTCOMES

Learners should be able to

1. Identify the metallurgical aspects of metals.
2. Identify suitable heat treatment processes for various applications.
3. Select appropriate ferrous and non-ferrous materials for various applications.
4. Identify and select suitable non-metallic materials.
5. Identify suitable strengthening mechanisms for Non-ferrous alloys.
6. Work with non-destructive testing methods.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS**9**

Constitution of alloys – Solid solutions, substitutional and interstitial – phase diagrams, Isomorphous, eutectic, peritectic, eutectoid and peritectoid reactions, Iron – Iron carbide equilibrium diagram - Classification of steel and cast Iron, microstructure, properties and applications.

UNIT II HEAT TREATMENT**9**

Definition – Full annealing, stress relief, recrystallisation and spheroidizing – normalising, hardening and tempering of steel. Isothermal transformation diagrams – cooling curves superimposed on TTT diagram, CCT - Hardenability, Jominy end quench test – Austempering, martempering – case hardening - carburising, nitriding, cyaniding, carbonitriding – Flame and Induction hardening.

UNIT III FERROUS AND NONFERROUS METALS**9**

Effect of alloying elements on steel (Mn, Si, Cr, Mo, V, Ti & W) - stainless and tool steels – HSLA - maraging steels – Gray, White malleable, Spheroidal Graphite irons - Copper and Copper alloys – Brass, Bronze and Cupronickel – Aluminum and Al-Cu – precipitation, strengthening treatment – Bearing alloys.

UNIT IV NON-METALLIC MATERIALS**9**

Polymers – types of polymer, commodity and engineering polymers – **Properties and Applications of thermoplastics (PP, PVC, ABS, and PMMA) and thermosetting plastics (PF, UF, MF) – Engineering Ceramics.**

UNIT V TESTING OF MECHANICAL PROPERTIES AND INSPECTION**9**

Mechanism of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and **shear loads – Hardness tests (Brinell, Vickers and Rockwell), Impact test - Izod and Charpy, Fatigue and creep test, S-N curve.**

Non Destructive Testing: Non Destructive Testing basic principles and testing method of Radiographic testing, Ultrasonic testing, Magnetic particle test and Liquid penetrant test, Eddy current testing.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kenneth G. Budinski and Michael K. Budinski	Engineering Materials	Prentice-Hall of India Private Limited, New Delhi	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William D. Callister & David G. Rethwisch	Material Science and Engineering	John Wiley and Sons, Delhi	2010

2	Raghavan.V	Materials Science and Engineering	Prentice Hall of India Pvt., Ltd, New Delhi	2006
3.	Shackelford. J.F	Introduction to Materials Science for Engineers	Pearson Edition	2009

WEB REFERENCES:

1. www.materials.unsw.edu.au
2. ocw.MIT.edu
3. www.istl.org
4. metalurgy-screw-tutorial.tobyavujo.com

COURSE OBJECTIVES

1. To understand the mobility of mechanism in practice.
2. To understand the mechanism for displacement, velocity and acceleration at any point in a link.
3. To enrich the understanding of cam-follower principles for practical applications.
4. To make the students conversant in selecting appropriate gear trains for engineering applications.
5. To understand the friction concepts in machine parts and assembly.
6. To give exposure to the basic components and layout of linkages in the assembly of a system.

COURSE OUTCOMES

1. Compute the mobility of mechanism in practice.
2. Analyze a mechanism for displacement, velocity and acceleration at any point in a link.
3. Apply cam-follower principles for practical applications.
4. Select appropriate gear trains for engineering applications.
5. Analyze friction concepts in machine parts and assembly.
6. Understand the basic components and layout of linkages in the assembly of a system

UNIT I BASICSOFMECHANISMS**9**

Terminology and Definitions–Degree of Freedom – Mobility–Kutzbach criterion–Grashoff's law–Kinematic Inversions of four bar chain and slider crank –Mechanical Advantage–Transmission angle –Single, double and offset slider mechanisms – Quick return mechanisms – Ratchets and escapements – Indexing Mechanisms – Straight line generators.

UNIT II KINEMATICS**9**

Displacement, velocity and acceleration – analysis in simple mechanisms – Graphical Method –velocity and acceleration polygons – Kinematic analysis by Complex Algebra methods–**Vector Approach, Instantaneous center – Coriolis Acceleration.**

UNIT III KINEMATICSOFCAM**9**

Classifications – Displacement diagrams–parabolic, Simple harmonic and Cycloidal motions – Layout of plate cam profiles – Derivatives of Follower motion – High speed cams – circular arc and tangent cams – Standard cam motion – Pressure angle and undercutting.

UNIT IV GEARS**9**

Spur gear - Terminology and definitions–Fundamental Law of toothed gearing and involute gearing–Interchangeable gears–gear tooth action – Terminology – Interference and undercutting–**Non standard gear teeth– Helical, Bevel, Worm, Rack and Pinion gears (Basics only)–Gear trains–Parallel axis gear trains–Epicyclic gear trains.**

UNIT V FRICTIONINDRIVES**9**

Surface contacts–Sliding and Rolling friction – Friction drives – Friction in screw threads – Friction clutches–Belt and rope drives, Friction aspects in Brakes.

TOTAL 45PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rattan S.S	Theory of Machines	Tata McGraw–Hill, New Delhi	2009
2	Shigley J.E, Uicker J J	Theory of Machines and Mechanisms	McGraw–Hill, Inc, New York	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Thomas Bevan	Theory of Machines	CBS Publishers and Distributors, New Delhi	2011
2	Ghosh A, Mallick A.K	Theory of Mechanisms and Machines	Affiliated East–West Pvt. Ltd., New Delhi	1994
3.	Rao J.S, Dukkipati R.V	Mechanics of Machines	Wiley–Eastern Ltd., New Delhi	2007

STANDARDS

IS 2458 : 2001, Vocabulary of Gear Terms – Definitions Related to Geometry

IS 3756 : 2002, Method of Gear correction – Addendum modification for External Cylindrical Gears with Parallel Axes.

IS 5267 : 2002 Vocabulary of Gear Terms – Definitions Related to Worm Gear Geometry.

IS 12328 : Part 1: 1988 Bevel Gear Systems Part – 1 Straight Bevel Gears.

IS 12328 : Part 2: 1988 Bevel Gear Systems Part – 2 Spiral Bevel Gears

COURSE OBJECTIVES

1. To provide knowledge on various Metrological equipments available to measure the dimension of the components.
2. To provide knowledge on the correct procedure to be adopted to measure the dimension of the components.
3. To enrich the understanding of principles of measuring instruments and gauges
4. To give exposure to inspection of spur gear and thread elements.
5. To equip them with skills to linear measurements using various measuring instruments
6. To give exposure to procedures involved in erecting machineries

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Understand the basics of measurements and quality standards.
2. Perform linear measurements using various measuring instruments
3. Perform the geometrical measurements of various components
4. Measure the various dimensions of a screw thread
5. Measure the dimensions of the simple spur gear.
6. Know the procedures involved in erecting machineries.

UNIT I CONCEPT OF MEASUREMENT**9**

General concept – Generalised measurement systems – units and standards – measuring instruments – sensitivity, readability, range of accuracy, precision – static and dynamic response – repeatability – systematic and random errors – correction, calibration, interchangeability – Basics of Measurement System Analysis.

UNIT II LINEAR AND ANGULAR MEASUREMENT**9**

Definition of metrology – Linear measuring instruments: Vernier, micrometer, interval measurement, Slip gauges and classification, limit gauges – Comparators: Mechanical, pneumatic and electrical types, applications – Angular measurements: – Sine bar, auto-collimator, angle Decker.

UNIT III FORM MEASUREMENT**9**

Measurement of screw threads – Thread gauges, floating carriage micrometer – measurement of gears – tooth thickness – constant chord and base tangent method – Eccentricity Measurements – radius measurements – surface finish, straightness, flatness and roundness measurements.

UNIT IV LASER AND ADVANCES IN METROLOGY**9**

Precision instruments based on laser – Principles – laser interferometer – application in linear, angular measurements and machine tool metrology – Coordinate measuring machine (CMM) – computer aided inspection – Nano metrology, techniques and applications – TEM, SEM, STM, XRD, AFM.

UNIT V MEASUREMENT OF POWER, FLOW AND TEMPERATURE RELATED PROPERTIES**9**

Force, torque, strain: – mechanical and electrical type – Flow measurement: Venturi, orifice, rotometer, – Electrical pressure transducers, Temperature: Thermocouples, Resistance temperature detectors, bimetallic strip thermometers, thermistor, pyrometry

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jain R.K	Engineering Metrology	Khanna Publishers, Delhi	2003
2	Alan S. Morris	The Essence of Measurement	Prentice Hall of India, New Delhi	1997
3	N.V. Raghavendra and L. Krishnamurthy	Engineering Metrology and Measurements	Oxford University press of India	2013

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta S.V	Engineering Metrology	Dhanpat rai Publications, New Delhi	2012
2	Tayal A.K	Instrumentation and Mechanical Measurements	Galgotia Publications, New Delhi	2013
3.	Beckwith T.G and N. Lewis Buck N	Mechanical Measurements	Addison Wesley, New york	2007

WEB REFERENCES

1. www.tms.org
2. www.arci.res.in/
3. www.fbh-berlin.com
4. www.lasermetrology.com/
5. www.lasermetrology.com/

COURSE OBJECTIVE

1. To perform different destructivetesting
2. To learn the characteristicmaterials.
3. To understand the stress and strain relationship.
4. To determine the shear force for various materials.
5. To determine the impact load for various materials.
6. To determine the hardness for various materials

COURSE OUTCOMES

1. Ability to perform different destructivetesting
2. Ability to characteristicmaterials
3. Understand the stress and strain relationship.
4. Determine the shear force for various materials.
5. Determine the impact load for various materials.
6. Determine the hardness for various materials

LIST OF EXPERIMENTS

1. Tensile test on metals–stress straincharacteristics
2. Cupping test on metal sheets–load deformation characteristics, cupping load, cuppingnumber.
3. Hardness test on metals–Brinell and Rockwell Hardnesstests.
4. Impact test on metals–Charpy, Izod impacttests.
5. Shear test on metals–direct shear strength, single shear, doubleshear.
6. Tests on helical springs–compression, tension springs–load deformation characteristics, stiffness, shear stress, modulus of rigidity,energy.
7. Torsion test on beams–torque and angle of twist characteristics, shear stress, modulus of rigidity,energy.
8. Microscopic examination of i) Hardened samples ii) Hardened and temperedsamples.
9. Tempering – Improvement of Mechanical properties –Comparison for i) Unhardenedspecimen ii) Quenched specimen iii) Quenched and tempered specimen.
10. Study of low carbon steel and medium carbonsteel.

TOTAL 45PERIODS

COURSE OBJECTIVES

1. To facilitate the understanding of shaping operation in shaper.
2. To provide practical knowledge on Preparing a flat and contour surface using milling machine.
3. To provide practical knowledge on Preparing holes with higher finish by Drilling / Tapping / Reaming.
4. To facilitate the understanding of surface and cylindrical grinding operations for surface finish.
5. To introduce single and multi-point cutting tools.
6. To impart knowledge on the operations in Capstan and Turret Lathe

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Perform shapingoperation
2. Perform milling & slottingoperation
3. Perform drilling, tapping and reamingoperation
4. Perform grindingoperations
5. Work with tool grindingmachine
6. Work in a capstan and turretlathe

LIST OF EXERCISES

1. Exercises inshaping.
2. Exercises inMilling.
3. Exercises inslotting.
4. Exercises in Drilling / Tapping /Reaming.
5. Exercises in Surface grinding and cylindrical grindingprocess.
6. Exercises in Tool grinding – single point and multi pointtools.
7. Exercises in Capstan and TurretLathe.

TOTAL 45PERIODS

COURSE OBJECTIVES

1. To help students comprehend the role of listening skills in effective communication.
2. To familiarize students with verbal and non-verbal communication.
3. To expose students to neutral accent.
4. To develop emotional intelligence skills in them for enhancing their self-esteem.
5. To assist them in setting goals and developing positive attitude.
6. To enable students to acquire decision making skills, problem solving skills and assertive skills.

COURSE OUTCOMES

1. Equip students of engineering and technology with effective speaking, writing and listening and reading skills in English.
2. Develop their soft skills and inter personal skills, which will make the transition from college to workplace smoother and help them excel in their job.
3. Equip students of engineering and technology with group discussion and other recruitment exercises.
4. Use both verbal and non-verbal skills cohesively and develop confidence in participating in seminars, conferences, technical and extracurricular activities for lifelong learning.
5. Overall attitude of students will enhanced and know the social responsibilities.
6. Understand the importance of Human values for the betterment of society and nation.

UNIT I**6**

Overview to communication, self Introduction, Presentation on their own topic, Extempore, Group Activity

UNIT II**6**

Group Discussion, Do's and Don'ts of Group Discussion, Body language, Grooming and Resume, Resume correction

UNIT III**8**

Introduction to HR, HR questions and Do's and Don't's in HR, HR Interview, Mock GD & HR, Stress Management

TOTAL 20PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Agarwal.R.S	Quantitative Aptitude for Competitive Examinations	S.Chand Limited	2011
2	Abhijit Guha	Quantitative Aptitude for Competitive Examinations	Tata McGraw Hill	2011
3	Edgar Thrope	Test Of Reasoning for Competitive Examinations	Tata McGraw Hill, 4th Edition	2012

COURSE OBJECTIVES

1. To incorporate the concepts and laws in thermodynamic analysis of cyclic processes.
2. To impart the mechanisms of combustion of fuels.
3. To apply the thermodynamic concepts in steam turbines and nozzles.
4. To learn about the performance of compressors.
5. To understand the concept of cogeneration and waste heat recovery in engineering applications.
6. To introduce concepts of refrigeration and air conditioning in engineering applications

COURSE OUTCOMES

Learners should be able to

1. Calculate the efficiency of various gas power cycles.
2. Calculate the performance characteristics of engines.
3. Analyze combustion mechanism in IC engines.
4. Evaluate the characteristic of steam turbines and nozzles.
5. Evaluate the performance characteristics of compressors.
6. Identify and utilize the concepts of refrigeration and air conditioning in engineering applications

UNIT I GAS POWER CYCLES AND IC ENGINES**9**

Otto, Diesel, Dual, Brayton cycles – Calculation of mean effective pressure and air standard efficiency – actual and theoretical PV and TS diagrams of two stroke and four stroke engines – valve timing diagram and port timing diagram – calculation of engine performance, heat balance sheet, retardation – Morse test.

UNIT II BOILER AND STEAM POWER CYCLES**9**

Generation of steam, Boiler – Classification, fire tube boiler, water tube boiler, comparison, boiler mountings and accessories, performance of steam boilers – dryness fraction, properties of steam, T–S diagram, Mollier diagram, steam tables, Rankine Cycle – incomplete evaporation – superheated steam – modified cycle.

UNIT III STEAM NOZZLES AND STEAM TURBINES**9**

Steam nozzles – flow through steam nozzles, effect of friction, critical pressure ratio, super saturated flow – Steam turbines – impulse and reaction turbine, compounding, velocity diagram, condition for maximum efficiency – multi stage turbines, cycles with reheating and regenerating heating – reheat factor, degree of reaction – governing of turbines.

UNIT IV AIR COMPRESSORS**9**

Classifications of compressors – Reciprocating air compressor – performance characteristics, effect of clearance volume, free air delivery and displacement, intercooler, after cooler – Rotary compressor – vane type, centrifugal and axial, flow performance characteristics.

UNIT V REFRIGERATION AND AIR CONDITIONING**9**

Fundamentals of refrigeration – COP – Vapour compression refrigeration system – cycle, p–h chart, Vapour absorption system – comparison, properties of refrigerants. Fundamentals of air conditioning system, cycle, controls, air handling and distribution, simple cooling and heat load estimation

TOTAL 45 PERIODS

(Permitted to use standard thermodynamic table, Mollier diagram, Psychometric chart and Refrigeration property table in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rajput R.K	Thermal Engineering, Sixth edition	Laxmi Publications, New Delhi	2010
2	Arora C.P	Refrigeration and Air conditioning	Tata McGraw–Hill, New Delhi	2010

REFERENCES

SEMESTER V

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kothandaraman C.P, and DomkundwarA.V	A course in Thermal Engineering, Fifth Edition	Dhanpat Rai and Sons, Delhi	2006
2	Ganesan V	Internal Combustion Engines	Tata McGraw–Hill, New Delhi	2008
3.	Yunus A Cengel	Thermodynamics’ An Engineering Approach	Tata McGraw Hill, New Delhi	2008

WEB REFERENCES

1. www.kruse-ltc.com
2. www.grc.nasa.gov
3. www.poweronsite.org
4. www.machinerylubrication.com
5. www.tpub.com

COURSE OBJECTIVES

1. To understand the various types of stresses induced in different machine members.
2. To Study and acquire knowledge on design shaft and couplings for effective transmission of power.
3. To study the features of welded joints and fasteners required for various industrial applications.
4. To give exposure to design springs and flywheels for various engineering applications.
5. To understand the importance design bearings and levers for engineering applications.
6. To make the students conversant to implement design procedure for designing a machine.

COURSE OUTCOME

Upon completion of this course, the students will be able to

1. Determine various types of stresses induced in different machine members.
2. Design shaft and couplings for effective transmission of power.
3. Select the type of welded joints and fasteners required for various industrial applications.
4. Design springs and flywheels for various engineering applications.
5. Design bearings and levers for engineering applications.
6. Implement design procedure for designing a machine.

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS
9 + 3

Introduction to the design process – factors influencing machine design, selection of materials based on mechanical properties – Factor of safety. Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading – Design of curved beams – crane hook and ‘C’ frame – theories of failure – stress concentration – design for variable loading – Soderberg, Goodman and Gerber relations.

UNIT II DESIGN OF SHAFTS AND COUPLINGS
9 + 3

Design of solid and hollow shafts based on strength, rigidity and critical speed – Design of keys and keyways – *Design of rigid and flexible couplings – Introduction to gear and shock absorbing couplings – design of knuckle joints.*

UNIT III DESIGN OF FASTENERS AND WELDED JOINTS
9 + 3

Threaded fasteners – Design of bolted joints including eccentric loading – Design of welded joints for pressure vessels and structures – theory of bonded joints.

UNIT IV DESIGN OF SPRINGS AND FLYWHEEL
9 + 3

Design of helical, leaf, disc and torsional springs under constant loads and varying loads – Concentric torsion springs – Belleville springs – *Design of flywheels involving stresses in rim and arm.*

UNIT V DESIGN OF BEARINGS AND LEVERS
9 + 3

Selection of bearings – sliding contact and rolling contact types – Cubic mean load – Selection of journal bearings – McKees equation – Lubrication in journal bearings – calculation of bearing dimensions – Design of Levers.

TOTAL 45 + 15 = 60 PERIODS

(Permitted to use PSG design data book in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Juvinall R.C and Marshek K.M	Fundamentals of Machine Component Design Third Edition	John Wiley and Sons, New Delhi	2011
2	Bhandari V.B	Design of Machine Elements	Tata McGraw-Hill Book Co, New Delhi	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Norton R.L	Design of Machinery	Tata McGraw–Hill Book Co., New Delhi	2004
2	Orthwein W	Machine Component Design	Jaico Publishing Co., New Delhi	2003
3.	Ugural A.C	Mechanical Design – An Integral Approach	McGraw–Hill Book Co., New York	2004
4	Spotts M.F, ShoupT.E	Design and Machine Elements	Pearson Education, New Delhi	2004

WEB REFERENCES:

1. www.roymech.co.uk
2. www.ncbi.nlm.nih.gov
3. www.engineersedge.com
4. www.bearings.machinedesign.com
5. www.efunda.com

COURSE OBJECTIVES

1. To make the student acquire sound knowledge on the types of vehicle structures, cooling and lubrication systems required.
2. To acquaint the student with the concepts of type of engines to be used for modern automobiles.
3. To familiarize the students to Distinguish between the manual transmissions systems with automatic transmission systems.
4. To provide knowledge on appropriate transmission systems for the optimal power transmission.
5. To provide knowledge on steering, brakes and suspension systems for effective functioning.
6. To acquaint the student with advanced technologies in automotive Engineering.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Identify the types of vehicle structures, cooling and lubrication systems required.
2. Determine the type of engines to be used for modern automobiles.
3. Distinguish between the manual transmissions systems with automatic transmission systems.
4. Select appropriate transmission systems for the optimal power transmission.
5. Select steering, brakes and suspension systems for effective functioning.
6. Implement the advanced technologies in automotive.

UNIT I AUTOMOBILE ARCHITECTURE AND PERFORMANCE 9

Automotive components, subsystems and their positions – Chassis, frame and body, front, rear and four wheel drives – Operation and performance – Traction force and traction resistance, Power required for automobile – Rolling, air and gradient resistance.

UNIT II TYPES OF ENGINES 9

Types of engines – multi valve engine – in-line engine, vee-engine, Petrol engine – direct – single point and multipoint injection, diesel engine – common rail diesel injection, supercharging and turbo charging –

alternate fuels – ethanol and ethanol blend, compressed natural gas, fuel cells, hybrid vehicles.

UNIT III TRANSMISSION SYSTEMS 9

Clutch : Types – coil spring and diaphragm type clutch, single and multi plate clutch, centrifugal clutch, Gear box : Types – constant mesh, sliding mesh and synchromesh gear box, layout of gear box, gear selector and shifting mechanism, overdrive, automatic transmission, Propeller shaft, universal joint, slip joint, differential and real axle arrangement, hydraulic coupling.

UNIT IV WHEEL AND TYRES AND SUSPENSION SYSTEM 9

Types of wheels, construction, wired wheels, Tyres – construction, Radial, bias and belted bias, slip angle, Tread patterns, Tyre retreading - cold and hot, Tubeless tyres, Types – front and rear suspension, conventional and independent type suspension, leaf springs, coil springs, dampers, torsion bars, stabilizer bars, arms, air suspension systems – Balancing of Wheels.

UNIT V STEERING SYSTEM AND BRAKING SYSTEM 9

Types of steering systems, Ackermann principle, Davis steering gear, steering gear boxes, steering linkages, power steering, wheel geometry – caster, camber, toe-in, toe out etc., wheel Alignment. Braking System – Forces on vehicles, tyre grip, load transfer, braking distribution between axles, stopping distance, Types of brakes, Mechanical, Hydraulic, Air brakes, Disc and Drum brakes, Engine brakes and Anti lock braking system.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta R.B	Automobile Engineering	Laxmi Publications, Chennai	2004
2	Kirpal Singh	Automobile Engineering Vol-I and II	Standard publishers, Delhi	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Julian Happian Smith	An introduction to modern vehicle design	Butterworth Heinemann, New Delhi	2002
2	Crouse W H	Automotive transmissions and power trains	McGraw-Hill International Editions, New Delhi	1976
3.	Heniz Heisler	Vehicle and Engine Technology	Society of Automotive Engineers	2002

WEB REFERENCES:

1. http://en.wikipedia.org/wiki/Automotive_engineering
2. <http://www.animatedengines.com/>
3. <http://www.automotive-online.com/transmission-system/>
4. <http://www.rqriley.com/suspensn.htm>
5. [http://en.wikipedia.org/wiki/Transmission_\(mechanics\)](http://en.wikipedia.org/wiki/Transmission_(mechanics))

COURSE OBJECTIVES

1. To provide knowledge on the static and dynamic forces in various mechanisms.
2. To study the features of determine the rotating masses in dynamic balancing.
3. To familiarize the students to understand free and forced vibration for practical applications.
4. To understand the importance torsional vibrations in mechanical components.
5. To explain principles and mechanisms used for speed control and stability control.
6. To impart knowledge on type of governors and gyroscopes for different applications

COURSE OUTCOMES

1. Analyze the static and dynamic forces in various mechanisms.
2. Determine the rotating masses in dynamic balancing.
3. Calculate free and forced vibration for practical applications.
4. Analyze torsional vibrations in mechanical components.
5. Understand the principles in mechanisms used for speed control and stability control.
6. Select the type of governors and gyroscopes for different applications.

UNIT I FORCE ANALYSIS**9 + 3**

Rigid Body dynamics in general plane motion – Equations of motion – Dynamic force analysis – Inertia force and Inertia torque – D'Alemberts principle – The principle of superposition – Dynamic Analysis in Reciprocating Engines – Gas Forces – Equivalent masses – Bearing loads – Crank shaft Torque – Turning moment diagrams – Fly wheels.

UNIT II BALANCING**9 + 3**

Static and dynamic balancing – Balancing of rotating masses – Balancing a single cylinder Engine – Balancing Multi-cylinder Engines – Partial balancing in locomotive Engines.

UNIT III FREE VIBRATION**9 + 3**

Basic features of vibratory systems – idealized models – Basic elements and lumping of parameters – Degrees of freedom – Single degree of freedom – Free vibration – Equations of motion – natural frequency – **Damping Types of Damping – Damped vibration, critical speeds of simple shaft.**

UNIT IV FORCED VIBRATION AND TORSIONAL VIBRATION**9 + 3**

Response to periodic forcing – Harmonic Forcing – Forcing caused by unbalance – Support motion – Force transmissibility and amplitude transmissibility – Vibration isolation.

Torsional systems; Natural frequency of free torsional vibrations, Natural frequency of two and three rotor systems.

UNIT V MECHANISMS FOR CONTROL**9 + 3**

Governors – Types – Centrifugal governors – Gravity controlled and spring controlled centrifugal governors – Characteristics – Effect of friction – Controlling Force – other Governor mechanisms.

Gyroscopes – Gyroscopic forces and Torques – Gyroscopic stabilization – Gyroscopic effects in Automobiles, ships and airplanes

TOTAL 45 + 15 = 60 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rattan S.S	Theory of Machines	Tata McGraw-Hill Publishing Company Ltd., New Delhi	2009
2	Shigley J.E, Uicker J.J	Theory of Machines and Mechanisms	McGraw-Hill, New York	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao J.S., Duggipati R.V	Mechanism and Machine Theory	Wiley- Eastern Limited, New Delhi	2007
2	John Hannah and Stephens R.C	Mechanics of Machines	Viva Books Pvt Ltd	2005
3.	Thomas Bevan	Theory of Machines	CBS Publishers and Distributors, New Delhi	2011

WEB REFERENCES

1. <http://freevideolectures.com/Course/2364/Dynamics-of-Machines>
2. http://en.wikipedia.org/wiki/Balancing_of_rotating_masses
3. http://www.efunda.com/formulae/vibrations/sdof_free_damped.cfm
4. http://www.roymech.co.uk/Useful_Tables/Vibrations/Free_Vibrations.html

COURSE OBJECTIVES:

1. The objective of this course is to familiarize the students with statistical techniques.
2. To find the solutions for transcendental equations using different methods
3. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
4. To introduce students to numerical methods used to solve engineering problems.
5. Fundamentals of numerical methods/algorithms to solve systems of different mathematical equations (e.g. linear/ non-linear algebraic equations, ordinary /partial differential equations), will be introduced.
6. The course would enable students to write their own computer programs using programming languages like C and software like Excel.

COURSE OUTCOMES:

1. To solve engineering problems involving Linear and non-linear equations.
2. Hands-on experience will be provided to apply these computer programs to solve problems in different areas of engineering.
3. To acquire skills in handling situations involving linear/ non-linear algebraic equations, ordinary /partial differential equations
4. To solving actual engineering problems through computer programming and coding.
5. To solve ordinary and partial differential equations using programming languages like C and software like Excel.
6. Student will understand procedure-oriented Excel concepts. Student will be capable of writing C and Excel programs efficiently.

LIST OF EXPERIMENTS

1. Finding solution of Transcendental equation
 - i) Newton – Raphson Method
 - ii) Bisection method
 - iii) Iterative method by reducing the equation to the form $x=f(x)$
2. Finding the dominant eigenvalue and eigenvector by power method
3. Numerical integration
 - i) Gauss 2 point and 3 point formulae
 - ii) Trapezoidal method
 - iii) Simpson's 1/3 rule
4. Solution of initial value problems governed by ODE
 - i) Runge - Kutta 4th order method
 - ii) Modified Euler's method
 - iii) Milne's method
 - iv) Adam – Bashforth method
5. Solution of BVP governed by PDE
 - i) Laplace Equation
 - ii) One – dimensional heat equation
 - a) Explicit method : Bender – Schmidt's method
 - b) Implicit method : Crank - Nicolson's method
 - iii) One dimensional wave equation Implicit method

TOTAL 30 + 30 = 60 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Curtis F. Gerald and Patrick O. Wheatley	Applied Numerical Analysis	Pearson Education, South Asia	2009
2	Steven C. Chapra, Raymond P. Canale	Numerical Methods for Engineers	McGraw - Hill Pub. Co. Ltd	2014

COURSE OBJECTIVES

1. To Understand the working of various governors.
2. To introduce jump speed and profile of the cam
3. To understand the importance of moment of inertia by oscillation method for connecting rod and flywheel.
4. To introduce the concepts to Characterize and calibrate measuring devices.
5. To expose students to measuring taper angle straightness, flatness, surface finish and thread parameters.
6. To explain the limits of dimensional tolerances using comparators

COURSE OUTCOMES

1. Understand the working of various governors.
2. Determine of jump speed and profile of the cam
3. Determine moment of inertia by oscillation method for connecting rod and flywheel.
4. Characterize and calibrate measuring devices.
5. Measure taper angle straightness, flatness, surface finish and thread parameters.
6. Examine the limits of dimensional tolerances using comparators.

LIST OF EXPERIMENTS**DYNAMICS**

1. Governors–Determination of sensitivity, effort, etc. for Watt, Porter, Proell, and spring controlled Governors
2. Cam – Determination of jump speed and profile of the cam.
3. Motorized Gyroscope–Verification of laws –Determination of gyroscopic couple.
4. Whirling of shaft–Determination of critical speed of shaft with concentrated loads.
5. Balancing of rotating and reciprocating masses.
6. Determination of moment of inertia by oscillation method for connecting rod and flywheel.
7. Vibrating system – spring mass system – Determination of damping coefficient of single degree of freedom system
8. Determination of torsional frequencies for compound pendulum and flywheel system with lumped moment of inertia.
9. Transverse vibration –free– Beam. Determination of natural frequency and deflection of beam.
10. Strain gauge measurement system.

METROLOGY

1. Calibration of Vernier / Micrometer / Dial gauge
2. Checking dimensions of part using slip gauges
3. Measurement of gear tooth dimensions – addendum, dedendum, pitch circle diameter and tooth thickness
4. Measurement of taper angle using sine bar / tool makers microscope
5. Measurement of straightness and flatness
6. Measurement of thread parameters
7. Checking the limits of dimensional tolerances using comparators (Mechanical / Pneumatic / Electrical)
8. Surface finish measurement

TOTAL 45 PERIODS

COURSE OBJECTIVES

1. Ability to conduct experiment on IC engine to study the characteristic and performance of IC design/ steam turbines.
2. To appreciate concepts learnt in fundamental laws of thermodynamics.
3. To learn ideas how to sustain in energy crisis and think beyond curriculum in the field of alternative and renewable sources of energy.
4. To communicate effectively the concepts of internal combustion engines.
5. To make the students to prepare them to carry out experimental investigation and analysis at later stages of graduation.
6. To make the students to think beyond curriculum in alternative sources of energy.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. conduct experiment on IC engine to study the characteristic and performance of IC Engine
2. conduct experiment to find the thermo physical properties of given fluid.
3. Understand the knowledge of mathematics, science and engineering fundamentals to model the energy conversion phenomenon.
4. Can formulate power production based on the fundamental laws of thermal engineering.
5. Understand instill upon to envisage appropriate experiments related to heat engines.
6. Understand and investigate the effectiveness of energy conversion process in mechanical power generation for the benefit of mankind.

LIST OF EXPERIMENTS

1. Valve Timing and Port Timing Diagrams.
2. Performance Test on 4-stroke Diesel Engine.
3. Heat Balance Test on 4-stroke Diesel Engine.
4. Load test on 4-stroke Diesel Engine.
5. Morse Test on multicylinder Petrol Engine.
6. Retardation Test to find Frictional Power of a Diesel Engine.
7. Determination of Viscosity – Red Wood Viscometer.
8. Determination of Flash Point and Fire Point.
9. Study of Steam Generators and Turbines.
10. Performance and energy balance test on a steam generator

TOTAL 45 PERIODS

COURSE OBJECTIVES

1. To expose students to problem definitions
2. To understand the Fabricate device/system/component (s) for problem solving.
3. To equip them subject knowledge to solve real world problems.
4. To acquaint the student to newer techniques to improve the performance of a device/system.
5. To develop the skill to prepare the project reports
6. To develop the skill to prepare power point presentation and to face reviews and viva voce examination.

COURSE OUTCOMES

1. Formulate problem definitions
2. Fabricate device/system/component (s) for problem solving.
3. Apply subject knowledge to solve real world problems.
4. Implement newer techniques to improve the performance of a device/system.
5. Develop the skill to prepare the project reports
6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.

Students will undergo industrial training for four weeks during the vacation at the end of IV semester and a report with the training completion certificate from the industry will be subsequently submitted to the department within a week after completion. Viva – Voce exam will be conducted at the end of V semester and 100 marks will be awarded.

COURSE OBJECTIVES

1. To understand the concepts of geometrical dimensioning and Tolerancing
2. To study the physical importance of them in industrial point of view
3. To know the various types of Tolerancing, its measurement and design.
4. To translate geometric callouts into plain English with one meaning.
5. To explain the major rules found in ASME Y14.5-2009
6. To understand the hierarchy of geometric tolerancing.

COURSE OUTCOMES

1. Ability to learn and apply geometric dimensioning and tolerance standards to communicate design intent
2. Ability to Learn how the knowledge of certain processes can affect part design and documentation
3. Gain added insight on working in a team design environment.
4. Translate geometric callouts into plain English with one meaning.
5. Explain the major rules found in ASME Y14.5-2009
6. Understand the hierarchy of geometric tolerancing.

UNIT I INTRODUCTION TO GD&T**6**

Introduction to Geometric dimensioning and Tolerancing – working of geometric system – Terms and definitions – Common symbols and Terminology – Fundamental Rules (Drawing)– Feature definition – With Size and Without Size – Material Condition (Maximum, Least, Regard of Material Condition)– Limit Tolerancing – Dimension Origin – Limits of Size, Rule 1 or Envelope Principle – Go– No Go Gauges.

UNIT II FORM AND ORIENTATION TOLERANCE**6**

and design considerations – Flatness and Circularity measurement concepts – Orientation tolerance specification and application design.

UNIT III POSITION AND RUNOUT TOLERANCE**8**

Profile of surface and line tolerance design and application – Location tolerance, Position, applied and material condition consideration – Coaxial controls and design – Concentricity, Symmetry – Measurement and application – Design considerations – Position, Composite tolerance concept, design and Measurement – Runout, Total Runout tolerances – Measurement and considerations.

TOTAL 20 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Siddeshwar and Kanniah	Machine Drawing	Tata McGraw Hill	2001
2	Gopalakrishna, K.R	Machine Drawing	, Subhas Stores	2002
3.	Wade. O	Tolerance Control in design and manufacturing	Industrial Press	1972

WEB REFERENCE

1. IS :10714,10715,10716,10717,11669,10719,813,919,2709,8000 pt 1 to 10721,11158 and AWS/ISO

COURSE OBJECTIVE

1. To Formulate and solve engineering and managerial situations as LPP.
2. To understand the Engineering and Managerial situations in Transportation.
3. To Study and acquire knowledge on engineering and Managerial solutions in Assignment and scheduling problems.
4. To give exposure to inventory in industry.
5. To make the student acquire sound knowledge on sequences to perform operation among various alternatives.
6. To provide an overview of various tools in various sections of industries like marketing, material handling etc.

COURSE OUTCOMES

At the end of the course, student will be able to understand the

1. Formulate and solve engineering and managerial situations as LPP.
2. Solve Engineering and Managerial situations in Transportation.
3. Give Engineering and Managerial solutions in Assignment and scheduling problems.
4. Manage inventory in industry.
5. Select better sequence to perform operation among various alternatives.
6. Apply the various tools in various sections of industries like marketing, material handling etc.

UNIT I INTRODUCTION TO OPERATIONS RESEARCH 9 + 3

Operations research and decision-making – types of mathematical models and constructing the model – Role of computers in operations research – Linear Programming Techniques: Formulation of linear programming problem, applications and limitations, graphical method, simplex method – The Big –M method – the two-phase method.

UNIT II TRANSPORTATION PROBLEMS 9 + 3

Least cost method, North west corner rule, Vogel's approximation method, modified distribution method, optimization models, unbalance and degeneracy in transportation model.

UNIT III ASSIGNMENT MODELS AND SCHEDULING 9 + 3

Assignment models - Hungarian algorithm, unbalanced assignment problems - maximization case in assignment problems, traveling salesman problem. Scheduling – processing n jobs through two machines, processing n jobs through three machines, processing two jobs through 'm' machines, processing n jobs through m machines.

UNIT IV INVENTORY CONTROL AND QUEUING THEORY 9 + 3

Variables in inventory problems, inventory models with penalty, shortage and quantity discount, safety stock, multi item deterministic model.

Queuing Models: Queues – Notation of queues, performance measures, The M/M/1 queue, The M/M/m queue, batch arrival queuing system, queues with breakdowns.

UNIT V PROJECT MANAGEMENT, GAME THEORY, REPLACEMENT MODELS 9 + 3

Basic terminologies, constructing a project network, network computations in CPM and PERT, cost crashing – Replacement Models: Replacement of Items due to deterioration with and without time value of Money, Group replacement policy, Staff replacement

TOTAL 45 + 15 = 60 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kanti Swarup, Gupta P.K and Manmohan	Operations Research	Sultan Chand and Sons, New Delhi	2008

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Viswanathan N and Narahari Y	Performance Modeling of Automated Manufacturing Systems	Prentice Hall Inc, Newyork	2000
2	Prem kumar Gupta and Hira D.S	Operation Research	S Chand and Company Limited, New Delhi	2008

WEB REFERENCES

1. <http://www.scienceofbetter.org/what/index.htm>
2. <http://www.informs.org/Pubs/OR>
3. http://www.me.utexas.edu/~jensen/ORMM/models/unit/network/subunits/special_cases/transportation.html
4. <http://www.projectmanagement.com/>

COURSE OBJECTIVES

1. To Study and acquire knowledge on design the power transmission components like belts, pulleys, ropes, chains and sprockets.
2. To Study and acquire knowledge on design spurs and parallel axis helical gears.
3. To give exposure to dimensions for bevel and worm gears.
4. To provide an overview of design procedures of gear boxes for industrial applications.
5. To provide an overview of clutches and brakes for engineering applications.
6. To make the student acquire sound knowledge of mechanical system

COURSE OUTCOMES

Upon completion of this course, the students will able to

1. Design the power transmission components like belts, pulleys, ropes, chains and sprockets.
2. Design spurs and parallel axis helical gears.
3. Estimate the dimensions for bevel and worm gears.
4. Practice the design procedures of gear boxes for industrial applications.
5. Design clutches and brakes for engineering applications.
6. Design a mechanical system

UNIT I DESIGN OF TRANSMISSION SYSTEMS FOR FLEXIBLE ELEMENTS 9

Design of V belts and pulleys – Selection of Flat belts and pulleys – Wire ropes and pulleys – Selection of Transmission chains and Sprockets – Design of sprockets.

UNIT II DESIGN OF SPUR AND HELICAL GEARS 9

Gear Terminology – Speed ratios and number of teeth – Force analysis – Tooth stresses – Dynamic effects – Fatigue strength – Factor of safety – Gear materials – Module and Face width – power rating calculations based on strength and wear considerations – **Parallel axis Helical Gears – Pressure angle in the normal and transverse plane – Equivalent number of teeth – forces and stresses – Estimating the size of the helical gears.**

UNIT III DESIGN OF BEVEL AND WORM GEARS 9

Straight bevel gear: Tooth terminology, tooth forces and stresses, equivalent number of teeth. Estimating the dimensions of pair of straight bevel gears. **Worm Gear: Merits and demerits – terminology – Thermal capacity, materials – forces and stresses, efficiency, estimating the size of the worm gear pair – Cross helical: Terminology – helix angles – Estimating the size of the pair of cross helical gears.**

UNIT IV DESIGN OF GEARBOXES 9

Geometric progression – Standard step ratio – Ray diagram, kinematics layout – Design of sliding mesh gear box – Constant mesh gear box. – Design of multi speed gear box.

UNIT V DESIGN OF CLUTCHES AND BRAKES 9

Design of plate clutches – axial clutches – cone clutches – internal expanding rim clutches – internal and external shoe brakes.

TOTAL 45 PERIODS

(Permitted to use PSG design data book in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Juvinal R. C, Marsh K. M	Fundamentals of Machine component Design	John Wiley and Sons., London	2011
2	Bhandari, V. B	Design of Machine Elements	Tata McGraw-Hill Publishing Company Ltd, New York	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Maitra G.M., Prasad L.V	Hand book of Mechanical Design	Tata McGraw–Hill, New Delhi	2009
2	Shigley J.E, Mischke C.R	Mechanical Engineering Design	McGraw–Hill International Editions, New Delhi	2011
3	Prabhu. T.J	Design of Transmission Elements	Mani Offset, Chennai	2002

WEB REFERENCES

1. <http://en.wikipedia.org/wiki/Gear>
2. <http://www.physicsforums.com/showthread.php?t=292163>
3. <http://www.seminarprojects.com/Thread–design–and–fabrication–of–gearbox–full–report>
4. <http://www.cs.cmu.edu/~rapidproto/mechanisms/chpt6.htm>

COURSE OBJECTIVES

1. To Study and acquire knowledge on heat transfer for conduction.
2. To introduce the concepts of heat transfer coefficients for natural and forced convection for different fluid flows.
3. To understand the performance of heat exchanger.
4. To study the features of radiation heat transfer between the surfaces.
5. To give exposure to mass transfer.
6. To make the students conversant to solve complex problems where heat and mass transfer takes place.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Determine the rate of heat transfer for conduction.
2. Evaluate heat transfer coefficients for natural and forced convection for different fluid flows.
3. Analyze performance of heat exchanger.
4. Estimate the radiation heat transfer between the surfaces.
5. Calculate the coefficient of mass transfer.
6. Solve complex problems where heat and mass transfer takes place.

UNIT I CONDUCTION**9 +3**

Basic Concepts – Mechanism of Heat Transfer – Conduction, Convection and Radiation – General Differential equation of Heat Conduction – Fourier Law of Conduction – Cartesian and Cylindrical Coordinates – One Dimensional Steady State Heat Conduction – Conduction through Plane Wall, Cylinders and Spherical systems – Composite Systems – Conduction with Internal Heat Generation – Extended Surfaces – Unsteady Heat Conduction – Lumped Analysis – Use of Heislers Chart.

UNIT II CONVECTION**9 +3**

Basic Concepts – Convective Heat Transfer Coefficients – Boundary Layer Concept – Types of Convection – Forced Convection – Dimensional Analysis – External Flow – Flow over Plates, Cylinders and Spheres – Internal Flow – Laminar and Turbulent Flow – Combined Laminar and Turbulent – Flow over Bank of tubes – Free Convection – Dimensional Analysis – Flow over Vertical Plate, Horizontal Plate, Inclined Plate, Cylinders and Spheres.

UNIT III PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS**9 +3**

Nusselts theory of condensation – pool boiling, flow boiling, correlations in boiling and condensation. Types of Heat Exchangers – LMTD Method of heat Exchanger Analysis – Effectiveness – NTU method of Heat Exchanger Analysis – Overall Heat Transfer Coefficient – Fouling Factors.

UNIT IV RADIATION**9 +3**

Basic Concepts, Laws of Radiation – Stefan Boltzman Law, Kirchoff Law – Black Body Radiation – Grey body radiation - Shape Factor Algebra – Electrical Analogy – Radiation Shields – Introduction to Gas Radiation.

UNIT V MASS TRANSFER**9 +3**

Basic Concepts – Diffusion Mass Transfer – Fick's Law of Diffusion – Steady state Molecular Diffusion – Convective Mass Transfer – Momentum, Heat and Mass Transfer Analogy – Convective Mass Transfer Correlations

TOTAL 45 + 15 = 60 PERIODS

(Permitted to use standard Heat and Mass Transfer Table in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sachdeva R.C	Fundamentals of Engineering Heat and Mass Transfer	New Age International, New Delhi	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Frank P. Incropera and David P. DeWitt	Fundamentals of Heat and Mass Transfer	John Wiley and Sons, New Delhi	2011
2	Ozisik M.N	Heat Transfer	McGraw-Hill Book Co, New Delhi	1994
3	Kothandaraman C.P	Fundamentals of Heat and Mass Transfer	New Age International, New Delhi	2012

WEB REFERENCES

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Heat%20and%20Mass%20Transfer/New_index1.html
2. <http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv084-Page1.htm>
3. http://en.wikipedia.org/wiki/Heat_transfer

COURSE OBJECTIVE

1. To give exposure to accessories and layout required for a steam power plant depending upon the requirements.
2. To study performance of steam power plant.
3. To make the student acquire sound knowledge of working of nuclear and hydel power plant.
4. To study the features of gas turbine power plant.
5. To make the student acquire sound knowledge of economics of the power plant.
6. To make the student acquire sound knowledge on renewable energy technologies and availability.

COURSE OUTCOME

1. Select the accessories and layout required for a steam power plant depending upon the requirements.
2. Compute performance of steam power plant.
3. Explain the working of nuclear and hydel power plant.
4. Compute performance of gas turbine power plant.
5. Calculate the economics of the power plant.
6. Apply appropriate type of renewable energy technologies depending upon the application and availability.

UNIT I FUNDAMENTALS OF ENGINEERING ECONOMICS**9**

Introduction to Engineering Economics – Definition, Scope and Significance – Demand and supply analysis – Definition – Law of Demand – Elasticity of Demand – Demand Forecasting – Supply – Law of supply – Elasticity of Supply.

UNIT II COMMERCIAL BANKING**9**

Law of contracts, negotiable instruments, its types and regulations there on – New Industrial Policy – MSME sector – Development financial institutions and their relevance – Export Promotion - DICGC, ECGCI, EXIM Bank - Import and export concepts - Letter of credit, forward contracts / hedging.

UNIT III CAPITAL MARKET**9**

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions – Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT IV FINANCIAL CONCEPTS**9**

Introduction, scope and objectives of basic financial concepts – time value of money – Interest - simple & compound interest, annuity and effective rate of interests. Appraisal of project for profitability, internal rate of return – payback period – net present value. NPV comparison – cost benefit analysis. Sources of finance – internal and external.

UNIT V COST ANALYSIS AND BREAK-EVEN ANALYSIS**9**

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	RamachandraAryasri V. V. RamanaMurthy	Engineering Economics & Financial Accounting	Tata McGraw Hill, New Delhi	2007
2	Varshney R. L., and K.L Maheshwari	Managerial Economics	Sultan Chand & Sons, New Delhi	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.L.Jhingan	Principles of Economics	Konark Publications	2010
2	Prasanna Chandra	Fundamentals of Financial Management	Tata McGraw Hill, New Delhi.	2007
3	D.M.Mithani	Money, Banking, International Trade & Public Finance	Himalaya Publishing House	2004

WEB REFERENCES

1. <http://economictimes.indiatimes.com>
2. <http://www.economist.com/>
3. <http://www.managementstudyguide.com/financial-management.htm>

**15BEME611 COMPUTER AIDED MODELINGANDSIMULATION
LABORATORY**
0 0 3 2100**COURSE OBJECTIVE**

1. To gain practical experience in handling 2D drafting and 3D modeling softwaresystems.
2. To impart training on SOLID WORKS for modelling
3. To provide knowledge on assembly ofcomponents
4. To facilitate the understanding of manufacturing drawings from the modelscreated
5. To understand the importance of MAT Lab for simulating different systems
6. To acquaint the student with the concepts of mat lab for performing various mathematical operations

COURSE OUTCOME

Upon completion of this course, the students can able to

1. use computer and CAD software's for modeling of mechanicalcomponents
2. use various options in SolidWorks for modeling of givencomponents
3. create assembly ofcomponents
4. prepare manufacturing drawings from the modelscreated
5. Use MAT Lab for simulating different systems like hydraulic and pneumaticcircuits
6. Use mat lab for performing various mathematicaloperations

COMPUTER AIDED DESIGN

1. 3D modeling of various machine elements using various options like protrusion, cut,sweep, draft, loft, blend,rib.
2. Assembly – creating assembly from parts – assemblyconstraints
3. Conversion of 3D solid model to 2D drawing – different views, sections, isometric view and dimensioning.
4. Introduction to SurfaceModeling.
5. Introduction to File Import, Export – DXF, IGES, STL,STEP

Note: Any one of the 3D MODELING software's like SOLIDWORKS, CREO, CATIA, NX Software, AutoCADetc.

COMPUTER AIDED SIMULATION

1. Simulation of Air conditioning system with condenser temperature and evaporator temperatures as input to get COP usingSoftware
2. Simulation of Hydraulic / Pneumatic cylinder usingSoftware
3. Simulation of cam and follower mechanism usingSoftware
4. MATLAB basics, Dealing with matrices, Graphing-Functions of one variable and two variables
5. Use of MATLAB to solve simple problems invibration

TOTAL 45PERIODS

COURSE OBJECTIVE

1. To ability to conduct experiment on IC engine to study the characteristic and performance of IC design/ steamturbines.
2. To apply Fourier's law to validate the theoretical over all heat transfer coefficient.
3. To apply Stefan-Boltzmann law of radiation and emissivity relation.
4. To determine thermal properties of material by applying 1-D steady state heat transfer equation.
5. To apply non-dimensional numbers to evaluate and validate heat transfer parameters.
6. To ability to understand and solve conduction, convection and radiation problems.

COURSE OUTCOME

1. Ability to conduct experiment on IC engine to study the characteristic and performance of IC design/ steamturbines.
2. Apply Fourier's law to validate the theoretical over all heat transfer coefficient.
3. Apply Stefan-Boltzmann law of radiation and emissivity relation.
4. Determine thermal properties of material by applying 1-D steady state heat transfer equation.
5. Apply non-dimensional numbers to evaluate and validate heat transfer parameters.
6. Ability to understand and solve conduction, convection and radiation problems.

LIST OF EXPERIMENTS HEAT TRANSFER

1. Heat transfer through a compositewall
2. Thermal conductivity measurement by guarded platemethod
3. Natural convection heat transfer from a verticalcylinder
4. Heat transfer from pin-fin (natural and forced convectionmodes)
5. Effectiveness of Parallel/counter flow heatexchanger
6. Determination of Stefan-Boltzmannconstant
7. Determination of emissivity of a greysurface

REFRIGERATION AND AIR CONDITIONING

1. Performance test on single/two stage reciprocating aircompressor.
2. Determination of COP of a refrigerationsystem
3. Experiments on air-conditioningsystem

TOTAL 45PERIODS

COURSE OBJECTIVE

1. To expose students to problem definitions
2. To understand the Fabricate device/system/component (s) for problem solving.
3. To equip them subject knowledge to solve real world problems.
4. To acquaint the student to newer techniques to improve the performance of a device/system.
5. To develop the skill to prepare the project reports
6. To develop the skill to prepare power point presentation and to face reviews and viva voce examination.

COURSE OUTCOMES

1. Formulate problem definitions
2. Fabricate device/system/component (s) for problem solving.
3. Apply subject knowledge to solve real world problems.
4. Implement newer techniques to improve the performance of a device/system.
5. Develop the skill to prepare the project reports
6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.

The students may be grouped into 2 to 4 and work under a project supervisor. The device/system/component(s) to be fabricated may be decided in consultation with the supervisor and if possible with an industry. A project report to be submitted by the group and the fabricated model, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL 30PERIODS

COURSE OBJECTIVES

1. To equip the students with effective technicalpresentation
2. To understand the barriers and bridges tocommunication
3. To improve the public speaking capabilities, body language andposture.
4. To improve the literature survey skill.
5. To develop presentation skill using power point presentation
6. To improve skill to face viva voce examination.

COURSE OUTCOMES

1. Develop the ability to fabrication skill.
2. Ability to make literature review till the successful solution.
3. Ability to identify specific problems.
4. Gain the knowledge about data collection and conducting experiments.
5. Develop the skill to prepare the project reports
6. Develop the skill to prepare power point presentation and to face reviews and viva voce examination.

During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

TOTAL 20PERIODS

SEMESTER VII

15BEME701 PROFESSIONAL ETHICS, PRINCIPLES OF MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT 3 0 0 3100

COURSE OBJECTIVE

1. To understand objectives, Strategies, Policies and Plan.
2. To introduce plans by directing and controlling.
3. To Understand the need of Engineering Ethics.
4. To Understand the forces that shape culture.
5. To develop the entrepreneurial skills.
6. To make the students conversant to execute an engineering plan with ethics.

COURSE OUTCOME

1. Prepare objectives, Strategies, Policies and Plan.
2. Execute plans by directing and controlling.
3. Understand the need of Engineering Ethics.
4. Understand the forces that shape culture.
5. Show the entrepreneurial skills.
6. Execute an engineering plan with ethics.

UNIT I HISTORICAL DEVELOPMENT, PLANNING, ORGANISING 9

Definition of Management – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing by Objectives – Strategies, Policies and Planning Premises – Forecasting – Decision-making – Formal and informal organization – Organization Chart –.

UNIT II DIRECTING AND CONTROLLING 9

Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control – Reporting

UNIT III ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – Models of Professional Roles – theories about right action – Self-interest – customs and religion – uses of ethical theories.

UNIT IV FACTORS OF CHANGES 9

Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT V ENTREPRENEURSHIP AND MOTIVATION 9

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth – Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harold Kooritz and Heinz Weihrich	Essentials of Management	Tata McGraw Hill, New Delhi	2010
2	Khanka S.S	Entrepreneurial Development	S.Chand and Co. Ltd., New Delhi	2006
3	Mike Martin and Roland Schinzinger	Ethics in Engineering	McGraw-Hill, New York	2005

SEMESTER VII

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Tripathy P.C and Reddy P.N	Principles of Management	Tata McGraw Hill, New Delhi	2008
2	Rabindra N Kanungo	Entrepreneurship and innovation	Sage Publications, New Delhi	1998
3	Charles E Harris, and Michael J Rabins	Engineering Ethics – Concepts and Cases	Wadsworth Thompson Learning, New Delhi	2013

WEB REFERENCES

1. http://www.managementstudyguide.com/taylor_fayol.htm
2. http://tutor2u.net/business/gcse/people_motivation_theories.htm
3. <http://lfkfb.tripod.com/eng24/gilliganstheory.html>
4. <http://www.developingeyes.com/five-types-of-entrepreneurs/>

COURSE OBJECTIVE

1. To explain the steps involved in FEA and also the types of weight residual methods
2. To impart knowledge to formulate and solve problems in one dimensional structures including trusses, beams and frames.
3. To enrich the understanding of two dimensional thermal and torsion problems.
4. To enrich the understanding of axisymmetric bodies, plate and shell.
5. To develop an understanding of the standard techniques on matrix solution techniques to dynamic problems.
6. To impart knowledge on FE equation for structural, heat transfer and vibration problems.

COURSE OUTCOME

1. Explain the steps involved in FEA and also the types of weight residual methods
2. Formulate and solve problems in one dimensional structures including trusses, beams and frames.
3. Predict finite element equations for two dimensional thermal and torsion problems.
4. Predict finite element equations for axisymmetric bodies, plate and shell.
5. Apply matrix solution techniques to dynamic problems.
6. Formulate FE equation for structural, heat transfer and vibration problems.

UNIT I INTRODUCTION**9 + 3**

Historical background – Matrix approach – Application to the continuum – Discretization – Matrix algebra – Governing equations for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method

UNIT II ONEDIMENSIONAL PROBLEMS**9 + 3**

Finite element modeling – Coordinates and shape functions – Potential energy approach – Galerkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

UNIT III TWODIMENSIONAL CONTINUUM**9 + 3**

Introduction – Finite element modeling – Scalar valued problem – Poisson equation – Laplace equation – Triangular elements – Element stiffness matrix – Force vector – Galerkin approach – Stress calculation – Temperature effects

UNIT IV AXISYMMETRIC CONTINUUM**9 + 3**

Axisymmetric formulation – Element stiffness matrix and force vector – Galerkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures

UNIT V ISOPARAMETRIC ELEMENTS FOR TWODIMENSIONAL CONTINUUM**9 + 3**

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector – Numerical integration – Stiffness integration – Stress calculations – Four node quadrilateral element.

TOTAL 45 + 15 = 60 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao S.S	The Finite Element Method in Engineering	Butter worth Heinemann imprint, USA	2011
2	Khanka S.S	A First course in the Finite Element Method	Cengage Learning, Stamford, USA	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chandrupatla T.R., and Belegundu A.D	Introduction to Finite Elements in Engineering	Pearson Education, Delhi	2011
2	David V Hutton	Fundamentals of Finite Element Analysis	McGraw-Hill Int. Ed, New York	2007

WEB REFERENCES

1. <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT-KANPUR/mathematics-2/node18.html>
2. <http://www.me.berkeley.edu/~lwlin/me128/FEMNotes.pdf>
3. <http://www.rose-hulman.edu/~fine/FE2004/Class2/Notes2.pdf>
4. <http://www.asiri.net/courses/meng412/m412sm04ex1sol.pdf>
5. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/laplace.html>

COURSE OBJECTIVE

1. To impart knowledge about the elements and techniques involved in Mechatronics systems which are very much essential to understand the emerging field of automation.
2. To understand the concepts of sensors and transducers.
3. To provide an overview of actuation systems.
4. To expose students to controller model for electrical, mechanical and thermal systems.
5. To provide knowledge about various types of controllers.
6. To facilitate the understanding of PLC program using ladder logic.

COURSE OUTCOME

Upon completion of this course, the students can able to

1. Implement the concepts of sensors and transducers.
2. Design the actuation systems.
3. Develop the controller model for electrical, mechanical and thermal systems.
4. Explain about various types of controllers.
5. Create the PLC program using ladder logic.
6. Design Mechatronic system.

UNIT I MECHATRONICS SENSORS AND TRANSducers 9

Introduction to Mechatronics – Systems – Measurement Systems – Control Systems – Traditional design – Microprocessor based Controllers. Introduction to sensors – Performance Terminology – Static and Dynamic characteristics – Displacement – Position and Proximity – Velocity and Motion – Fluid Pressure – Temperature Sensors – Light Sensors – Selection of Sensors – Signal processing – Servo systems.

UNIT II ACTUATORS AND SYSTEM MODELS 9

Pneumatic and Hydraulic Systems – Directional Control Valves – Rotary Actuators. Mechanical Actuation Systems – Cams – Gear Trains – Ratchet and pawl – Belt and Chain Drives – Bearings. Electrical Actuation Systems – Mechanical Switches – Solid State Switches – Solenoids – D.C Motors – A.C Motors – Stepper Motors.

Introduction to system models – Building block of Mechanical, Electrical, Fluid and Thermal Systems.

UNIT III MICROPROCESSORS IN MECHATRONICS 9

Introduction – Architecture – pin configuration Instruction set – Programming of Microprocessors using 8085 instructions – Interfacing. **Input and output devices – interfacing D/A converters and A/D converters – Application – Temperature control – Stepper motor control.**

UNIT IV CONTROLLERS 9

Introduction – Continuous and discrete process Controllers – Control Mode – Two – Step mode – Proportional Mode – Derivative Mode – Integral Mode – PID Controllers – Digital Controllers – Adaptive Control – Digital Logic Control – Micro Processors Control. **Introduction to PLC – Basic Structure – Input / Output Processing – Programming – Mnemonics – Timers, Internal relays and counters – Data Handling – Analog Input / Output – Selection of a PLC.**

UNIT V DESIGN OF MECHATRONIC SYSTEMS 9

Stages in designing Mechatronic Systems – Traditional and Mechatronic Design – Possible Design Solutions – Case Studies of Mechatronics Systems, Pick and place robot – automatic Car Park Systems – Engine Management Systems – Introduction to MEMS.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Bolton W	Mechatronics	Pearson Education, Delhi	2008

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Michael B. Histan David G. Alciatore	Introduction to Mechatronics and Measurement Systems	McGraw–Hill International Editions, New York	2012
2	Bradley D, Buru N.C and Loader A.J	Mechatronics	Chapman and Hall, Pearson Education Asia, New Delhi	2000
3	Ghosh P.K and Sridhar P.R	Introduction to Microprocessors for Engineers and Scientist	Prentice Hall of India, New Delhi	2009

WEB REFERENCE

1. www.cs.indiana.edu

15BEME7E --	DEPARTMENTELECTIVEIV	3 0 0 3100
15BEME7E --	DEPARTMENTELECTIVEV	3 0 0 3100
15 - - --OE--	OPENELECTIVE	3 0 0 3100
15BEME711	CAE /CAMLABORATORY	0 0 4 2100
COURSE OBJECTIVES		
<ol style="list-style-type: none"> 1. To study the features of the software tools needed to analyze engineering problems. 2. To introduce the concepts of the different applications of simulation and analysis tools. 3. To familiarize the students to understand the features of CNC Machine Tool. 4. To make the student acquire sound knowledge on part programming for machining a work. 5. Perform operations in CNC machines like CNC lathe, 6. Perform operations in CNC Vertical Machining Centre 		
COURSE OUTCOME		
Upon completion of this course, the Students will be able to		
<ol style="list-style-type: none"> 1. Perform structural analysis of bars andtrusses 2. Perform structural analysis of beams andframes 3. Perform 2d analysis of plate andshells 4. Perform modal analysis of simplesystems 5. Perform thermal analysis of simplesystems 6. Perform fluid and failure analysis of simplesystems 		
LIST OF EXPERIMENTS		
COMPUTER AIDED ENGINEERING (Simple Analysis using ANSYS Tool)		
<ol style="list-style-type: none"> 1. Stress analysis of rectangular Lbracket 2. Stress analysis of beams (Cantilever, Simply supported, Fixedends) 3. Mode frequency analysis of beams (Cantilever, Simply supported, Fixedends) 4. Harmonic analysis of a 2Dcomponent 5. Thermal stress analysis of a 2Dcomponent 6. Modeling a 3D component. (Single point cutting tool, I beams,etc.,) 		
COMPUTER AIDED MANUFACTURING (CAM)		
<ol style="list-style-type: none"> 1. MANUAL PART PROGRAMMING (Using G and M Codes) in CNCMachine. 2. Part programming for Linear, Circular interpolation, and Contourmotions. 3. Part programming using standard canned cycles for Thread cutting, Drilling, Peck drilling, andBoring. 4. NC code generation using software's like Edge CAM, CREO, etc. CNC Controllers likeFANUC, Siemens, and Hiedenhain etc. 		
TOTAL		45PERIODS

OBJECTIVE

1. To introduce the program for arithmetic functions and the program for sorting, code conversion functions.
2. To enrich the understanding of the program codes to interface with stepper motor.
3. To understand the importance of set speed with actual speed of DC motor by interfacing suitable speed sensors.
4. To introduce the concepts of all the hydraulic, pneumatic and electro pneumatic circuits by using simulation software.
5. To understand the concept of displacement, force and temperature measurement
6. To understand about the controllers

OUTCOME

1. Create the program for arithmetic functions and the program for sorting, code conversion functions.
2. Formulate the program codes to interface with stepper motor.
3. Compare the set speed with actual speed of DC motor by interfacing suitable speed sensors.
4. Integrate all the hydraulic, pneumatic and electro pneumatic circuits by using simulation software.
5. Able to recognize the controllers and their applications
6. Perform the displacement, force and temperature measurement.

LIST OF EXPERIMENTS

1. Design and testing of fluid power circuits to control
(i) Velocity (ii) direction and (iii) force of single and double acting actuators
2. Design of circuits with logic sequence using Electro pneumatic trainer kits.
3. Simulation of basic Hydraulic, Pneumatic and Electric circuits using software
4. Circuits with multiple cylinder sequences in Electro pneumatic using PLC.
5. Servo controller interfacing for open loop
6. PID controller interfacing
7. Stepper motor interfacing with 8051 Microcontroller
(i) Full step resolution (ii) Half step resolution
8. Modeling and analysis of basic electrical, hydraulic and pneumatic systems using LABVIEW
9. Computerized data logging system with control for process variables like pressure, flow and temperature
10. Measurement of displacement using LVDT
11. Measurement of temperature using Thermocouples
12. Measurement of Force using Strain Gage

TOTAL 45 PERIODS

COURSE OBJECTIVES

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Understand the fundamentals of therobots
2. Describe the robot celldesign
3. Know the safety considerations in roboticapplications.
4. The student with knowledge of the singularity issues associated with the operation of robotic systems.
5. The student with some knowledge and analysis skills associated with trajectory planning.
6. The student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT**6**

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Their Functions – Need for Robots – Different Applications. Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features. End Effectors – Grippers. Requirements of a sensor, Principles and Applications of sensors – Position of sensors, Proximity Sensors, Touch Sensors – Camera, Frame Grabber, Sensing and Digitizing Image.

UNIT II ROBOT CELL DESIGN**6**

Robot cell design – simulation software (RoboWave). Robot cell layouts – Multiple robots and machine interference – robot cell planning – robot cycle time analysis for assembly, welding and painting shop.

UNIT III SAFETY CONSIDERATIONS**8**

Safety Considerations for Robot Operations, Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

TOTAL 20 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics - Technology Programming and Applications	McGraw Hill	2001

COURSE OBJECTIVES

1. To understand the working principles of pumps
2. To understand the working principles and motors
3. To develop the system curve
4. To calculate the Net Positive Suction Head
5. To calculate the pump Total Head versus Rate of Flow characteristic
6. To match pumps to variable, parallel and series pumping systems

COURSE OUTCOMES

1. Understand the working principles of pumps.
2. Understand the working principles and motors.
3. Develop the system curve.
4. Calculate the Net Positive Suction Head.
5. Calculate the pump Total Head versus Rate of Flow characteristic.
6. Match pumps to variable, parallel and series pumping systems.

UNIT I SINGLE PHASE INDUCTION MOTOR**6**

Constructional details of single phase induction motor – Principle of operation – Types – Losses and Efficiency – Performance analysis – Starting methods of single-phase induction motors. – Design aspects of motors for usage in submersible pumps – Motors Rating and selection criteria.

UNIT II THREE PHASE INDUCTION MOTOR**6**

Constructional details – Types of rotors – Principle of operation – Need for starters – Types of starters – DOL, Stator resistance and reactance, rotor resistance, autotransformer and star-delta starters – Speed control – Change of voltage, torque, number of poles and slip – Losses and Efficiency – Performance analysis – Design aspects of motors for usage in submersible pumps – Motors Rating and selection criteria.

UNIT III PUMPS**8**

Pumps: definition and classifications – Centrifugal pump: classifications, working principle, velocity triangles, specific speed, efficiency and performance curves – Reciprocating pump: classification, working principle, indicator diagram, work saved by air vessels and performance curves – cavitations in pumps – rotary pumps: working principles of gear and vane pumps

TOTAL 20 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kothari, D. P., and Nagrath, I. J	Electric Machines	Tata McGraw Hill Publishing Company Ltd., New Delhi	2002
2	Bimbhra, P. S	Electrical Machinery	Khanna Publishers, New Delhi	2003

SEMESTER VIII

15BEME801

TOTALQUALITYMANAGEMENT

3 0 0 3100

COURSE OBJECTIVE

1. To introduce the concepts of essentiality of quality.
2. To understand the importance of various TQM principles.
3. To introduce the concepts of the various TQM principles.
4. To Understand the techniques for quality management.
5. To introduce the standard quality systems in industries.
6. To familiarize the students to understand the various techniques to improve the quality in industries.

COURSE OUTCOMES

At the end of the course the student would be able to

1. Understand the essentiality of quality.
2. Summarize various TQM principles.
3. Understand the various TQM principles.
4. Understand the techniques for quality management.
5. Implement standard quality systems in industries.
6. Apply various techniques to improve the quality in industries.

UNIT I ESSENTIALS OF TQM

9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II TQM PRINCIPLES

9

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDCA Cycle, 5S, Kaizen, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT III TQM TOOLS

9

The new seven management tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma – APQP.

UNIT IV TQM TECHNIQUES

9

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT V QUALITY AND ENVIRONMENT SYSTEMS

9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2002 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 and ISO 18001 – Concept, Requirements and Benefits.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dale H. Besterfield	Total Quality Management	Pearson Education, Delhi	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Feigenbaum.A.V	Total Quality Control	McGraw Hill, New Delhi	2004
2	Oakland.J.S	Total Quality Management	Butterworth – Hcinemann Ltd., Oxford	2003
3	Narayana V. and SreenivasanN.S	Quality Management – Concepts and Tasks	New Age International Ltd., New Delhi	2007
4	Zairi	Total Quality Management for Engineers	WoodHead Publishers, New Delhi	1996

WEB REFERENCES:

1. <http://auciello.tripod.com/14tqm.html>
2. <http://www.fkm.utm.my/~shari/download/toc%20paper%20hilma%20tqm%20dis06.pdf>
3. <http://www.businessgyan.com/node/5409>
4. http://www.accelper.com/pdfs/SS_Measurements_Concepts.pdf
5. <http://tutor2u.net/business/strategy/benchmarking.htm>
6. <http://www.trst.com/iso2a.htm>

COURSE OBJECTIVE

1. To understand the concept and basics of thrust areas of Mechanical Engineering.
2. To explain the Review literature to identify gaps and define objectives & scope of the work.
3. To make the student appreciate the purpose of innovative ideas for social benefit.
4. To understand the importance of a prototypes/models, experimental set-up and software systems necessary to meet the objectives.
5. To familiarize the students to understand the methods and materials to carry out experiments/develop code.
6. To Reorganize the procedures with a concern for society, environment and ethics

COURSE OUTCOME

1. Identify thrust areas of Mechanical Engineering.
2. Review literature to identify gaps and define objectives & scope of the work.
3. Generate and implement innovative ideas for social benefit.
4. Develop a prototypes/models, experimental set-up and software systems necessary to meet the objectives.
5. Identify methods and materials to carry out experiments/develop code.
6. Reorganize the procedures with a concern for society, environment and ethics

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL 360PERIODS

DEPARTMENT ELECTIVES

15BEME5E01

COMPUTERAIDED DESIGN

3 0 0 3100

COURSE OBJECTIVE

1. To apply basic concepts to develop construction (drawing) techniques.
2. To ability to manipulate drawings through editing and plotting techniques.
3. To understand geometric construction and Produce template drawings.
4. To understand and demonstrate dimensioning concepts and techniques.
5. To understand Section and Auxiliary Views.
6. To become familiar with Solid Modelling concepts and techniques.

COURSE OUTCOMES:

Upon completion of the course, the students will be able to

1. Apply basic concepts to develop construction (drawing) techniques.
2. Ability to manipulate drawings through editing and plotting techniques.
3. Understand geometric construction and Produce template drawings.
4. Understand and demonstrate dimensioning concepts and techniques
5. Understand Section and Auxiliary Views
6. Become familiar with Solid Modelling concepts and techniques.

UNIT I OVERVIEW OF CAD SYSTEMS

9

Conventional and computer aided design processes-advantages and disadvantages. Subsystems of CAD-CAD hardware and software, analytical and graphics packages, CAD workstations. Networking of CAD systems.

UNIT II INTERACTIVE COMPUTER GRAPHICS AND GRAPHIC TRANSFORMATIONS

9

Generative, cognitive and image processing graphics. Static and dynamic data graphics. Transport of graphics data. Graphic standards. Generation of graphic primitives - display transformation in Two- and Three – Dimensional graphics concepts, Graphical input technique, Geometric transformations, Visual Realism, Computer animation, customizing graphics software.

UNIT III GEOMETRIC MODELING

9

Wireframe, surface, NURBS and solid modeling-applications and advantages. Creating primitive solids, sweeping solids, boolean operations. Extracting entities from a solid. Filleting of edges of solids. Boundary representation (B-rep) Constructive Solid Geometry(CSG) and Analytical Solid Modeling(ASM)

UNIT IV PARAMETRIC DESIGN AND OBJECT REPRESENTATION

9

Types of co-ordinate systems. Parametric design - definition and advantages. Parametric representation of analytic and synthetic curves. Parametric representation of surfaces and solids - manipulations.

UNIT V PRODUCT DESIGN AND DEVELOPMENT

9

Automated 2D drafting - basics, mechanical assembly - bill of materials generation. Mass property calculations.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Vera B Anand	Computer Graphics and Geometric Modeling for Engineers	John Wiley & Sons, New York	2000
2	Radhakrishnan P and Subramanyan S	CAD/CAM/CIM	New Age International Pvt. Ltd	2004

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Radhakrishnan P and Kothandaraman C P	Computer Graphics and Design	Dhanpat Rai & Sons, New Delhi	2002
2	Ibrahim Zeid	CAD/CAM Theory and Practice	McGraw Hill Inc., New York	2003
3	Barry Hawhes	The CAD/CAM Process	Pitman Publishing, London	1998
4	William M Newman and Robert Sproul	Principles of Interactive Computer Graphics	McGraw Hill Inc., New York	1994
5	Sadhu Singh	Computer-Aided Design and Manufacturing	Khanna Publishers, New Delhi	1998
6	Rao S S	Optimisation Techniques	Wiley Eastern, New Delhi	2003

COURSE OBJECTIVES

1. To understand the application of computers in various aspects of Manufacturing viz., Design, proper planning, Manufacturing cost, Layout & Material Handlingsystem.
2. To know the application of principles of group technology in computer aided processplanning.
3. To impart knowledge on working of the shop floorcontrol
4. To Study and acquire knowledge on data collection system in FMS.
5. To familiarize the students to understand CIM architecture for practicalapplication.
6. To expose students to generate database for computer integrated manufacturingprocesses.

COURSE OUTCOMES

Upon completion of this course, the student can able to

1. Implement computer integrated manufacturing concepts in industries.
2. Apply the principles of group technology in computer aided processplanning.
3. Understand the working of the shop floorcontrol
4. Implement automated data collection system in FMS.
5. Develop CIM architecture for practicalapplication.
6. Generate database for computer integrated manufacturingprocesses.

UNIT I INTRODUCTION**9**

The meaning and origin of CIM– the changing manufacturing and management scene – External communication – islands of automation and software–dedicated and open systems–manufacturing automation protocol – product related activities of a company– marketing engineering – production planning – plant operations – physical distribution– business and financial management.

UNIT II GROUP TECHNOLOGY**9**

Group technology– – part families – Classification and coding – Approaches to computer aided process planning –variant approach and generative approaches

UNIT III SHOP FLOOR CONTROL AND INTRODUCTION OF FMS**9**

Shop floor control–phases –factory data collection system –automatic identification methods– Bar code technology–automated data collection system. **FMS–components of FMS – types –FMS workstation –material handling and storage systems– FMS layout –computer control systems–application and benefits.**

UNIT IV CIM IMPLEMENTATION AND DATA COMMUNICATION**9**

CIM and company strategy – system modeling tools –IDEF models – activity cycle diagram – CIM open system architecture (CIMOSA)– manufacturing enterprise wheel–CIM architecture – Product data management–CIM implementation software. **Communication fundamentals– local area networks –topology – LAN implementations – network management and installations –MRP, ERP concepts**

UNIT V OPEN SYSTEM AND DATABASE FOR CIM**9**

Open systems–open system inter connection – manufacturing automations protocol and technical office protocol (MAP /TOP).

Development of databases –database terminology– architecture of database systems–data modeling and data associations –relational data bases – database operators – advantages of data base and relational database.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mikell.P.Groover	Automation, Production Systems and computer integrated manufacturing	Pearson Education, Delhi	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yoremkoren	Computer Integrated Manufacturing system	McGraw-Hill, New York	2005
2	Kant Vajpayee S	Principles of computer integrated manufacturing	Prentice Hall India, New Delhi	2003
3	Radhakrishnan P and Subramanyan S	CAD/CAM/CIM, 2 nd Edition	New Age International (P) Ltd, New Delhi	2000

WEB REFERENCES

1. http://en.wikipedia.org/wiki/Computer-integrated_manufacturing
2. <http://www.technologystudent.com/rmgrp07/intman1.html>
3. <http://www.computerintegratedmanufacturing.com/>

COURSE OBJECTIVES

1. To provide knowledge on different aspects of powder metallurgy parameters.
2. To understand the importance of principle of advanced welding processes and its application.
3. To understand the importance of advanced forming processes and its application.
4. To familiarize the students to advanced manufacturing process for processing of different materials.
5. To acquaint the student to apply the suitable rapid prototyping mechanism for industry need.
6. To provide knowledge on optimum parametric for advanced manufacturing process.

COURSE OUTCOMES

Upon the completion of this course, the students will be able to

1. Understand different aspects of powder metallurgy parameters.
2. Understand basic principle of advanced welding processes and its application.
3. Understand basic principle of advanced forming processes and its application.
4. Select the best suitable advanced manufacturing process for processing of different materials.
5. Apply the suitable rapid prototyping mechanism for industry need.
6. Select the optimum parametric for advanced manufacturing process.

UNIT I POWDERMETALLURGYPROCESS 9

Introduction to powder metallurgy process – preparation of powders – types and functions of binders – green compaction – sintering process and its effect on the product.

UNIT II ADVANCEDWELDINGPROCESSES 9

Percussion Welding– Electro Slag Welding, Plasma Arc Welding – Thermit Welding – Electron Beam Welding – Friction and Inertia Welding – Friction Stir Welding – Under Water WeldingProcess.

UNIT III SHEET METAL ANDFORMINGPROCESS 9

Working principle and application of special forming process – Hydro Forming– Rubber Pad Forming– Explosive Forming – Magnetic Pulse Forming– Peen Forming – Super Plastic Forming – Deep Drawing Process.

UNIT IV ADVANCEDMACHININGPROCESS 9

Modern machining process: Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, Electro chemical Machining, Electro chemical Grinding, Electro Discharge Machining, wire cut EDM, Electron Beam Machining, plasma arc machining, Laser Beam Machining. Ultrasonic Machining, High speed machining process – deep hole drilling process

UNIT V RAPIDPROTOTYPING 9

Introduction to Rapid Prototyping – Need for RPT– Stereo–lithography – Selective Laser Sintering, Fused Deposition Modeling, Laminated Object Manufacturing, Solid Ground Curing, Ballistic Particle Manufacturing

TOTAL 45PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Seropekalkpakjian and Steven.R. Schmid	Manufacturing process for engineering materials	Pearson Education, Inc	2009
2	O.P.Khanna	A Textbook OfWWelding Technology	Dhanpat Rai Publications Pvt Ltd	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	P.N. Rao	Manufacturing technology Volume I	TMH Ltd	2013
2	Singh, M.K	Unconventional Manufacturing Process	New age international	2008
3	Vijay.K Jain	Advanced Machining Processes	Allied Publishers Pvt. Ltd	2009

WEB REFERENCES

1. <http://mfg.eng.rpi.edu/gmp/WebChapters/ch39.pdf>
2. http://web.iitd.ac.in/~pmpandey/MEL120_html/RP_document.pdf
3. <http://www.me.psu.edu/lamancusa/rapidpro/rpintro2.pdf>
4. <http://file.guiacnc.com.br/data/PDF/PrototypeBook2.pdf>

COURSE OBJECTIVES

1. To recognize symbols and fundamentals in fluid power generation and distribution.
2. To identify power source for hydraulic systems.
3. To select appropriate components used in various hydraulic systems.
4. To design hydraulic circuits for given applications.
5. To distinguish the components used in pneumatic circuits.
6. To create the logic circuits for controlling electro-hydraulic/ pneumatic systems.

COURSE OUTCOMES

At the end of the course, the students will be able to

1. Recognize symbols and fundamentals in fluid power generation and distribution.
2. Identify power source for hydraulic systems.
3. Select appropriate components used in various hydraulic systems.
4. Design hydraulic circuits for given applications.
5. Distinguish the components used in pneumatic circuits.
6. Create the logic circuits for controlling electro-hydraulic/ pneumatic systems.

UNIT I FLUID POWER SYSTEMS AND FUNDAMENTALS**9**

Introduction to fluid power, Advantages of fluid power, Application of fluid power system. Types of fluid power systems, Properties of hydraulic fluids – General types of fluids – Fluid power symbols. Basics of Hydraulics–Applications of Pascals Law– Laminar and Turbulent flow – Reynold's number – Darcy's equation – Losses in pipe, valves and fittings.

UNIT II HYDRAULIC SYSTEM AND COMPONENTS**9**

Sources of Hydraulic Power: Pumping theory – Pump classification – Gear pump, Vane Pump, piston pump, Pressure boosting pumps, construction and working of pumps – pump performance – Variable displacement pumps. Fluid Power Actuators: Linear hydraulic actuators – Types of hydraulic cylinders – Single acting, Double acting special cylinders like tandem, Rodless, Telescopic, Cushioning mechanism, Construction of double acting cylinder, Rotary actuators – Fluid motors, Gear, Vane and Piston motors.

UNIT III DESIGN OF HYDRAULIC CIRCUITS**9**

Construction of Control Components : Direction control valve – 3/2 way valve – 4/2 way valve – Shuttle valve – check valve – pressure control valve – pressure reducing valve, sequence valve, Flow control valve – Fixed and adjustable, electrical control solenoid valves, Relays, ladder diagram. Accumulators and Intensifiers: Types of accumulators – Accumulators circuits, sizing of accumulators, intensifier – Applications of Intensifier – Intensifier circuit.

UNIT IV PNEUMATIC SYSTEMS AND COMPONENTS**9**

Pneumatic Components: Properties of air – Compressors – Filter, Regulator and Lubricator UNIT Air control valves, Quick exhaust valves, pneumatic actuators. Fluid Power Circuit Design, Speed control circuits, synchronizing circuit, Pneumatic hydraulic circuit, Sequential circuit design for simple applications using cascade method.

UNIT V DESIGN OF PNEUMATIC CIRCUITS**9**

Servo systems – Hydro Mechanical servo systems, Electro hydraulic servo systems and proportional valves. Fluidics – Introduction to fluidic devices, simple circuits, Introduction to Electro Hydraulic Pneumatic logic circuits, ladder diagrams, PLC applications in fluid power control. Fluid power circuits; failure and troubleshooting.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Anthony Esposito	Fluid Power with Applications	Pearson Education, New Delhi	2013
2	Majumdar S.R	Oil Hydraulics	Tata McGraw–Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Majumdar S.R	Pneumatic systems – Principles and maintenance	Tata McGraw Hill, New Delhi	2006
2	Anthony Lal	Oil hydraulics in the service of industry	Allied publishers, New Delhi	1982
3	Michael J, Princes and AshbyJ.G	Power Hydraulics	Prentice Hall of India, New Delhi	1996

WEB REFERENCES

1. http://www.g-w.com/PDF/SampChap/60525_0816_Ch02.pdf
2. http://www.engineeringtoolbox.com/classification-pumps-d_55.html
3. <http://www.omega.com/auto/pdf/SimpValvesguide.pdf>

COURSE OBJECTIVES

1. To give exposure to accessories and layout required for a steam power plant depending upon the requirements.
2. To study performance of steam power plant.
3. To make the student acquire sound knowledge of working of nuclear and hydel power plant.
4. To study the features of gas turbine power plant.
5. To make the student acquire sound knowledge of economics of the power plant.
6. To make the student acquire sound knowledge on renewable energy technologies and availability.

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Select the accessories and layout required for a steam power plant depending upon the requirements.
2. Compute performance of steam power plant.
3. Explain the working of nuclear and hydel power plant.
4. Compute performance of gas turbine power plant.
5. Calculate the economics of the power plant.
6. Apply appropriate type of renewable energy technologies depending upon the application and availability.

UNIT I INTRODUCTION TO POWER PLANTS AND BOILERS**9**

Layout of Steam, Hydel, Diesel, MHD, Nuclear and Gas Turbine Power Plants – Combined Power Cycles – Comparison and Selection, Load Duration Curves.

Steam Boilers and Cycles – High Pressure and Super Critical Boilers – Fluidised Bed Boilers – Industrial Standards.

UNIT II STEAM POWER PLANT**9**

Fuel and Ash Handling, Combustion Equipment for burning coal, Mechanical Stokers, Pulveriser, Electrostatic Precipitator, Draught – different types, Surface Condenser Types, Cooling Towers

UNIT III NUCLEAR AND HYDEL POWER PLANTS**9**

Nuclear Energy – Fission, Fusion Reaction, Types of Reactors, pressurized water reactor, Boiling Water Reactor, Waste Disposal and safety.

Hydel Power Plant – Essential Elements, Selection of Turbines, Governing of Turbines – Micro Hydel developments.

UNIT IV DIESEL AND GAS TURBINE POWER PLANT**9**

Types of Diesel Plants, Components, Selection of Engine Type, Applications Gas Turbine Power Plant – Fuels – Gas Turbine Material – Open and Closed Cycles – Reheating – Regeneration and Intercooling – Combined Cycle.

UNIT V OTHER POWER PLANTS AND ECONOMICS OF POWER PLANTS**9**

Geo thermal – OTEC – Tidal – Pumped storage – Solar thermal central receiver system.

Cost of Electric Energy – Fixed and operating Costs – Energy Rates – Types of Tariffs – Economics of load sharing, comparison of economics of various power plants.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arora S.C and Domkundwar S	A course in Power Plant Engineering	Dhanpatrai Publishers, New Delhi	1988

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nag P.K	Power plant Engineering	Tata McGraw Hill, New Delhi	2007
2	Rajput R.K	Power Plant Engineering	Laxmi Publications, Chennai	2008
3	Morse Frederick T	Power Plant Engineering	Prentice Hall of India, New Delhi	1998

WEB REFERENCES

1. www.solarpaces.org
2. www.igcar.gov.in
3. ga.water.usgs.gov
4. www.mapsofindia.com

COURSE OBJECTIVES

1. To impart knowledge on the principles of locating and clamping devices in machining process.
2. To familiarize the students to understand design of jigs for a given component.
3. To Study and acquire knowledge on design fixtures for a given component.
4. To make the student acquire sound knowledge on appropriate type of press tool for a given component.
5. To expose students to drawing die for a given component.
6. To give exposure to the use computer aids for sheet metal forming analysis

COURSE OUTCOMES

Upon the completion of this course the students will be able to

1. Summarize the principles of locating and clamping devices in machining process.
2. Design jigs for a given component.
3. Design fixtures for a given component.
4. Design an appropriate type of press tool for a given component.
5. Develop a drawing die for a given component.
6. Use computer aids for sheet metal forming analysis

UNIT I PURPOSE TYPES AND FUNCTIONS OF JIGS AND FIXTURES**9**

Tool design objective – Production devices – Inspection devices – Materials used in Jigs and Fixtures – Types of Jigs – Types of Fixtures–Mechanical actuation–pneumatic and hydraulic actuation–Analysis of clamping force–Tolerance and error analysis.

UNIT II JIGS**9**

Drill bushes –different types of jigs–plate latch, channel, box, post, angle plate, angular post, turnover, pot jigs–Automatic drill jigs–Rack and pinion operated. Air operated Jigs components. Design and development of Jigs for given components.

UNIT III FIXTURES**9**

General principles of boring, lathe, milling and broaching fixtures– Grinding, planning and shaping fixtures, assembly, Inspection and welding fixtures– Modular fixtures. Design and development of fixtures for given component.

UNIT IV PRESS WORKING TERMINOLOGIES AND ELEMENTS OF DIES AND STRIP LAY OUT**9**

Press working terminology–Presses and press accessories–Computation of capacities and tonnage requirements. Elements of progressive combination and compound dies:Die block–die shoe. Bolster plate–punch plate–punch holder–guide pins and bushes – strippers – knockouts–stops –pilots–Selection of standard die sets strip lay out–strip lay out calculations

UNIT V DESIGN AND DEVELOPMENT OF DIES**9**

Design and development of progressive and compound dies for Blanking and piercing operations. Bending dies – development of bending dies–forming and drawing dies–Development of drawing dies. Design considerations in forging, extrusion, casting and plastic dies.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Edward G Hoffman	Jigs and Fixture Design	Thomson – Delmar Learning, Singapore	2004
2	Donaldson C	Tool Design	Tata McGraw–Hill, New Delhi	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kempster	Jigs and Fixtures Design	Tata McGraw–Hill Publishing, New Delhi	2004
2	Joshi P.H	Jigs and Fixtures Second Edition	Tata McGraw–Hill Publishing Company Limited, New Delhi	2010
3	Hiram E Grant	Jigs and Fixture	Tata McGraw–Hill, New Delhi	2003

WEB REFERENCES

1. www.wisetool.com
2. www.invert-a-bolt.com
3. www.diemech.com
4. www.schaeferertools.com
5. www.steelsmith.com

COURSE OBJECTIVES

1. To introduce Governing Equations of viscous fluidflows
2. To introduce numerical modeling and its role in the field of fluid flow and heattransfer
3. To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.
4. To create confidence to solve complex problems in the field of fluid flow and heat transfer by using high speed computers.
5. To equip them with skills to solve convection and diffusion problems
6. To understand the importance continuity and momentum equations for different types of fluid flow

COURSE OUTCOMES

Upon completion of this course, the students can able

1. Identify, solve engineering problems by computational fluid dynamics.
2. Understand the importance of governing equations involved in CFD
3. Formulate and solve problems in the field of fluid flow and heat transfer.
4. Solve the heat conduction problems using finite difference method.
5. Analyze and provide solutions for convection and diffusion problems.
6. Develop continuity and momentum equations for different types of fluid flow.

UNIT I GOVERNING EQUATIONS AND BOUNDARY CONDITIONS**9**

Basics of computational fluid dynamics – Governing equations of fluid dynamics – Continuity, Momentum and Energy equations – Chemical species transport – Physical boundary conditions – Time-averaged equations for Turbulent flow – Turbulence – Kinetic – Energy Equations – mathematical behavior of PDEs on CFD: Elliptic, Parabolic and Hyperbolic equations.

UNIT II DISCRETIZATION AND SOLUTION METHODOLOGIES**9**

Methods of Deriving the Discretization Equations – Taylor Series formulation – Finite difference method – Control volume Formulation – Spectral method.

Solution methodologies: Direct and iterative methods, Thomas algorithm, Relaxation method, Alternating Direction Implicit method.

UNIT III HEAT CONDUCTION**9**

Finite difference and finite volume formulation of steady/transient one-dimensional conduction equation, Source term linearization, Incorporating boundary conditions, Finite volume formulations for two and three dimensional conduction problems

UNIT IV CONVECTION AND DIFFUSION**9**

Finite volume formulation of steady one-dimensional convection and Diffusion problems, Central, upwind, hybrid and power-law schemes – Discretization equations for two dimensional convection and diffusion.

UNIT V CALCULATION OF FLOW FIELD**9**

Representation of the pressure – Gradient term and continuity equation – Staggered grid – Momentum equations – Pressure and velocity corrections – Pressure – Correction equation, SIMPLE algorithm and its variants. Turbulence models: mixing length model, two equation ($k-\epsilon$) models.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Versteeg H.K and Malalasekera.W	An Introduction to Computational Fluid Dynamics	Pearson education ltd, UK	2008
2	Ghoshdastidar P.S	Computer Simulation of flow and heat transfer	Tata McGraw-Hill Publishing Company Ltd., New Delhi	1998

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Patankar S.V	Numerical Heat Transfer and Fluid Flow	McGraw–Hill book company, New Delhi	1980
2	Muralidhar K and Sundarajan T	Computational Fluid Flow and Heat Transfer	Narosa Publishing House, New Delhi	2013
3	Bose T.K. Jain	Numerical Fluid Dynamics	Narosa publishing House, New Delhi	2005

WEB REFERENCES

1. <http://www.ams.org/mcom//.pdf>
2. <http://www.cham.co.uk/website/new/cfdintro.htm>
3. <http://www.mechartes.com/>
4. <http://www.technologystudent.com>
5. http://web.njit.edu/topics/Prog_Lang_Docs/html/FLUENT/fluent/fluent5/ug/html/node594.htm

COURSE OBJECTIVES

1. To provide an overview of factors affecting the behavior of materials in components.
2. To expose students to understand the mechanism of fracture.
3. To Study and acquire knowledge on Dynamic and Time-dependent fracture.
4. To study the features of fracture toughness values.
5. To provide an overview of life prediction
6. To Study and acquire knowledge on failure analysis tools in industries

COURSE OUTCOMES

1. Identify the Factors affecting the behavior of materials in components.
2. Understand the mechanism of fracture.
3. Understand the Dynamic and Time-dependent fracture.
4. Determine the fracture toughness values.
5. Improve the life of product through life prediction
6. Use various failure analysis tools in industries.

UNIT I MATERIALS AND DESIGN PROCESS**9**

Factors affecting the behavior of materials in components, effect of component geometry and shape factors, design for static strength, stiffness, designing with high strength and low toughness materials, designing for hostile environments, material processing and design, processes and their influence on design, process attributes, systematic process selection, screening, process selection diagrams, ranking, process cost.

UNIT II FRACTURE MECHANICS**9**

Ductile fracture, brittle fracture, Cleavage-fractography, ductile-brittle transition-Fracture mechanics approach to design-energy criterion, stress intensity approach, time dependent crack growth and damage. Linear Elastic Fracture Mechanics - Griffith theory, Energy release rate, instability and R-curve, stress analysis of cracks-stress intensity factor, K-threshold, crack growth instability analysis, crack tip stress analysis. Elastic Plastic Fracture Mechanics - Crack tip opening displacement(CTOD), J integral, relationship between J and CTOD,

UNIT III DYNAMIC AND TIME-DEPENDENT FRACTURE**9**

Dynamic fracture, rapid loading of a stationary crack, rapid crack propagation, dynamic contour integral, Creep crack growth-C Integral, Visco elastic fracture mechanics, viscoelastic J integral

UNIT IV DETERMINATION OF FRACTURE TOUGHNESS VALUES**9**

Experimental determination of plane strain fracture toughness, K- R curve testing, J measurement, CTOD testing, effect of temperature, strain rate on fracture toughness.

UNIT V FAILURE ANALYSIS TOOLS**9**

Reliability concept and hazard function, life prediction, life extension, application of poisson, exponential and Weibull distribution for reliability, bath tub curve, parallel and series system, MTBF, MTTR, FMEA definition- Design FMEA, Process FMEA , analysis causes of failure, modes, ranks of failure modes, fault tree analysis, industrial case studies/projects on FMEA.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John M Barsoom and Stanley T Rolte	Fracture and Fatigue Control in Structures	Prentice Hall, New Delhi	1987
2	Michael F Ashby	Material Selection in Mechanical Design	Butterworth – Heinemann	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
--------	----------------	-------------------	-----------	---------------------

15BEME6E04**FAILURE ANALYSIS AND DESIGN****3 0 0 3100**

1	Shigley and Mische	Mechanical Engineering Design	McGraw Hill Inc., New York	1992
2	Mahmoud M Farag	Material Selection for Engineering Design	Prentice Hall, New Delhi	1997
3	Faculty of Mechanical Engineering	Design Data Book	PSG College of Technology, DPV Printers, Coimbatore	1993
4	ASM Metals Handbook	Failure Analysis and Prevention	ASM Metals Park, Ohio, USA,	1995

COURSE OBJECTIVES

1. To explain importance of renewable energy resources.
2. To understand the importance of basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
3. To understand the importance of principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen.
4. To study the features of design principles of biogas plants.
5. Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
6. To give exposure to power plants working with non-conventional energy.

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Understand the importance of renewable energy resources.
2. Understand the basic concepts of solar radiation and analyze the working of solar PV and thermal systems.
3. Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen.
4. Implement design principles of biogas plants.
5. Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
6. Able to classify and select the best renewable energy sources for the system under analysis.

UNIT I ENERGY AND ENVIRONMENT**9**

Primary energy sources – world energy resources – Indian energy scenario – energy cycle of the earth – environmental aspects of energy utilisation, CO₂ emissions and Global warming – renewable energy resources and their importance. Potential impacts of harnessing the different renewable energy resources.

UNIT II SOLAR ENERGY**9**

Principles of solar energy collection – solar radiation – measurements – instruments – data and estimation – types of collectors – characteristics and design principles of different type of collectors – performance of collectors – testing of collectors. Solar thermal applications – water heaters and air heaters – performance and applications – simple calculations – solar cooling – solar drying – solar ponds – solar tower concept – solar furnace.

UNIT III WIND, TIDAL AND GEOTHERMAL ENERGY**9**

Energy from the wind – general theory of windmills – types of windmills – design aspects of horizontal axis windmills – applications. Energy from tides and waves – working principles of tidal plants and ocean thermal energy conversion plants – power from geothermal energy – principle of working of geothermal power plants.

UNIT IV BIOENERGY**9**

Energy from bio mass and bio gas plants – various types – design principles of biogas plants – applications. Energy from wastes – waste burning power plants – utilization of industrial and municipal wastes – energy from the agricultural wastes.

UNIT V OTHER RENEWABLE ENERGY SOURCES**9**

Direct energy conversion (Description, principle of working and basic design aspects only) – Magneto hydrodynamic systems (MHD) – thermoelectric generators – thermionic generators – fuel cells – solar cells – types, Emf generated, power output, losses and efficiency and applications. Hydrogen conversion and storage systems

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai G.D	An Non conventional Energy sources	Khanna Publishers, New Delhi	2011
2	Duffie and Beckmann	Solar Energy Thermal Processes	John Wiley, London	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sukhatme S.P	Solar Energy	Tata McGraw Hill, New Delhi	2003
2	Garg. H. P and Prakash J	Solar Energy - Fundamentals and applications	Tata McGrawHill, New Delhi	2007
3	Ashok V Desai	Non-conventional Energy	Wiley Eastern Ltd, New Delhi	1990

WEB REFERENCES

1. http://www.apricus.com/html/solar_typesofsolar.htm
2. <http://www.solarserver.de/wissen/sonnenkollektoren-e.html>
3. <http://earthsci.org/mineral/energy/wind/wind.html>
4. <http://www.biomassgasification.com/>

COURSE OBJECTIVES

1. To familiarize the students in the Science of Precision Engineering.
2. To provide and enhance the technical knowledge in precision manufacturing and error control.
3. To create the awareness among students about new trends in manufacturing and its precise control.
4. To learn micro electro mechanical systems.
5. To learn bulk micro machining and Nano technology.
6. To acquire knowledge about accuracy, micro finishing processes and unconventional machining.

COURSE OUTCOMES

The students would be able to understand

1. The meaning precision machining and the importance of it.
2. The requirements of machine network elements to achieve precision in the components.
3. The principles of various precision engineering processes and apply them in actual field.
4. Various method of micromachining using LASER and other processes.
5. Learn micro electro mechanical systems.
6. Learn bulk micro machining and Nano technology.

UNIT I ACCURACY**9**

Concept of accuracy – accuracy of numeric control systems, acceptance test for machine tools. Factors Affecting Accuracy - Static stiffness and its influence on machining accuracy, inaccuracies due to thermal effects, influence of forced vibrations on accuracy, dimensional wear of cutting tools and its influence on accuracy.

UNIT II MICROFINISHING PROCESS**9**

Surface roughness, bearing area curves, surface texture measurement, methods of improving accuracy and surface finish, finish boring, finish grinding, precision cylindrical grinding, micro machining, precision micro drilling.

UNIT III UNCONVENTIONAL MACHINING**9**

Precision, cut in wire, EDM machining, electro mechanical grinding, electron beam machining, laser beam machining.

UNIT IV MICRO ELECTROMECHANICAL SYSTEMS**9**

Introduction to silicon processing, wafer cleaning, diffusion and ion implantation, oxidation, photolithography, photo resist, resist strip, electron beam and X-ray lithography, thin film deposition, evaporation, sputtering, molecular beam epitaxy, chemical vapour deposition, electro plating.

UNIT V BULK MICRO MACHINING AND NANOTECHNOLOGY**9**

Wet etching, isotropic etching, anisotropic etching, dry etching, physical etching, reactive ion etching, Nano Technology, nano-grating system, nano-lithography, fabrication of CCDs, nano processing of materials for super high density ICs, nano-mechanical parts.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murthy R L	Precision Engineering in Manufacturing	New Age International Publishers, Chennai	1996
2	Mark J Madou	Fundamentals of Micro Fabrication	CRC Press, New York	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Davidson	Handbook of Precision Engineering Vol. 1, 12	McMillan	1972
2	Jaeger R C	Introduction to Micro Electronics Fabrication	Addison Wesley, England	1988
3	Chang C V, Sze S M	VLSI Technology	Tata McGraw Hill, New Delhi	2003
4	BhartBhusshan	Handbook of Nano Technology	Springer Verlag, Germany	2004
5	Nano Tanigudi	Nanotechnology	Oxford University Press, New York	2003

COURSE OBJECTIVES

1. To understand objectives, Strategies, Policies and Plan.
2. To introduce plans by directing and controlling.
3. To Understand the need of Engineering Ethics.
4. To Understand the forces that shape culture.
5. To develop the entrepreneurial skills.
6. To make the students conversant to execute an engineering plan with ethics

COURSE OUTCOMES

1. Prepare objectives, Strategies, Policies and Plan.
2. Execute plans by directing and controlling.
3. Understand the need of Engineering Ethics.
4. Understand the forces that shape culture.
5. Show the entrepreneurial skills.
6. Execute an engineering plan with ethics

UNIT I ENTREPRENEURSHIP**9**

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT II MOTIVATION**9**

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS**9**

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT IV FINANCING AND ACCOUNTING**9**

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, Management of working Capital, Costing, Break Even Analysis, Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT V SUPPORT TO ENTREPRENEURS**9**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures - Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Khanka. S.S	Entrepreneurial Development	S.Chand & Co. Ltd., New Delhi	2013
2	Donald F Kuratko	Entrepreneurship – Theory, Process and Practice	Cengage Learning	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hisrich R D, Peters M	Entrepreneurship	Tata McGraw-Hill	2013
2	Mathew J Manimala	Enterprenuership theory at cross roads: paradigms and praxis	Dream tech	2005
3	Rajeev Roy	Entrepreneurship	Oxford University Press	2011

COURSE OBJECTIVES

1. To Understand and apply the principles of science, technology, engineering, and math to solve industry–related problems.
2. To Understand the concepts and terminologies in Industries
3. To Study and acquire knowledge in creating an industrial design layout
4. To introduce the methods involved in materials handling
5. To understand the knowledge in analysis of work processing happening in industries
6. To equip them with skills to perform work measurement in an industry

COURSE OUTCOMES

Upon completion of this course, the student can able to

1. Understand the concepts and terminologies in Industries
2. apply their knowledge in creating an industrial design layout
3. understand the methods involved in materials handling
4. apply their knowledge in analysis of work processing happening in industries
5. perform work measurement in an industry
6. understand the role of human involvement in industrial work system design

UNIT I INTRODUCTION TO INDUSTRIAL ENGINEERING 9

for layout study – types of layout. Plant location analysis – factors, costs, location decisions – simple problems in single facility location models, network location problems.

UNIT II LAYOUT DESIGN 9

Design cycle – SLP procedure manpower, machinery requirements – computer algorithms – ALDEP, CORELAP, CRAFT

UNIT III QUANTITATIVE METHODS AND MATERIAL HANDLING 9

Group technology – Production Flow analysis (PFA), ROC (Rank Order Clustering) – Line balancing. Principles, unit load concept, material handling system design, handling equipment types, selection and specification, containers and packaging.

UNIT IV OPERATIONS ANALYSIS AND WORK MEASUREMENT 9

Productivity and living standards, Productivity measurement, work design and Productivity – process planning – types. Total time for a job or operation, total work content and ineffective time, methods and motions, graphic tools. Stop watch time study – time study through video graphy, Standard data, methods time measurement (MTM), Development of Production Standards, learning effect.

UNIT V HUMAN FACTORS IN WORK SYSTEM DESIGN 9

Human factors Engineering/Ergonomics, human performance in physical work, anthropometry, design of work station, design of displays and controls.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	O.P. Khanna	Industrial Engineering And Management	Dhanpat rai and Co	2012
2	M.Mahajan	Industrial Engineering and Production Management	Dhanpat rai and Co	2008

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Tompkins .J.A. and J.A. White	Facilities planning	John Wiley	2010
2	James Apple,M.Plant	Material Handling	John Wiley	1977
3	Barnes,R.M	Motion and Time study	John Wiley	1980
4	Bridger R.S	Introduction to Ergonomics	McGraw Hill	2008

WEB REFERENCES

1. <http://www.websukat.com/PAOM-plant-layout.htm>
2. http://www.du.ac.in/fileadmin/DU/Academics/course_material/EP_07.pdf
3. <http://www.scribd.com/doc/60109160/8/Rank-Order-Clustering-Method>
4. <http://www.zalzala.info/IKMA/LinkedDocuments/GAManufacturing/sld006.htm>
5. <http://www.wrebn.nl/16.pdf>

COURSE OBJECTIVES

1. To understand the importance of the DFM approach and guidelines
2. To enrich the understanding of the selective assembly and Datum systems
3. To introduce the concepts of demonstrate true Position tolerancing theory.
4. To develop an understanding of the standard techniques and redesigning cast members using weldments and plastic component manufacturing.
5. To equip them with skills on Tolerance Charting Technique.
6. To Study and acquire knowledge of the various factors influencing the manufacturability of components and the use of tolerances in manufacturing

COURSE OUTCOMES

Upon completion of this course, the students will be able to,

1. Understand the DFM approach and guidelines
2. Understand the selective assembly and Datum systems
3. Demonstrate true Position tolerancing theory.
4. Understand redesigning cast members using weldments and plastic component manufacturing.
5. Demonstrate the Tolerance Charting Technique.
6. Know the various factors influencing the manufacturability of components and the use of tolerances in manufacturing

UNIT I DFM APPROACH, SELECTION AND SUBSTITUTION OF MATERIALS IN INDUSTRY 9

DFM approach, DFM guidelines, standardisation, group technology, value engineering, comparison of materials on cost basis, design for assembly, DFA index, Poka – Yoke principle; 6σ concept; Tolerance Analysis: Process capability, process capability metrics, Cp, Cpk, cost aspects, feature tolerances, geometric tolerances, surface finish, review of relationship between attainable tolerance grades and different machining process, cumulative effect of tolerances, sure fit law, normal law and truncated normal law.

UNIT II SELECTIVE ASSEMBLY 9

Interchangeable and selective assembly, deciding the number of groups, Model–I: group tolerances of mating parts equal; Model–II: total and group tolerances of shaft, control of axial play.

Datum Systems: Grouped datum systems—different types, two and three mutually perpendicular grouped datum planes, grouped datum system with spigot and recess, pin and hole, and tongue–slot pair, computation of translational and rotational accuracy.

UNIT III TRUE POSITION TOLERANCING THEORY 9

Comparison between co–ordinate and convention method of feature location tolerancing and true position tolerancing, zero true position tolerance, virtual size concept, floating and fixed fasteners, projected tolerance zone, functional gauges, paper layout gauging, compound assembly, examples.

UNIT IV FORM DESIGN OF CASTINGS AND WELDMENTS 9

Redesign of castings based on parting line considerations, minimising core requirements, redesigning cast members using weldments, use of welding symbols – design considerations for plastic component manufacturing.

UNIT V TOLERANCE CHARTING 9

Tolerance Charting Technique: Operation sequence for typical shaft type of components, preparation of process drawings for different operations, tolerance worksheets and centrality analysis, examples, design features to facilitate machining. **Datum features – functional and manufacturing, component design–machining considerations, redesign for manufacture, examples.**

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harry Peck	Designing for Manufacture	Pitman Publications, London	1983
2	Matousek R	Engineering Design – A Systematic Approach	Blackie and Son Ltd., London	1974

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Spotts M F	Dimensioning and Tolerance for Quantity Production	Prentice Hall Inc., New Jersey, USA	1983
2	Oliver R Wade	Tolerance Control in Design and Manufacturing	Industrial press Inc., New York	1967
3	James G Bralla	Hand Book of Product Design for Manufacturing	McGraw Hill Publications, New Delhi	1986
4	Creveling C M	Tolerance Design – A Hand Book for Developing Optimal Specifications	Addison Wesley Longman Inc	1997

WEB REFERENCES

1. www.dfma.com
2. www.design4manufacturability.com

COURSE OBJECTIVES

1. To understand the basic difference between incompressible and compressible flow.
2. To understand the phenomenon of shock waves and its effect on flow. To gain some basic knowledge about jet propulsion and Rocket Propulsion.
3. To introduce the concepts of various conditions of compressible fluid flows
4. To Study and acquire knowledge on performance analysis of subsonic and supersonic inlets, combustors, afterburners and exhaust nozzles
5. To understand the concept of working of various types of rocket engines
6. To study the features of thrust equation for rocket propulsion system

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Analyze various conditions of compressible fluid flows.
2. Calculate mass flow rate in flow through variable area ducts.
3. Carry out simple performance analysis of subsonic and supersonic inlets.
4. Perform performance analysis of combustors, afterburners and exhaust nozzles.
5. Understand the working of various types of rocket engines
6. Use thrust equation for rocket propulsion system.

UNIT I BASIC CONCEPTS AND ISENTROPIC FLOWS**9**

Energy and momentum equations of compressible fluid flows – Stagnation states, Mach waves and Mach cone – Effect of Mach number on compressibility – Isentropic flow through variable area ducts – Nozzle and Diffusers – area ratio as a function of Mach number, mass flow rate through nozzles and diffusers, effect of friction in flow through nozzles. Use of Gas tables.

UNIT II FLOW THROUGH DUCTS**9**

Flow through constant area ducts with heat transfer (Rayleigh flow) and Friction (Fanno flow) – Variation of flow properties – Isothermal flow with friction in constant area ducts – Use of tables and charts – Generalised gas dynamics.

UNIT III NORMAL AND OBLIQUE SHOCKS**9**

Governing equations – Variation of flow parameters across the normal and oblique shocks – Prandtl – Meyer relations – Use of table and charts – Applications.

UNIT IV JET PROPULSION**9**

Theory of jet propulsion – Thrust equation – Thrust power and propulsive efficiency – Operation principle, cycle analysis and use of stagnation state performance of ram jet, turbojet, turbofan and turbo prop engines – Aircraft combustors.

UNIT V ROCKET PROPULSION**9**

Types of rocket engines – Propellants – Ignition and combustion – Theory of rocket propulsion – solid and liquid propellants, comparison of different propulsion systems .Performance study – Staging – Terminal and characteristic velocity – Applications – Space flights.

TOTAL 45 PERIODS

(Permitted to use standard Gas Tables in the examination)

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yahya.S.M	Fundamentals of Compressible flow	New Age International (P) Ltd., New Delhi	2009
2	Rathakrishnan.E	Gas Dynamics	Prentice Hall of India, New Delhi	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Patrich.H.Oosthvizen, WillamE.Carscallen	Compressible fluid flow	McGraw–Hill	1997
2	Zucker,R.D. and Biblarz,O	Fundamentals of Gas Dynamics	John Willey	2002
3	Ganesan .V	Gas Turbines	Tata McGraw–Hill, New Delhi	2010
4	P.Hill and C. Peterson	Mechanics and Thermodynamics of Propulsion	Addison –Wesley Publishing Company	1992

WEB REFERENCES

1. http://www.adl.gatech.edu/classes/ae3021/ae3021_f06_6.pdf
2. <http://www.grc.nasa.gov/WWW/k-12/airplane/isndrv.html>
3. http://panoramix.ift.uni.wroc.pl/~maq/papers/PM_Correct_Matyka.pdf
4. <http://soliton.ae.gatech.edu/people/jseitzma/classes/ae3450/StudyProblems.pdf>
5. http://www.sil.si.edu/smithsoniancontributions/AnnalsofFlight/pdf_lo/SAOF-0001.4.pdf

COURSE OBJECTIVES

1. To understand the anatomy, basic concepts and applications of robot.
2. To learn the drives and end effectors used in robot.
3. To study the various types of sensors used in robot.
4. To familiarize robot kinematics and robot programming
5. To provide knowledge on simple offline robot program
6. To impart knowledge on economic analysis of robots

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Identify the various types of robots.
2. Select appropriate drive systems and end effectors for industrial application.
3. Decide the types of sensors required according to the applications of robot.
4. To identify the different types of machine vision technologies
5. Develop simple offline robot program for different applications.
6. Calculate the economic analysis of robots.

UNIT I FUNDAMENTALS OF ROBOT**9**

Robot – Definition – Robot Anatomy – Co-ordinate Systems, Work Envelope, types and classification – Specifications – Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and Their Functions – Need for Robots – Different Applications

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS**9**

Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of all these Drives
End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations

UNIT III SENSORS AND MACHINE VISION**9**

Requirements of a sensor, Principles and Applications of the following types of sensors – Position sensors (Piezo Electric Sensor, LVDT, Resolvers, Optical Encoders, Pneumatic Position Sensors), Range Sensors (Triangulation Principle, Structured, Lighting Approach, Time of Flight Range Finders, Laser Range Meters), Proximity Sensors (Inductive, Hall Effect, Capacitive, Ultrasonic and Optical Proximity Sensors), Touch Sensors, (Binary Sensors, Analog Sensors), Wrist Sensors, Compliance Sensors, Slip Sensors
Camera, Frame Grabber, Sensing and Digitizing Image Data – Signal Conversion, Image Storage, Lighting Techniques. Image Processing and Analysis – Data Reduction, Segmentation, Feature Extraction, Object Recognition, Other Algorithms. Applications – Inspection, Identification, Visual Servoing and Navigation.

UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING**9**

Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems.
Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands, and Simple programs

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS**9**

RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Groover M.P	Industrial Robotics – Technology Programming and Applications	McGraw-Hill, New Delhi	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Fu.K.S., Gonzalz.R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	McGraw–Hill Book Co., New Delhi	1988
2	Yoram Koren	Robotics for Engineers	McGraw–Hill Book Co., New Delhi	1992
3	Janakiraman. P.A	Robotics and Image Processing	Tata McGraw–Hill, New Delhi	1995

WEB REFERENCE

1. www.learnaboutrobots.com/industrial.htm

COURSE OBJECTIVES

1. To provide foundations on design of experiments and statistical analysis of experimental data obtained from laboratory and/or industrial processes.
2. To understand the important concepts of single factorial designs
3. To Study and acquire knowledge on various methodologies involved in single factorial designs
4. To know the application of testing of factorial experiment
5. To enrich the understanding of special experimental designs
6. To impart knowledge on basic concepts of Taguchi method in parameter design

COURSE OUTCOMES

Upon successful completion of the course, students will be able to:

1. Understand the knowledge of various techniques for experimental planning
2. Understand the concepts of single factorial designs
3. List the various methodologies involved in single factorial designs
4. Apply the concept of testing of factorial experiment
5. Solve the partial and ordinary differential equations special experimental designs
6. Apply the basic concepts of Taguchi method in parameter design

UNIT I INTRODUCTION**9**

Planning of experiments – Steps – Need - Terminology: Factors, levels, variables, experimental error, replication, Randomization, Blocking, Confounding.

UNIT II SINGLE FACTOR EXPERIMENTS**9**

ANOVA rationale - Sum of squares – Completely randomized design, Randomized block design, effect of coding, Comparison of treatment means – Newman Kuel's test, Duncan's Multiple Range test, Latin Square Design, Graeco-Latin Square Design, Balanced incomplete design.

UNIT III FACTORIAL EXPERIMENTS**9**

Main and interaction effects – Two and three Factor full factorial Designs, 2 k designs with Two and Three factors – Unreplicated design – Yate's Algorithm

UNIT IV SPECIAL EXPERIMENTAL DESIGNS**9**

Blocking in factorial design, Confounding of 2k design, nested design – Response Surface Methods.

UNIT V TAGUCHI TECHNIQUES**9**

Fundamentals of Taguchi methods, Quality Loss function, orthogonal designs, application to Process and Parameter design.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Montgomery, D.C	Design and Analysis of Experiments	John Wiley and Sons	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hicks. C.R	Fundamental concepts in the Design of Experiments	Holt, Rinehart and Winston	2000
2	Bagchi. T.P	Taguchi Methods explained	PHI	2002
3	Ross. P.J	Taguchi Techniques for quality Engineering	Prentice Hall	2000

WEB REFERENCES

1. <http://cran.r-project.org>
2. <http://www.itl.nist.gov/div898/handbook/>
3. <http://home.ubalt.edu/ntsbarsh/stat-data/Topics.htm>

COURSE OBJECTIVES

1. To understand the underlying principles of operation of different IC Engines and components.
2. To provide knowledge on pollutant formation, control, alternate fuels etc.
3. To Study and acquire knowledge to Identify parts, terminology and fuel supply system of internal combustion engine
4. To introduce the concepts of cooling and lubrication systems of IC Engines
5. To make the student acquire sound knowledge on combustion, knocking and super charging of internal combustion engines
6. To expose students to recent trends associated with IC Engines

COURSE OUTCOMES

Upon completion of this course, the students can able to

1. Explain the construction and operation of internal combustion engine.
2. Identify parts, terminology and fuel supply system of internal combustion engine.
3. Recognize the component used in cooling and lubrication systems of IC Engines.
4. Describe the function of combustion, knocking and super charging of internal combustion engines.
5. Implement strategies for pollution control.
6. Know about the recent trends associated with IC Engines

UNIT I SPARK IGNITION ENGINES**9**

Mixture requirements – Fuel injection systems – Monopoint, Multipoint & Direct injection - Stages of combustion – Normal and Abnormal combustion – Knock - Factors affecting knock – Combustion chambers.

UNIT II COMPRESSION IGNITION ENGINES**9**

Diesel Fuel Injection Systems - Stages of combustion – Knocking – Factors affecting knock – Direct and Indirect injection systems – Combustion chambers – Fuel Spray behaviour – Spray structure and spray penetration – Air motion - Introduction to Turbocharging.

UNIT III POLLUTANT FORMATION AND CONTROL**9**

Pollutant – Sources – Formation of Carbon Monoxide, Unburnt hydrocarbon, Oxides of Nitrogen, Smoke and Particulate matter – Methods of controlling Emissions – Catalytic converters, Selective Catalytic Reduction and Particulate Traps – Methods of measurement – Emission norms and Driving cycles.

UNIT IV ALTERNATIVE FUELS**9**

Alcohol, Hydrogen, Compressed Natural Gas, Liquefied Petroleum Gas and Bio Diesel - Properties, Suitability, Merits and Demerits - Engine Modifications.

UNIT V RECENT TRENDS**9**

Air assisted Combustion, Homogeneous charge compression ignition engines – Variable Geometry turbochargers – Common Rail Direct Injection Systems - Hybrid Electric Vehicles – NO_x Adsorbers - Onboard Diagnostics.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ramalingam, K.K	Internal Combustion Engine Fundamentals	Scitech Publications	2002
2	Ganesan	Internal Combustion Engines	TMH	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mathur, R.B. and R.P. Sharma	Internal Combustion Engines	Dhanpat Rai & Sons	2007
2	Duffy Smith	Auto Fuel Systems	The Good Heart Willcox Company, Inc.	1987
3	Eric Chowenitz	Automobile Electronics	SAE Publications	1995

COURSE OBJECTIVES

1. To know the principle methods, areas of usage, possibilities and limitations as well as environmental effects of the Additive Manufacturing technologies
2. To be familiar with the characteristics of the different materials those are used in Additive Manufacturing.
3. To introduce process involved in Additive manufacturing technology
4. To understand the importance of knowledge on software's used in additive manufacturing technology
5. To enrich the understanding of the working of SLS and other techniques
6. To provide an overview of additive manufacturing technology in medical field and biostream

COURSE OUTCOMES

On completion of this course, students will be able to

1. Understand the need for additive manufacturing technology
2. Explain the process involved in Additive manufacturing technology
3. Get knowledge on software's used in additive manufacturing technology
4. Describe the working of SLS and other techniques
5. Apply the additive manufacturing technology in medical field
6. Applications of additive manufacturing technology in biostream.

UNIT I INTRODUCTION**9**

Overview – History - Need-Classification -Additive Manufacturing Technology in product development- Materials for Additive Manufacturing Technology – Tooling - Applications.

UNIT II CAD & REVERSE ENGINEERING**9**

Basic Concept – Digitization techniques – Model Reconstruction – Data Processing for Additive Manufacturing Technology: CAD model preparation – Part Orientation and support generation – Model Slicing – Tool path Generation – Softwares for Additive Manufacturing Technology: MIMICS, MAGICS.

UNIT III LIQUID BASED AND SOLID BASED ADDITIVE MANUFACTURING SYSTEMS**9**

Classification – Liquid based system – Stereolithography Apparatus (SLA)- Principle, process, advantages and applications - Solid based system – Fused Deposition Modeling - Principle, process, advantages and applications, Laminated Object Manufacturing

UNIT IV POWDER BASED ADDITIVE MANUFACTURING SYSTEMS**9**

Selective Laser Sintering – Principles of SLS process - Process, advantages and applications, Three Dimensional Printing - Principle, process, advantages and applications- Laser Engineered Net Shaping (LENS), Electron Beam Melting.

UNIT V MEDICAL AND BIO-ADDITIVE MANUFACTURING**9**

Customized implants and prosthesis: Design and production. Bio-Additive Manufacturing- Computer Aided Tissue Engineering (CATE) – Case studies

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chua C.K., Leong K.F., and Lim C.S	Rapid prototyping: Principles and applications	World Scientific Publishers	2010
2	Gebhardt A	Rapid prototyping	Hanser Gardener Publications	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Liou L.W., LiouF.W	Rapid Prototyping and Engineering applications	CRC Press	2007
2	Kamrani A.K. and Nasr E.A	Rapid Prototyping: Theory and practice	Springer	2006
3	Hilton P.D, Jacobs P.F	Rapid Tooling: Technologies and Industrial Applications	CRC press	2000

COURSE OBJECTIVES

1. To gain knowledge in production, gear material selection
2. To introduce the concepts of gear manufacturing
3. To Study and acquire knowledge on mechanism involve in conical gears
4. To Study and acquire knowledge on the procedures that involves in gear material selection
5. To expose students to detailed view of gear finishing methods
6. To impart knowledge modern gear production methods

COURSE OUTCOMES

Upon the completion of this course the students will be able to

1. Understand the overview on classification of gears and its terminology
2. Explain the various methods of gear manufacturing
3. Understands the concepts and mechanism involve in conical gears
4. Understand the procedures that involves in gear material selection
5. Attain a detailed view of gear finishing methods
6. Understanding the modern gear production methods

UNIT I INTRODUCTION TO GEARS**9**

Types of gears-classification, application of gears, gearboxes, drawings for gears, gear production method an overview, types of blanks and blank preparation. Production Of Cylindrical Gears: Procedure of cutting gears and obtainable quality in hobbing and gear shaping, cutter selection and work holding methods, setting calculations. Rack type gear shaping machine description and application. Internal gear cutting methods, CNC gear hobbing and gear shaping machines.

UNIT II PRODUCTION OF CONICAL GEARS**9**

Production of straight bevel gears by bevel gear generator, duplex rotary cutter method, Gleason Reva cycle method, spiral and hybrid bevel gear generation. Description of machine, cutter and machine setting.

UNIT III GEAR MATERIAL SELECTION AND HARDENING METHODS**9**

Properties of gear materials-non-metallic, non-ferrous and plastic gears, selection of material for power transmission, high speed application. Selection of material for worm and wheel. Hardening by through hardening, case hardening, induction hardening, flame hardening, nitriding and carburizing, hardening defects.

UNIT IV GEAR FINISHING METHODS**9**

Gear finishing advantages, finishing of gears by grinding, shaving, lapping and honing methods, cold rolling of gears - description of process, machine, cutters and process parameters setting.

Gear Inspection: Type of gear errors-gear quality standards and allowable limits-tooth thickness, base tangent length measurement, pitch error, radial run out, involute profile error measurements methods and analysis, composite error measurement, computerized gear inspection, gear failure reasons and remedies.

UNIT V MODERN GEAR PRODUCTION METHODS**9**

Gear production by stamping, die casting, powder metal process, injection and compression moulding of plastic gears, cold and hot rolling. Mass production methods, shear speed shaping, gear broaching, Gleason G-TRAC – gear generation methods. Economical and Quality Production of Gears: Gear production systems – batch production, gear production cells, lean and agile production practices, automobile gear and gear boxes, heavy engineering gear production, gear for instruments and appliances, process and cutter selection for quantity, cost and quality criteria.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Watson	Modern Gear Production	Persman Press, Oxford	1984
2	HMT	Production Technology	Tata McGraw Hill Co., New Delhi	1992

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	SAE	Gear Design Manufacturing Inspection Manual	Persman Press, Oxford	1990
2	Weck .M	Hand Book of Machine Tools Technology and Sun Gear Technology	Magazine Back Volumes	1984

WEB REFERENCES

1. www.geartechnology.com
2. www.gearsolutions.com

COURSE OBJECTIVES

1. To understand the underlying principles of operations in different Refrigeration & Air conditioning systems and components.
2. To provide knowledge on design aspects of Refrigeration & Air conditioning systems
3. To introduce the concepts on use of unconventional refrigerant system for industrial application
4. To expose students to properties of air using psychrometric chart
5. To provide knowledge on cooling load for a given system
6. To know the application of air conditioning system for industrial and domestic purpose

COURSE OUTCOMES

Learners should be able to

1. Calculate COP of various refrigeration cycles.
2. Choose appropriate refrigerants for various applications.
3. Identify the use of unconventional refrigerant system for industrial application.
4. Calculate the properties of air using psychrometric chart.
5. Calculate cooling load for a given system
6. Select the appropriate air conditioning system for industrial and domestic applications.

UNIT I REFRIGERATION CYCLE**9**

Review of thermodynamic principles of refrigeration. Concept of refrigeration system. Vapour compression refrigeration cycle – use of P–H charts – multistage and multiple evaporator systems – cascade system – COP comparison. Vapor absorption refrigeration system. Ammonia water and Lithium Bromide water systems. Steam jet refrigeration system

UNIT II REFRIGERANTS, SYSTEM COMPONENTS AND BALANCING**9**

Compressors – reciprocating and rotary (elementary treatment.) – Condensers – evaporators – cooling towers. Refrigerants – properties – selection of refrigerants, Alternate Refrigerants, Refrigeration plant controls – testing and charging of refrigeration units. Balancing of system components. Applications to refrigeration systems – ice plant – food storage plants – milk – chilling plants – refrigerated cargo ships.

UNIT III PSYCHROMETRY**9**

Psychrometric processes – use of psychrometric charts – Grand and Room Sensible Heat Factors – bypass factor – requirements of comfort air conditioning – comfort charts – factors governing optimum effective temperature, recommended design conditions and ventilation standards

UNIT IV COOLING LOAD CALCULATIONS**9**

Types of load – design of space cooling load – heat transmission through building. Solar radiation – infiltration – internal heat sources (sensible and latent) – outside air and fresh air load – estimation of total load – Domestic, commercial and industrial systems – central air conditioning systems.

UNIT V AIR CONDITIONING**9**

Air conditioning equipments – air cleaning and air filters – humidifiers – dehumidifiers – air washers – condenser – cooling tower and spray ponds – elementary treatment of duct design – air distribution system. Thermal insulation of air conditioning systems. – Applications: car, industry, stores, and public buildings

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Manohar Prasad	Refrigeration and Air Conditioning	New Age International Ltd, New Delhi	2006
2	Arora. C.P	Refrigeration and Air Conditioning	Tata McGraw–Hill, New Delhi	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Roy.JDossat	Principles of Refrigeration	Pearson Education, New Delhi	2002
2	Jordon and Prister	Refrigeration and Air Conditioning	Prentice Hall of India PVT Ltd., New Delhi	1981
3	StoeckerN.F and Jerold W.Jones	Refrigeration and Air Conditioning	McGraw Hill, New Delhi	1986

WEB REFERENCES

1. http://nptel.iitg.ernet.in/Mech_Engg/IIT%20Kharagpur/Refrigeration%20and%20Air%20Conditioning.htm
2. <http://www.ashrae.org/>
3. http://en.wikipedia.org/wiki/Thermal_comfort

COURSE OBJECTIVES

1. To gain knowledge in design and material selection of various machinetools.
2. To provide an overview of regulation of speeds and feeds
3. To study the features of machine toolstructures
4. To understand the importance of constructional features of machine toolstructures
5. To expose students to design in machine tool structures, guide ways, power screws andspindles
6. To expose students to design spindles and spindlesupports

COURSE OUTCOMES

Upon the completion of this course the students will be able to

1. Discuss the basics machine tool drives andmechanisms
2. Get knowledge on regulation of speeds and feeds
3. Understand the importance of machine toolstructures
4. Explain the constructional features of machine toolstructures
5. Design in machine tool structures, guide ways, power screws andspindles
6. Design spindles and spindlesupports

UNIT I INTRODUCTION TO MACHINE TOOL DRIVESANDMECHANISMS 9
Introduction to the course, Working and Auxiliary Motions in Machine Tools, Kinematics of Machine Tools, Motion Transmission

UNIT II REGULATION OF SPEEDSANDFEEDS 9
Aim of Speed and Feed Regulation, Stepped Regulation of Speeds, Multiple Speed Motors, Ray Diagrams and Design Considerations, Design of Speed Gear Boxes, Feed Drives, Feed Box Design

UNIT III DESIGN OF MACHINETOOLSTRUCTURES 9
Functions of Machine Tool Structures and their Requirements, Design for Strength, Design for Rigidity, Materials for Machine Tool Structures, Machine Tool Constructional Features, Beds and Housings, Columns and Tables, Saddles and Carriages

UNIT IV DESIGN OF GUIDEWAYS, POWER SCREWSANDSPINDLES 9
Functions and Types of Guideways, Design of Guideways, Design of Aerostatic Slideways, Design of Anti-Friction Guideways, Combination Guideways, Design of Power Screws.

UNIT V DESIGN OF SPINDLES AND SPINDLESUPPORTS 9
Functions of Spindles and Requirements, Effect of Machine Tool Compliance on Machining Accuracy, Design of Spindles, Antifriction Bearings. Dynamics of Machine Tools - Machine Tool Elastic System, Static and Dynamic Stiffness

TOTAL 45PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sen, G.C. and Bhattacharya, A	Principles of machine tools	New Central Book Agency, Calcutta	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chernov N	Machine Tools	Mir publishers Moscow	1984
2	N.K. Mehta	Machine Tool Design and Numerical Control	TMH, New Delhi	2010
3	G.C. Sen and A. Bhattacharya	Principles of Machine Tools	New Central Book Agency	2009
4	D. K Pal, S. K. Basu	Design of Machine Tools	Oxford IBH	2008
5	N. S. Acherkhan	Machine Tool Design	MIR publications	1968

COURSE OBJECTIVES

1. To gain knowledge in sequence of process planning and cost estimation of various products.
2. To introduce the concepts of dimensional and tolerance analysis
3. To expose students to manufacturing drawings
4. To equip them with skills to apply their knowledge in re-dimensioning and tolerance charting
5. To understand the process chart for a given component
6. To Estimate the cost of a given component

COURSE OUTCOMES

Upon completion of this course, the student can able to

1. Apply the various standards and conventions used in a drawingsheet
2. Perform dimensional and tolerance analysis
3. Understand the manufacturing drawings
4. Apply their knowledge in re-dimensioning and tolerance charting
5. Prepare process chart for a given component
6. Estimate the cost of a given component

UNIT I STANDARDS AND CONVENTIONS**9**

Current international standards (ISO) and Indian Standards (IS)- types of lines - principles of presentation - dimensioning - conventional representation of threaded parts, springs, and gears.

UNIT II DIMENSIONAL AND FORM TOLERANCES**9**

Limits and fits IT system of tolerances, deviation of fit - geometric tolerance-tolerancing of form, orientation, location and runout - datums and Datum systems-Dimensioning and tolerancing of profiles

UNIT III MANUFACTURING DRAWINGS**9**

Surface texture indication on drawing - welds symbolic representation of drawings. Given a sub-assembly/assembly to prepare manufacturing drawings of components, Sample exercises on CAD- preparation of manufacturing Drawings.

UNIT IV RE-DIMENSIONING AND TOLERANCE CHARTING**9**

Introduction to re-dimensioning to suit manufacturing requirements-manufacturing datum-functional datum. Introduction to tolerance charting

UNIT V COST ESTIMATION**9**

Preparation of Process chart for a given component-estimation of setting time and machining time-estimation of material cost, labour cost and overhead cost based on supplied data.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Siddeshwar and Kanniah	Machine Drawing	Tata McGraw Hill	2001
2	Gopalakrishna, K.R	Machine Drawing	Subhas Stores	2002
3	Wade. O	Tolerance Control in design and manufacturing	Industrial Press	1972

WEB REFERENCE

1. IS :10714,10715,10716,10717,11669,10719,813,919,2709,8000 pt 1 to 10721,11158 and AWS/ISO

COURSE OBJECTIVES

1. To Understand the concept of SQC.
2. To enrich the understanding of control charts to analyze for improving the process quality.
3. To familiarize the students to understand different sampling plans
4. To Understand the importance of need and types of life testing.
5. To introduce the reliability of a system.
6. To introduce the concepts of quality control and reliability techniques in industries.

COURSE OUTCOMES

Upon the completion of this course the students will be able to

1. Understand the concept of SQC.
2. Use control charts to analyze for improving the process quality.
3. Describe different sampling plans
4. Understand the need and types of life testing.
5. Improve the reliability of a system.
6. Implement quality control and reliability techniques in industries.

UNIT I INTRODUCTION AND PROCESS CONTROL FOR VARIABLES 9

Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality cost–Variation in process– factors – process capability – process capability studies and simple problems – Theory of control chart– uses of control chart – Control chart for variables – X chart, R chart and σ chart.

UNIT II PROCESS CONTROL FOR ATTRIBUTES 9

Control chart for attributes –control chart for proportion or fraction defectives – P chart and NP chart – control chart for defects – C and U charts, State of control and process out of control identification in charts.

UNIT III ACCEPTANCE SAMPLING 9

Lot by lot sampling – Types – probability of acceptance in single, double, multiple sampling techniques – O.C. curves – producer's Risk and consumer's Risk. AQL, LTPD, AOQL concepts–standard sampling plans for AQL and LTPD– uses of standard sampling plans.

UNIT IV LIFE TESTING– RELIABILITY 9

Life testing – objective: – failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate, system reliability, series, parallel and mixed configuration – simple problems. Maintainability and availability – simple problems. Acceptance sampling based on reliability test – O.C Curves.

UNIT V QUALITY AND RELIABILITY 9

Reliability improvements – techniques– use of Pareto analysis – design for reliability – redundancy unit and standby redundancy – Optimization in reliability – Product design – Product analysis – Product development – Product life cycles – Maintenance.

TOTAL 45 PERIODS

Note: Permitted to use approved statistical table in the examination.

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grant. Eugene .L	Statistical Quality Control	McGraw–Hill, New Delhi	2008
2	Srinath L.S	Reliability Engineering	Affiliated East west press New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Manohar Mahajan	Statistical Quality Control	Dhanpat Rai and Sons, New Delhi	2003
2	Besterfield D.H	Quality Control	Prentice Hall, New Delhi	1993
3	Danny Samson	Manufacturing and Operations Strategy	Prentice Hall, New Delhi	1991
4	Connor P.D.T.O	Practical Reliability Engineering	John Wiley, New Delhi	2011

WEB REFERENCES

1. <http://www.statsoft.com/textbook/stquacon.html>
2. <http://www.isixsigma.com/library/content/c010806a.asp>
3. http://www.statgraphics.com/control_charts.htm
4. <http://www.sqconline.com/sampling-plans.html>
5. http://reliability.sandia.gov/Maintenance/Data_Failure_Analysis/data_failure_analysis.html
6. <http://www.designinindia.net/everywhere/disciplines/product-design/index.html>

COURSE OBJECTIVES

1. To understand the fundamentals of composite material strength and its mechanical behavior
2. Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.
3. Thermo-mechanical behavior and study of residual stresses in Laminates during processing.
4. Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.
5. To introduce the concepts of carbon-carbon composite for different industrial application
6. To impart knowledge on various advances in composites

COURSE OUTCOMES

Learners should be able to

1. Select the various types of composite matrix required for an application.
2. Choose appropriate manufacturing process for polymer matrix composite.
3. Opt appropriate manufacturing process for metal matrix composite.
4. Use the concepts of ceramic composites and its production techniques.
5. Identify the type of carbon-carbon composite for different industrial application.
6. Explain the various advances in composites

UNIT I INTRODUCTION TO COMPOSITES

9

Fundamentals of composites – need for composites – Enhancement of properties – classification of composites

– Matrix-Polymer matrix composites (PMC), Metal matrix composites (MMC), Ceramic matrix composites (CMC) – Reinforcement – Particle reinforced composites, Fibre reinforced composites. Applications of various types of composites.

UNIT II POLYMER MATRIX COMPOSITES

9

Polymer matrix resins – Thermosetting resins, thermoplastic resins – Reinforcement fibres – Rovings – Woven fabrics – Non woven random mats – various types of fibres. PMC processes - Hand lay up processes – Spray up processes – Compression moulding – Reinforced reaction injection moulding - Resin transfer moulding – Pultrusion – Filament winding – Injection moulding. Fibre reinforced plastics (FRP), Glass fibre reinforced plastics (GRP).

UNIT III METAL MATRIX COMPOSITES

9

Characteristics of MMC, Various types of Metal matrix composites Alloys - MMC, Advantages of MMC, Limitations of MMC, Metal Matrix, Reinforcements – particles – fibres. Effect of reinforcement - Volume fraction – Rule of mixtures. Processing of MMC – Powder metallurgy process - diffusion bonding – stir casting – squeeze casting.

UNIT IV CERAMIC MATRIX COMPOSITES

9

Engineering ceramic materials – properties – advantages – limitations – Monolithic ceramics – Need for CMC

– Ceramic matrix - Various types of Ceramic Matrix composites- oxide ceramics – non oxide ceramics – aluminium oxide – silicon nitride – reinforcements – particles- fibres- whiskers. Sintering - Hot pressing – Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing).

UNIT V ADVANCES IN COMPOSITES

9

Carbon /carbon composites – Advantages of carbon matrix – limitations of carbon matrix Carbon fibre – chemical vapour deposition of carbon on carbon fibre perform. Sol gel technique. Composites for aerospace applications.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mathews F.L and Rawlings R.D	Composite materials Engineering and Science	Wood head publishing Ltd, England	2006
2	Chawla K.K	Composite materials	Springer – Verlag, , New York	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Clyne T.W and Withers P.J	Introduction to Metal Matrix Composites	Cambridge University Press, New York	1995
2	Strong A.B	Fundamentals of Composite Manufacturing	Society of Manufacturing Engineering	2008
3	Sharma S.C	Composite materials	Narosa Publications, New Delhi	2000

WEB REFERENCES

1. <http://www.metu.edu.tr/~ckaynak/METE%20470.htm>
2. <http://www.springerlink.com/content/978-1-4020-8771-4>
3. <http://www.virginia.edu/bohr/mse209/chapter17.htm>
4. <http://www.virginia.edu/bohr/mse209/chapter10.htm>

COURSE OBJECTIVES

1. To impart knowledge of need for planning and control in various aspects.
2. To develop an understanding of the standard techniques in various work study methodologies.
3. To familiarize the students to understand the product and process plan.
4. To introduce the concepts of a production schedule based on different facets.
5. To enrich the understanding of the level of inventory
6. To understand the importance the recent advancements in production planning and control.

COURSE OUTCOMES

Student will be able to

1. Indicate the need for planning and control in various aspects.
2. Understand various work study methodologies.
3. Construct product and process plan.
4. Prepare a production schedule based on different facets.
5. Estimate the level of inventory
6. Understand the recent advancements in production planning and control.

UNIT I INTRODUCTION**9**

Objectives: and benefits of planning and control–Functions of production control–Types of production–job–batch and continuous–Product development and design–Marketing aspect – Functional aspects–Operational aspect–Durability and dependability aspect–aesthetic aspect. Profit consideration–Standardization, Simplification and specialization–Break even analysis–Economics of a new design.

UNIT II WORKSTUDY**9**

Method study, basic procedure–Selection–Recording of process – Critical analysis, Development – Implementation – Micro motion and memo motion study – work measurement – Techniques of work measurement – Time study – Production study – Work sampling – Synthesis from standard data – Predetermined motion time standards.

UNIT III PRODUCT PLANNING AND PROCESS PLANNING**9**

Product planning–Extending the original product information–Value analysis–Problems in lack of product planning–Process planning and routing–Pre requisite information needed for process planning–Steps in process planning–Quantity determination in batch production–Machine capacity, balancing–Analysis of process capabilities in a multi product system.

UNIT IV PRODUCTION SCHEDULING**9**

Production Control Systems–Loading and scheduling–Master Scheduling–Scheduling rules–Gantt charts–Perpetual loading–Basic scheduling problems – Line of balance – Flow production scheduling–Batch production scheduling–Product sequencing – Production Control systems–Periodic batch control–Material requirement planning Kanban –Dispatching–Progress reporting and expediting–Manufacturing lead time–Techniques for aligning completion times and due dates.

UNIT V INVENTORY CONTROL AND RECENT TRENDS IN PPC**9**

Inventory control–Purpose of holding stock–Effect of demand on inventories–Ordering procedures. Two bin system –Ordering cycle system–Determination of Economic order quantity and economic lot size–ABC analysis–Recorder procedure–Introduction to computer integrated production planning systems–elements of JIT Systems–Fundamentals of MRP and ERP.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Martand Telsang	Industrial Engineering and Production Management	S.Chand and Company, New Delhi	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Samson Eilon	Elements of production planning and control	Macmillan, India	1981
2	Elwood S. Buffa, and Rakesh K. Sarin	Modern Production Operations Management	John Wiley and Sons, New Delhi	2007
3	Jain C.K and Aggarwal L.N	Production Planning Control and Industrial Management	Khanna Publishers, New Delhi	1997

WEB REFERENCES

1. <http://envfor.nic.in/divisions/iwsu/iwsu.html>
2. <http://src.edu/work-study>
3. <http://thequalityportal.com/articles/value.htm>

COURSE OBJECTIVES

1. To study the significance of waste heat recovery systems and carry out its economic analysis
2. To know the concepts of cogeneration, its types and probable areas of applications
3. To enrich the understanding of thermodynamics, heat transfer, and fluid Mechanics principles to design and analysis of this emerging technology.
4. To impart knowledge on operational issues and challenges cogeneration technologies.
5. To Understand the impact of this technology in waste heat recovery systems
6. To introduce the concepts of various systems involved in waste heat recovery process

COURSE OUTCOMES

The student will be able to

1. Understand the various methods of cogeneration.
2. Apply knowledge of thermodynamics, heat transfer, and fluid Mechanics principles to design and analysis of this emerging technology.
3. Have thorough understanding, operational issues and challenges cogeneration technologies.
4. Understand the impact of this technology in waste heat recovery systems
5. Get the knowledge over various systems involved in waste heat recovery process
6. Begin a career as an engineer in an organization economic analysis

UNIT I INTRODUCTION**9**

Introduction – principles of thermodynamics – cycles – topping - bottoming – combined cycle - organic rankine cycles – performance indices of cogeneration systems – waste heat recovery – sources and types – concept of trigeneration.

UNIT II COGENERATION TECHNOLOGIES**9**

Configuration and thermodynamic performance – steam turbine cogeneration systems – gas turbine cogeneration systems – reciprocating IC engines cogeneration systems – combined cycles cogeneration systems – advanced cogeneration systems: fuel cell, Stirling engines etc.,

UNIT III ISSUES AND APPLICATIONS OF COGENERATION TECHNOLOGIES**9**

Cogeneration plants electrical interconnection issues – utility and cogeneration plant interconnection issues – applications of cogeneration in utility sector – industrial sector – building sector – rural sector – impacts of cogeneration plants – fuel, electricity and environment

UNIT IV WASTE HEAT RECOVERY SYSTEMS**9**

Selection criteria for waste heat recovery technologies - recuperators - Regenerators - Economizers - plate heat exchangers - thermic fluid heaters - Waste heat boilers classification, location, service conditions, design Considerations - fluidized bed heat exchangers - heat pipe exchangers - heat pumps – sorption systems.

UNIT V ECONOMIC ANALYSIS**9**

Investment cost – economic concepts – measures of economic performance – procedure for economic analysis – examples – procedure for optimized system selection and design – load curves - sensitivity analysis – regulatory and financial frame work for cogeneration and waste heat recovery systems.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.Kehlhofer, B. Rukes, F. Stirnimann	Combined-cycle gas & steam turbine power plants	PennWell Books	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Steve Doty, Wayne C. Turner	Energy management handbook	The Fairmont Press, Inc	2009
2	A.Thumann, D. Paul Mehta	Handbook of energy engineering	The Fairmont Press Inc	2008
3	B.F.Kolanowski	Small-scale cogeneration handbook	Fairmont Press	2003
4	M.P. Boyce	Handbook for cogeneration and combined cycle power plants	ASME Press	2002
5	Educogen	The European Educational tool for cogeneration	Fairmont Press	2001

COURSE OBJECTIVES

1. To understand and analyze the energy data of industries
2. To carry out energy accounting and balancing
3. To conduct energy audit and suggest methodologies for energy savings
4. To utilize the available resources in optimal ways
5. To make the students conversant with concepts of industrial furnaces
6. To equip them with skills to perform Energy audit

COURSE OUTCOMES:

At the end of the course, student will be able to

1. Understand the Environmental aspects of energy utilization
2. Perform combustion analysis
3. Explain the concepts of industrial boiler
4. understand how to work with the steam generated from the boilers in the industrial point of view
5. Explain the concepts of industrial furnaces
6. Perform Energy audit

UNIT I ENERGY SCENARIO**9**

Present status, rate of growth, energy utilization (sector wise), concept of energy conservation, energy economics.

COMBUSTION: Fuel analysis, combustion calculations, air requirements, theoretical and excess air requirements, excess air control, flue gas analysis and measurement, types of draught, draught calculations, chimney size calculations. F.D and I.D fan draught requirements and power requirements, furnace pressure requirements.

UNIT II INDUSTRIAL BOILERS**9**

Types and characteristics of industrial boilers, heat balance in boilers, efficiency trials in boilers, energy conservation opportunities in boilers operation and maintenance, water treatment requirements, soot blowing requirements, super heaters and superheat controls, waste heat recovery systems.

STEAM: Distribution requirements of steam and streamlines, efficient utilization of steam, steam trapping and air venting, flash steam recovery, condensate recovery, thermal insulation for systems including HVAC, steam balance calculations.

UNIT III INDUSTRIAL FURNACES**9**

Furnace types and characteristics, heat balance in furnaces, furnace efficiency calculations, energy conservation opportunities in furnaces, refractories types and properties, waste heat recovery system, insulating refractories, ceramic fibers, heat loss reduction calculations, wall and stored heat loss reduction.

UNIT IV DRYING**9**

Principle of drying and types of driers, mass and heat balance in driers, energy conservation opportunities in drying operations.

EVAPORATION: Principle of evaporation and types of evaporations, mass and heat balance, single and multiple effect evaporation, capacity and steam economy calculations, vapour recompression system.

UNIT V ENERGY AUDIT AND APPLICATIONS**9**

Types, methodology, questionnaire development, specific energy consumption (unit wise/section wise), identification of energy conservation measures/ technologies, economic and cost benefit analysis, case studies.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Turner, W. C., Doty, and Truner, W. C	Energy Management Hand book	Fairmont Press	2009
2	De. B. K.	Energy Management audit & Conservation	Vrinda Publication	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trinks M.H, W.Mawhinney	Industrial Furnaces	John Wiley Publications, London	2004
2	Prabir Basu, Cen Kefa, Louis Jestin	Boilers and Burners Design and Theory	Springer Publications, New Delhi	2012

WEB REFERENCES

1. www.energyconservation.co.in
2. [www.energymanagertraining.com\](http://www.energymanagertraining.com/)
3. www.nrel.gov
4. www.aerfindia.org
5. www.gvepinternational.org

COURSE OBJECTIVES

1. To provide in-depth knowledge on various techniques of non-destructive testing
2. To provide an overview of destructive and non destructive tests and state their applications
3. To study the features of NDT techniques for various products.
4. To expose students to skills needed for selection of appropriate NDT technique(s) for new inspection jobs
5. To understand the established NDE techniques and basic familiarity of emerging NDE techniques.
6. To facilitate the understanding of standard application area of NDET

COURSE OUTCOMES

Student will be able to

1. Understand the codes, standards and specifications related to NDT
2. Classify the destructive and non destructive tests and state their applications
3. Develop NDT techniques for various products.
4. Acquire skills needed for selection of appropriate NDT technique(s) for new inspection jobs
5. Acquire sound knowledge of established NDE techniques and basic familiarity of emerging NDE techniques.
6. Make use of standards application area of NDET

UNIT I BASIC CONCEPTS AND VISUAL INSPECTION 9

Concepts of Non-Destructive Testing - Relative merits and limitations - NDT versus mechanical testing, Unaided and aided visual inspection testing.

UNIT II LIQUID PENETRANT INSPECTION 9

Principle, applications, advantages and limitations, dyes, developers and cleaners, fluorescent, penetrant test.

UNIT III MAGNETIC PARTICLE INSPECTION 9

Principles, applications, magnetisation methods, magnetic particles, dry technique and wet technique, demagnetization, advantages and limitations.

UNIT IV EDDY CURRENT AND ULTRASONIC TESTING 9

Principle, applications and instrumentation of eddy current testing. Types of ultrasonic waves, principles of wave propagation, characteristics of ultrasonic waves, Attenuation, couplants. Inspection methods - pulse echo, Transmission and resonance techniques, thickness measurement. Types of scanning, test block, IIW - reference blocks.

UNIT V RADIOGRAPHY TESTING 9

X-rays and Gamma rays, properties of X-rays relevant to NDE, absorption of rays, scattering, types and use of filters and screens, characteristics of films - graininess, density, speed, contrast, characteristic curves, penetrameters, exposure charts, radiographic equivalence. Fluoroscopy- Xero-Demerits of Radiography.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Barry Hull and Vernon John	Non Destructive Testing	ELBS / Macmillan	1989
2	Mc Gonnagle W T	Non-Destructive Testing	McGraw Hill Book Co	1988

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Louis Cartz	Non-Destructive Testing	ASM International, Metals Park Ohio, US	1995
2	ASM Metals Handbook	Destructive Evaluation and Quality Control	American Society of Metals, Metals Park, Ohio, USA	2001

OPEN ELECTIVES
(COURSES OFFERED BY OTHER DEPARTMENTS)
SCIENCE AND HUMANITIES

15BESH0E01

INDUSTRIAL MATHEMATICS I

3 0 0 3100

COURSE OBJECTIVES:

1. To develop analytical skills for solving engineering problems
2. To teach the students the basic concepts of LPP,
3. To learn the techniques to solve transportation problems
4. To learn the techniques to solve Assignment problems
5. To make the students to study about the Integer Programming and Network Analysis
6. Analyse the results and propose recommendations to the decision-making processes in Management Engineering

COURSE OUTCOMES:

1. To define and formulate linear programming problems and appreciate their limitations.
2. To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
3. To be able to build and solve Transportation Models, Assignment Models,
4. To construct linear integer programming models and discuss the solution techniques.
5. To formulate and solve problems as networks and graphs.
6. To be able to solve problems in different environments and develop critical thinking

UNIT I LINEAR PROGRAMMING PROBLEM

9

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method.

UNIT II TRANSPORTATION PROBLEM

9

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM

9

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING

9

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS

9

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TEXT BOOKS

TOTAL 45 PERIODS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P.,	Operations Research	Pearson Education,	2005
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004

WEB REFERENCES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

COURSE OBJECTIVES

1. To kindle analytical skills for solving engineering problems
2. To impact the knowledge about inventory models
3. To learn replacement models
4. To learn about simulation models
5. To provide techniques for effective methods to solve nonlinear programming and decision making.
6. To analyse the results and propose recommendations to the decision-making processes in Management Engineering

COURSE OUTCOMES

The students will

1. To be able to solve simple models in Inventory problems and Replacement problems.
2. To understand different queuing situations and find the optimal solutions using models for different situations.
3. Simulate different real life probabilistic situations using Monte Carlo simulation technique.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non integer programming.

UNIT I INVENTORY MODELS

9

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT II NONLINEAR PROGRAMMING

9

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT III SIMULATION MODELS

9

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT IV DECISION MODELS

9

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk– Decision – Tree Analysis.

UNIT V REPLACEMENT MODELS

9

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time- Replacement of items that fail suddenly and completely.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2013
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P.,	Operations Research	Pearson Education,	2005
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004

WEB REFERENCES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

COURSE OBJECTIVES

1. To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
2. To understand the basic concepts of probability, one- and two-dimensional random variables
3. To introduce some standard distributions applicable to engineering which can describe real life phenomenon.
4. To understand the basic concepts of random processes which are widely used in IT fields.
5. To understand the concept of correlation and spectral densities.
6. To understand the significance of linear systems with random inputs.

COURSE OUTCOMES

Upon successful completion of the course, students should be able:

1. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. To understand the basic concepts of one- and two-dimensional random variables and apply in engineering applications.
3. To apply the concept random processes in engineering disciplines.
4. To understand and apply the concept of correlation and spectral densities.
5. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable.
6. To analyze the response of random inputs to linear time invariant systems.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY**9**

Measures of central tendency – Mean, Median, Mode - Standard Deviation Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT II STANDARD DISTRIBUTIONS**9**

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma (one Parameter only) and Normal distributions - Moment generating functions, Characteristic function and their properties – Chebyshev's inequality.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES**9**

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT IV CLASSIFICATION OF RANDOM PROCESS**9**

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES**9**

Autocorrelation-Crosscorrelation-Properties-Power spectral density-Cross spectral density-Properties – Wiener-Khinchine relation – Relationship between cross power spectrum and cross correlation function Linear time invariant system - System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TEXT BOOK**TOTAL 45 PERIODS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002
2	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2012
3	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
4	Veerarajan, T.	Probability, Statistics and Random process	Tata McGraw-Hill Publications, Second Edition, New Delhi	2012

WEB REFERENCES

1. www.cut-theknot.org/probability.shtml
2. www.mathcentre.ac.uk
3. www.mathworld.Wolfram.com

1. This course aims at providing the required skill to apply the statistical tools in engineering problems.
2. To introduce the basic concepts of probability and random variables.
3. To introduce about the concepts of random distributions
4. To introduce the basic concepts of two dimensional random variables.
5. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
6. To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

COURSE OUTCOMES

1. To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
2. To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
3. To apply the concept of testing of hypothesis for small and large samples in real life problems.
4. To apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
5. To have the notion of sampling distributions and statistical techniques used in engineering and management problems.
6. To make the student acquire sound knowledge of techniques in quality control that model engineering problems.

UNIT I MEASURES OF CENTRAL TENDENCY AND PROBABILITY 9

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration.

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem - Probability mass function - Probability density functions.

UNIT II STANDARD DISTRIBUTIONS 9

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT IV TESTING OF HYPOTHESIS 9

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT V DESIGN OF EXPERIMENTS 9

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

TOTAL 45 PERIODS

Note: Use of approved statistical tables permitted in the examination.

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta. S.C. and Kapur. V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
2	Athanasios Papoulis and S Pillai	Probability Random variables and Stochastic Processes	McGraw-Hill Publications, New Delhi.	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Walpole. R.E., Myers. R.H., and Ye. K	Probability and Statistics for Engineers and Scientists	Pearsons Education, Delhi.	2007
2	Lipschutz. S. and Schiller. J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross. S	A first Course in Probability	Pearson Education, Delhi	2014
4	Johnson. R.A	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi	2014

WEB REFERENCES

1. www.cut-the-knot.org/probability.shtml
2. www.mathcentre.ac.uk
3. [www.mathworld. Wolfram.com](http://www.mathworld.Wolfram.com)

COURSE OBJECTIVES

1. To understand the fundamental knowledge of probability theory.
2. To introduce the concept of random variable and functions of random variables.
3. To introduce the basic concepts of two dimensional random variables.
4. To introduce the concepts of random processes and Markov chain
5. To understand the different Queuing models
6. To understand how to solve problems using various models

COURSE OUTCOMES

1. The student gain the knowledge in measures of central tendency and probability
2. Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
3. Understand the basic concepts of two dimensional random variables and apply in engineering applications.
4. Understand the concepts of random process and markov chains
5. They will be able to solve the Queuing models
6. The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT I PROBABILITY AND RANDOM VARIABLE**9**

Axioms of probability - Conditional probability - Total probability – Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS**9**

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES**9**

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT IV RANDOM PROCESS AND MARKOV CHAINS**9**

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT V QUEUEING THEORY**9**

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ross.S	A first course in probability	Pearson Education, Delhi	2014
2	Medhi.J	Stochastic Process	New Age Publishers ,New Delhi	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan.T	Statistics and Random Processes	Tata McGraw-Hill, 2nd Edition, New Delhi.	2008
2	Allen.O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross.D. and Harris. C.M	Fundamentals of Queuing theory	John Wiley and Sons, New York.	2008
4	Taha.H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2006

WEB REFERENCES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.mit.edu

COURSE OBJECTIVES

Students should

1. Be able to understand basic knowledge of fuzzy sets and fuzzy logic
2. Be able to apply basic knowledge of fuzzy operations.
3. Able to know the basic definitions of fuzzy relations
4. Be able to know about the fuzzy measures
5. Be able to apply basic fuzzy inference and approximate reasoning
6. To know the applications of fuzzy Technology.

COURSE OUTCOMES

1. To gain the main subject of fuzzy sets.
2. To understand the concept of fuzziness involved in various systems and fuzzy set theory.
3. To gain the methods of fuzzy logic.
4. To comprehend the concepts of fuzzy relations.
5. To analyze the application of fuzzy logic control to real time systems.
6. The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I FUZZYSETS

9

Fuzzy Sets: Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – Fuzzy functions - Zadeh's Extension Principle

UNIT II OPERATIONS ON FUZZYSETS

9

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III FUZZYRELATIONS

9

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV FUZZYMEASURES

9

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V FUZZYINFERENCE

9

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TOTAL 45PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall NJ	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.J. Zimmermann	Fuzzy Set Theory and its Applications	Allied Publishers, New Delhi	2001
2	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman	1998
3	Michal Baczynski and Balasubramaniam	Fuzzy Implications	Springer Verlag, Heidelberg	2008

WEB REFERENCES

1. www.mathcentre.ac.uk
2. www.mathworld.Wolfram.com
3. www.doc.ic.ac.uk
4. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

COURSE OBJECTIVES

1. To know the fundamentals of Tensors
2. To know the series solutions to differential equations
3. To introduce the concepts of special functions
4. To study about Calculus of variations
5. To study about the integral equations
6. To know how to solve problems for above functions and equations

COURSE OUTCOMES

1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
2. Learn about special type of matrices that are relevant in physics and then learn about tensors.
3. Get introduced to Special functions like Bessel, Legendre, Hermite and Laguerre functions and their recurrence relations
4. Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
5. Students will master in calculus of variations and linear integral equations.
6. The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS**8**

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudotensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS**8**

Series Solution : Classification of singularities of an ordinary differential equation - Series solution-Method of Frobenius - indicial equation -examples

UNIT III SPECIAL FUNCTIONS**8**

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre, Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS**9**

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS**12**

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green's function – solution of a integral equation – integral equations of the convolution type – Abel's integral equations – integro-differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	40 th edition, , Khanna Publishers	2013
2	Stephenson, G, Radmore. P.M	Advanced Mathematical Methods for Engineering and Science students	Cambridge University Press	1990
3	Andrews, Larry C.	Special Function for Engineers and Applied Mathematicians	Macmillan, New York	1997
4	Murray R Spiegel, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEB REFERENCES

1. <http://www.doitpoms.ac.uk/>
2. www.phys.uu.nl/~thooft/lectures/specialfct.pdf
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE.aspx>

COURSE OBJECTIVES

1. To introduce the concepts of special functions.
2. To find the solutions to partial differential equations and their applications
3. To study about mathematical physics and perturbation techniques
4. To learn replacement models and simulation models
5. To provide techniques for effective methods to solve nonlinear programming
6. To provide techniques for decision making

COURSE OUTCOMES

1. Students know the concepts of improper integrals, Beta and Gamma functions.
2. The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
3. Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
4. To be able to understand the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools to be used in each type.
5. **Convert** and **solve** the practical situations into replacement models.
6. To understand how to model and solve problems using non-integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS**9**

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS**9**

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT III PERTURBATION TECHNIQUES**9**

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT IV SIMULATION MODELS**9**

Elements of simulation model - Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1)$: $(\infty/FIFO)$, $(M/M/c)$: $(\infty/FIFO)$ Models.

UNIT V DECISION MODELS**9**

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig. E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Gupta. A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	2008
3	Sankara Rao. K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	2010
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi.	2010

WEB REFERENCES

1. www.phys.uu.nl/~thooft/lectures/specialfct.pdf
2. www.maths.manchester.ac.uk/~bl/teaching/math34011/
3. pubsonline.informs.org/journal/opre

COURSE OBJECTIVES

1. To introduce the basic concepts of vector space
2. To know the fundamentals of linear Algebra
3. To solve system of linear equations
4. To study about the linear transformations
5. To study about the eigen values and eigen vectors
6. To introduce the concepts of inner product spaces

COURSE OUTCOMES

The student will be able to

1. To explain the fundamental concepts of advanced algebra
2. To explain their role in modern mathematics and applied contexts.
3. To apply the fundamental concepts in their respective engineering fields
4. To visualize linear transformations as matrix form
5. To recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
6. To articulate the importance of Linear Algebra and its applications in branches of Mathematics

UNIT I VECTORS SPACES**9**

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space

UNIT II EIGEN VALUES AND EIGEN VECTORS**9**

Eigen values and Eigen vectors - diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS**9**

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss- Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS**9**

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES**9**

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig, E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2014
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition	2012
3	Jim DeFranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill	2008

WEB REFERENCES

1. www.sosmath.com
2. www.linear.ups.edu
3. www.mathworld.wolfram.com
4. www.tutorial.math.lamar.edu

COURSE OBJECTIVES

1. To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
2. To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
3. To acquaint the student with Fourier, transform techniques used in wide variety of situations.
4. To introduce the basic concepts of PDE for solving standard partial differential equations
5. To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes
6. To develop Z transform techniques for discrete time systems.

COURSE OUTCOMES

1. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
2. The learners can equip themselves in the transform techniques and solve partial differential equations
3. Understand how to solve the given standard partial differential equations.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
6. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT I FOURIER SERIES**9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM**9**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS**9**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**9**

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT V Z - TRANSFORM AND DIFFERENCE EQUATIONS**9**

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem - Formation of difference equations – Solution of difference equations using Z - transform.

**TEXT
BOOKS****TOTAL 45 PERIODS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2013
2	Erwin Kreyszig	Advanced Engineering Mathematics.	Wiley India (P) Ltd, New Delhi.	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2007
2	Narayanan, S., and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd.	2006
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2008

WEB REFERENCES

1. www.sosmath.com
2. <http://mathworld.wolfram.com/FourierSeries.html>
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx>

COURSE OBJECTIVES

1. Develop abilities to write technically and expressively,
2. Recognize writing as a constructive, meaningful process,
3. Practice using reading strategies for effective writing.
4. Design effective technical documents for both print and digital media
5. Identify the qualities of good technical writing
6. To lean avoiding similarity index.

COURSE OUTCOMES

1. Construct simple sentences, correct common grammatical errors in written English.
2. Develop confidence in English language by imbibing lexical and syntax rules.
3. Enrich their reading ability for effective writing.
4. Elevate them to minimize word, sentence, and paragraph length without sacrificing clarity or substance
5. Familiarize with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
6. Demonstrate the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.

UNIT I BASICSOFWRITING**9**

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer’s block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT II PARAGRAPHS ANDESSAYS**9**

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT III LETTERS, MEMOS ANDEMAIL**9**

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT IV THE ART OF CONDENSATION ANDTECHNICALPROPOSALS**9**

StepstoEffectivepréciswriting–Guidelines–TechnicalProposals–TypesofProposals–Characteristics– Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /FilmReview – Travelogue – DialogueWriting.

UNIT V REPORTS ANDRESEARCHARTICLES**9**

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TOTAL 45PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V.N. Arora and Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing	Collins; First edition	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2010

COURSE OBJECTIVES

1. To inculcate the basics of brief history of Earth sciences
2. To divulge knowledge on the basics of structure of earth and earth's gravitational field.
3. To disseminate the fundamentals of magnetic field and thermal distribution of earth.
4. To introduce the concepts of seismology and seismic waves
5. To impart the basic knowledge of oceans
6. To Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

COURSE OUTCOMES

1. Gain knowledge on the basics of history of Earth sciences.
2. Acquire knowledge on concepts of structure of earth and earth's gravitational field.
3. Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
4. Obtain knowledge on the basics of seismic waves.
5. Understand the basics of oceans and properties of sea water.
6. Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNIT I ORIGIN OF EARTH**9**

A brief history of the development of Earth Sciences and of Geophysics in particular, An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition

UNIT II STRUCTURE OF EARTH**9**

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH**9**

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle

UNIT IV SEISMOLOGY**9**

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its historical perspective and essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, trenches and island arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS**9**

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A.Jacobs, R.D.Russel	Physics and Geology	McGraw-Hill	2002

WEB REFERENCES

1. www.ocw.mit.edu
2. www.physicsclassroom.com
3. www.nptel.ac.in
4. www.physics.org

COURSE OBJECTIVES

1. To disseminate the fundamentals of acoustic waves.
2. To inculcate the characteristics of radiation and reception of acoustic waves.
3. To teach the concepts of radiation and reception of acoustic waves
4. To divulge knowledge on the basics of pipe resonators and filters.
5. To introduce the features of architectural acoustics.
6. To impart the basic knowledge of transducers and receivers.

COURSE OUTCOMES

1. Develop the idea of the fundamentals of acoustic waves.
2. Apply the concepts of radiation and reception of acoustic waves.
3. Explain the basic ideas of pipe resonators and filters.
4. Illustrate the basics of architectural acoustics.
5. Illustrate the transducers and receivers and its applications in various electronic devices.
6. Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION**9**

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves -Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES**9**

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS**9**

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS**9**

Sound in endosse – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION**9**

Transducer as an electrical network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamics microphone piezoelectric microphone – calibration of receivers

TOTAL 45 PERIODS**TEXTBOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lawrence E. Kinsler, Austin R. Frey,	Fundamentals of Acoustics	4th edition, John Wiley & Sons	2000

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	F. Alton Everest & Ken Pohlmann	Master Handbook of Acoustics	McGraw Hill Professional	2014

WEB REFERENCES

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

COURSE OBJECTIVES

1. To understand about the fuel
2. To study about the alcohols
3. To study importance of alcohols in engine
4. To gain knowledge on the fuel gas and oils
5. To get the information on fuel cell
6. To understand electric, hybrid and solar cars

COURSE OUTCOMES

1. Students will know about the basic concepts of alternate fuels
2. Students will know about the basic concepts of alcohols.
3. Students will understand about fuel gas and oils
4. Students can enrich their knowledge about the alternate fuels and energy systems
5. Develop their knowledge in studies of vegetable oils
6. Students knows about the importance of electric, hybrid and solar cars

UNIT I INTRODUCTION**9**

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS**9**

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS**9**

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications

UNIT IV VEGETABLE OILS**9**

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS**9**

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Richard.L.Bechfold	Alternative Fuels Guide Book	SAE International Warren dale	2002
2	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nagpal G R	Power Plant Engineering	Khanna Publishers	2002
2	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing	Gulf Professional Publisher, USA	2012

WEB REFERENCES

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. <http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
3. <http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

COURSE OBJECTIVES:

1. To make the students conversant with basics of Solid wastes and its classification.
2. To make the student acquire sound knowledge of different treatments of solid wastes.
3. To acquaint the student with concepts of waste disposals.
4. To develop an understanding of the basic concepts of Hazardous waste managements.
5. To acquaint the students with the basics of energy generation from waste materials.
6. To get the information on energy conservation.

COURSE OUTCOMES:

1. Outline the basic principles of Solid waste and separation of wastes (K)
2. Identify the concepts of treatment of solid wastes (S)
3. Identify the methods of wastes disposals. (S)
4. Examine the level of Hazardousness and its management. (S)
5. Examine the possible of the energy production using waste materials. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLIDWASTE**9**

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTETREATMENT**9**

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTEDISPOSAL**9**

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV HAZARDOUS WASTEMANAGEMENT**9**

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling -Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE**9**

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, energy recovery systems. Biological & chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TOTAL 45PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dara.S.S, Mishra.D.D	A Text book of Environmental chemistry and pollution control	S.Chand and company Ltd	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nagpal H.Theisen, S. Vigil	Integrated Solid Waste management- Engg. Principles and management issues	George Tchobanoglous, McGraw Hill	2013
2	Frank Kreith, George Tchobanoglous	Hand Book of Solid Waste Management- 2ndedition	McGraw Hill Publishing Ltd., Newyork	2002
3	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall	1999

WEB REFERENCES

1. www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
2. <http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
3. www.alternative-energy-news.info/technology/garbage-energy/
4. nzic.org.nz/ChemProcesses/environment/

COURSE OBJECTIVES:

1. To make the students conversant about the green chemistry
2. To make the student acquire sound knowledge of the atom efficient process
3. Able to synthesis elaborately the atom efficient process.
4. To acquaint the student with concepts of green technology.
5. To develop an understanding of the basic concepts of renewable energy resources.
6. To acquaint the students with the basic information on catalysis.

COURSE OUTCOMES:

1. Outline the basic principles of green chemistry (K)
2. Examine the different atom efficient process and synthesis elaborately (S)
3. Apply the concepts combustion of green technology (S)
4. Identify and apply the concepts of renewable energy (S)
5. Apply the concepts of green catalysts in the synthesis (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I INTRODUCTION TO GREENCHEMICALPRINCIPLES 9

Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENTPROCESSES 9

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis

UNIT III BIOTECHNOLOGY AND GREENCHEMISTRY 9

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES 9

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion

UNIT V CATALYSIS IN GREENCHEMISTRY 9

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V. K. Ahluwalia and M. Kidwai	New Trends in Green Chemistry	Anamaya publishers. New Delhi. Second Edition	2007
2	Sanjay K. Sharma, Ackmez Mudhoo	Green Chemistry for Environmental Sustainability	CRC Press	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K. R. Desai	Green Chemistry	Himalaya Publishing House, Mumbai.	2005
2	Dr. Sunita Ratan	A Textbook of Engineering Chemistry	S.K. Kataria and Sons	2012
3	A. S. Matlack	Introduction to Green Chemistry	Marcel Dekker: New York	2001
4	Mukesh Doble	Green Chemistry and Engineering	Academic Press	2007

WEB REFERENCES

1. <http://www.organic-chemistry.org/topics/green-chemistry.shtm>
2. <http://www.essentialchemicalindustry.org/processes/green-chemistry.html>
3. http://www.chm.bris.ac.uk/webprojects2004/vickery/green_solvents.htm
4. <http://www.epa.gov/research/greenchemistry/>
5. <http://www.amazon.in/Green-Chemistry-Catalysis>

COURSE OBJECTIVES:

1. To make the students conversant with **the information on electrochemical material**.
2. To make the student acquire sound knowledge of **conducting polymers**.
3. To acquaint the student with concepts of Energy storage devices.
4. To develop energy storage devices.
5. To impart knowledge on basic principles of solar cells
6. To know the applications of energy storage

COURSE OUTCOMES:

1. Outline the basic principles of chemistry in electrochemical material (K)
2. Examine the properties of conducting polymers (S)
3. Apply the concepts of electrochemistry in storage devices. (S)
4. Identify the concepts of storage devices and its applications. (S)
5. Apply the suitable materials for the manufacturing of storage devices. (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METALFINISHING**9**

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS**9**

Electropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers-poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I**9**

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II**9**

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE**9**

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990
2	Cynthia G. Zoski	Hand Book of Electrochemistry	Academic Press, Elsevier., UK	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.M.Baizer	Organic electrochemistry	Dekker Inc. New York	1983
2	M. Barak	Electrochemical power sources	IEEE series, Peter Peregrinus Ltd, Steverage, U.K.	1997
3	K.L. Chopra and I. Kaur	Thin film devices and their application	Plenum Press, New York.	1983
4	Bruno Scrosati	Applications of Electroactive polymers	Chapman & Hall, London	1993

WEB REFERENCES

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

COURSE OBJECTIVES:

1. To make the students conversant with **cement and lime** and its uses.
2. To make the student acquire sound knowledge of abrasives
3. To make the student acquire sound knowledge of refractories.
4. To acquaint the student with concepts of inorganic chemicals.
5. To develop an understanding of the basic concepts of **explosives**.
6. To acquaint the students with the basics of **agriculture chemicals**.

COURSE OUTCOMES:

1. Outline the basic chemistry of **cement and lime (K)**
2. Examine the uses of abrasives and refractories (S)
3. Identify the usage of the inorganic chemicals. (S)
4. Identify the concepts of explosives and smoke screens (S)
5. Identify the usage of the **agriculture chemicals** (S)
6. Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME**9**

Manufacture of Portland cement – setting and hardening of Portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES**9**

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS**9**

Common salt and soda ash – Manufacture – Different grades – products – alkalis – Na_2CO_3 , Caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, Sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES**9**

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS**9**

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut	2000
2	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
2	R.N. Sherve	Chemical process industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
3	James A. Kent	Hand Book of Industrial Chemistry, 9th edition	New York, Van Nostrand Reinhold.	1992
4	S.D. Shukla and G.N. Pandey	A text book of chemical technology	Vikas publishing house pvt. Ltd, New Delhi.	1979

WEB REFERENCES

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>
4. <http://toxics.usgs.gov/topics/agchemicals.html>

COMPUTER SCIENCE AND ENGINEERING

15BEC SOE01

PYTHON PROGRAMMING

3 0 0 3100

COURSE OBJECTIVES:

1. To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
2. To study decision structures and loops
3. To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
4. To understand the process and skills necessary to effectively deal with problem solving
5. To discuss in relation to writing programs
6. To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
2. Structure simple Python programs for solving problems
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, dictionaries
5. Read and write data from/to files in Python Programs
6. Understand various program object and graphics based on python

UNIT I FUNDAMENTALS

9

The Universal Machine-Program power- What is Computer Science?-Hardware Basics- Programming Languages-Python-Inside Python program-Software Development Process- Example program-Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II DECISION STRUCTURES AND LOOPS

9

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III FUNCTIONS

9

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV SEQUENCES

9

String data type- String Processing - List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V OBJECTS AND GRAPHICS

9

Overview - Object of Objects - Simple Graphics Programming - Using Graphical Objects - Choosing Coordinates - Interactive Graphics-Graphics module reference

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Zelle	Python Programming: An Introduction to Computer Science	Franklin & Associates	2009
2	Mark Lutz	Learning Python	OREily	2013
3	David Beazly & Brian K. Jones	Python Cookbook	OREily	2013

COURSE OBJECTIVES:

1. To study concepts of Internet, IP addresses and protocols
2. To explain the concept of web page development through HTML
3. To introduce the PERL and explore its current strengths and Weaknesses
4. To write working Java code to demonstrate the use of applets for client-side programming
5. To study Internet telephony and various multimedia applications
6. To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

1. Learn the advanced concepts & techniques of Internet and Java.
2. Analyze the requirements for and create and implement the principles of web page development
3. Understand the concepts of PERL
4. Implement client-side programming using java applets
5. Generate internet telephony based upon advanced concepts
6. Develop applications on internet programming based on java applets and scripts

UNIT I INTRODUCTION

9

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML

9

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL

9

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV CLIENT-SERVER PROGRAMMING

9

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V INTERNET TELEPHONY

9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.P. Gopalan and J. Akilandeswari	Web Technology: A Developer's Perspective	PHI Learning, Delhi	2013
2	Rahul Banerjee	Internetworking Technologies, An Engineering Perspective	PHI Learning, Delhi	2011

COURSE OBJECTIVES:

1. To impart the fundamental concepts of Computer Animation and Multimedia
2. To study the graphic techniques and algorithms using flash
3. Explain various concepts available in 3D animation
4. Explain various devices available for animation
5. To study the multimedia concepts and various I/O technologies for concept development
6. To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

1. Develop their creativity using animation and multimedia
2. Understand the concepts of Flash and able to develop animation using it
3. Understand about various latest interactive 3D animation concepts
4. Know the various devices and software available in motion capture
5. Understand the concept development process
6. Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I INTRODUCTION**9**

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II CREATING ANIMATION IN FLASH**9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III 3D ANIMATION & ITS CONCEPTS**9**

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV MOTION CAPTION**9**

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V CONCEPT DEVELOPMENT**9**

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ranjan Parekh	Principles of Multimedia	TMH	2007
2	Ashok Banerji, Ananda Mohan Ghosh	Multimedia Technologies	McGraw Hill Publication	2007
3	Malay K. Pakhira	Computer Graphics, Multimedia and Animation	PHI Learning	2010
4	Pankaj Dhaka	Encyclopedia of Multimedia and Animations	Anmol Publications	2011

COURSE OBJECTIVES:

1. To study the basic parts of computer in detail
2. Introduce various peripheral devices available for computer and its detailed working concepts
3. Overview of various interfaces and other hardware overview
4. Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
5. To study basic concepts and methods in troubleshooting
6. To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

1. Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
2. Identify various peripheral devices available and its working
3. Understand various concepts of hardware and its interface and control
4. Perform basic installation of PC. Importance of maintenance is understood
5. Understand Various faults and failures are identified and troubleshooting in detail
6. Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I INTRODUCTION**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II PERIPHERAL DEVICES**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC HARDWARE OVERVIEW**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV INSTALLATION AND PREVENTIVE MAINTENANCE**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V TROUBLESHOOTING**9**

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B. Govindarajalu	IBM PC Clones Hardware, Troubleshooting and Maintenance	TMH	2002
2	Peter Abel, Niyaz Nizamuddin	IMB PC Assembly Language and Programming	Pearson Education	2007
3	Scott Mueller	Repairing PC's	PHI	1992

COURSE OBJECTIVES:

1. To understand the basic requirements, installation and structure of gaming using Java
2. Discuss various aspects of safe cracker projects
3. Discuss various aspects of match game projects
4. Discuss various aspects of pizza delivery projects
5. Discuss various aspects of moon landing projects
6. Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

1. Interpret various concepts of gaming based on Java
2. Design the frame and code to develop safe cracker project
3. Design the frame and code to develop match game project
4. Design the frame and code to develop pizza delivery project
5. Design the frame and code to develop moon landing project
6. Design and develop various games using Java

UNIT I INTRODUCTION**9**

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II SAFECRACKER PROJECT**9**

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III MATCH GAME PROJECT**9**

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV PIZZA DELIVERY PROJECT**9**

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V MOON LANDING PROJECT**9**

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Philip Conrod, Lou Tylee	Programming Games with Java	Cengage Learning PTR	2013
2	Timothy M. Right	Fundamental 2D Game Programming with Java	Cengage Learning PTR	2015
3	Wayne Holder, Doug Bell	Java Game Programming for Dummies	Cengage Learning PTR	2013

ELECTRICAL AND ELECTRONICS ENGINEERING

15BEEEOE01

ELECTRICHYBRIDVEHICLES

3 0 0 3100

Course Objectives

1. To understand the basic concepts of electric hybrid vehicle.
2. To gain the knowledge about electric propulsion unit.
3. To gain the concept of Hybrid Electric Drive-Trains.
4. To gain the different Energy Management Strategies.
5. To study about the efficiency manipulation in drives
6. To understand and gain the knowledge about various energy storage devices

Course Outcomes:

1. Summarize the basic concepts in bioprocess Engineering.
2. Explain the concept of Hybrid Electric Vehicles.
3. Understand the concept of Hybrid Electric Drive-Trains.
4. Identify the different Energy Management Strategies.
5. Understand the concept of different Energy Storage devices.
6. Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRIDELECTRICDRIVE-TRAINS

9

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRICPROPULSIONUNIT

9

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGYSTORAGE

9

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGYMANAGEMENTSTRATEGIES

9

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TOTAL 45PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2010

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2009
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2012

COURSE OBJECTIVES:

1. To gain the knowledge about energy management.
2. To understand the basic concepts in economic analysis in energy management.
3. To understand the basic principles of energy audit.
4. To gain the knowledge about the basic concept of types of Energy Audit
5. To gain and Evaluate the different energy efficient motors
6. Understand the concept of Energy conservation.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand the concept of Energy Management.
2. Analyze the different methods for economic analysis
3. Knowledge about the basic concept of Energy Audit and types.
4. Evaluate the different energy efficient motors
5. Understand the concept of Energy conservation.
6. Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT**9**

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS**9**

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT**9**

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS**9**

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system-energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS**9**

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice- lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	Energy Management	Heinemann Publications	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons, 7th Edition	2013
3	Paul o' Callaghann	Energy Management	Mc-Graw Hill Book Company – 1st edition	1998

COURSE OBJECTIVES

1. It deals with various types of Sensors & Transducers and their working principle
2. It deals with resistive transducers
3. It deals with capacitive transducers
4. It deals with inductive transducers
5. It deals with some of the miscellaneous transducers
6. It deals with characteristics of transducers

COURSE OUTCOMES

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3. Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS**9**

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS**9**

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS**9**

Potentiometer – Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER**9**

Self inductive transducer – Mutual inductive transducers – LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLANEOUS TRANSDUCERS**9**

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2003
2	Patranabis. D	Sensors and Transducers	Prentice Hall of India	2003
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2004
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2010

COURSE OBJECTIVES

1. To understand the basic principles of PLC systems.
2. To gain the knowledge about data handling functions.
3. To gain the knowledge of storage techniques in PLC
4. To acquire the knowledge about how to handle the data and functions
5. To study about flow charts of ladder and spray process system
6. To understand the principles of PID.

COURSE OUTCOME

1. At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
2. To acquire the knowledge of storage techniques in PLC
3. Students know how to handle the data and functions
4. Students known about advanced controller in PLC applications
5. Students gather real time industrial application of PLC
6. Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION**9**

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING**9**

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS**9**

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS**9**

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES**9**

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing, analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	2004
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2009

WEB REFERENCE

1. <http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm>, - Introduction to programmable Logiccontroller

COURSE OBJECTIVES

1. To gain the knowledge about environmental aspects of energy utilization.
2. To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
3. To study about solar energy collectors and its storages
4. To study about the inter connected system in wind power
5. To understand the basic principles fuel cell, Geo thermal power plants.
6. To gain the knowledge about hydro energy.

COURSE OUTCOMES

At the end of this course, students will demonstrate the ability to

1. Analyze the Energy Scenario in India
2. Understand the concept of Solar Energy
3. Understand the concept of Wind Energy
4. Understand the concept of Hydro Energy
5. Analyze the different energy sources
6. Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION**9**

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY**9**

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY**9**

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY**9**

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES**9**

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers ,Fourth edition	2011
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao.S. &Parulekar	Energy Technology	Khanna publishers, Fourth edition	2013
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2015
4	Mittal K.M	Non-Conventional Energy Systems	Wheeler Publishing Co. Ltd	1997

WEB REFERENCE

1. www.energycentral.com
2. www.catelectricpowerinfo.com

COURSE OBJECTIVES:

1. To study the state variable analysis
2. To provide adequate knowledge in the phase plane analysis and also describing function analysis.
3. To study the analysis discrete time systems using conventional techniques.
4. To analyze the stability of the systems using different techniques.
5. To study the design of optimal controller.
6. To study the types of compensators

COURSE OUTCOMES:

At the end of the course the student will be able to

1. understand the state variable analysis, Z- transform, state equation
2. Construct the frequency response of the system using various plots
3. Correlate the time and frequency domain specifications and
4. Correlate the effect of compensation
5. Design the different types of compensators using frequency response plots to stabilize the control system
6. Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT I STATE VARIABLE ANALYSIS**9**

Concept of state – State Variable and State Model – State models for linear and continuous time systems – Solution of state and output equation – controllability and observability - Pole Placement –State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS**9**

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising non- linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM**9**

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT IV STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM**9**

State equation – Solutions – Realization – Controllability – Observability – Stability – Jury's test.

UNIT V OPTIMAL CONTROL**9**

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control – Optimal estimation – Multivariable control design.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press	1992
4	George J. Thaler	Automatic Control Systems'	Jaico Publishers	1993

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J. Thaler	Automatic Control Systems	Jaico Publishers	1993
2	M.Gopal	Modern control system theory	New Age International Publishers	2002
3	Gene F. Franklin, and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
4	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

ELECTRONICS AND COMMUNICATION ENGINEERING

15BEECOE01

REAL TIME EMBEDDED SYSTEMS

3 0 0 3100

COURSE OBJECTIVES

1. To introduce students to the embedded systems, its hardware and software.
2. To introduce devices and buses used for embedded networking.
3. To study about task management
4. To learn about semaphore management and message passing
5. To study about memory management
6. To impart knowledge on

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand overview of embedded systems architecture
2. Acquire knowledge on embedded system, its hardware and software.
3. Gain knowledge on overview of Operating system
4. Discuss about task Management
5. Gain knowledge about semaphore management and message passing.
6. Gain knowledge about memory management.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM

9

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT II OPERATING SYSTEM OVERVIEW

9

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT III TASK MANAGEMENT

9

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

9

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT V MEMORY MANAGEMENT

9

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

TOTAL 45 PERIODS

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

COURSE OBJECTIVES

1. To study about various speakers and microphone
2. To learn the fundamental of television systems and standards
3. To learn the process of audio recording and reproduction
4. To study various telephone networks
5. To discuss about the working of home appliances
6. To familiarize with TV services like ISDN.

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand working of various type of loud speakers
2. Acquire knowledge on various types of picture tubes
3. Demonstrate the working of various optical recording systems
4. Distinguish various standards for color TV system
5. Acquire knowledge on various telecommunication networks
6. Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES 9

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT II TELEVISION STANDARDS AND SYSTEMS 9

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT III OPTICAL RECORDING AND REPRODUCTION 9

Audio Disc – Processing of the Audio signal – readout from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats - recording systems – Playback Systems.

UNIT IV TELECOMMUNICATIONS SYSTEMS 9

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT V HOME APPLIANCES 9

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

TOTAL 45 PERIODS

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.P. Bali	Consumer Electronics	Pearson Education	2005

COURSE OBJECTIVES

1. To familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application
2. To have a solid understanding of Nanotechnology concepts.
3. To introduce the basic concepts of Nanotechnology and its applications in various domain
4. To understand the molecular structure of carbon nano tube
5. To educate how to use Nanotechnology to solve real-world problems
6. To familiar with the structure and application of carbon nano tube

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand the basic concepts of Nanotechnology and its applications in various domain
2. Ability to develop how to use Nanotechnology to solve real-world problems
3. Understand solid understanding of Nanotechnology concepts
4. Understand the important concepts applicable to small electronic devices, their fabrication, characterization and application
5. Understand the molecular structure of carbon nano tube
6. Familiar with the structure and application of carbon nano tube

UNIT I LIMITATIONS OF CMOS**9**

Fundamentals of MOSFET devices - Scaling of CMOS - Limitations - Alternative concepts in materials - Structures of MOS devices: SOI MOSFET, FINFETs, Dual Gate MOSFET, Ferro electric FETs.

UNIT II MICRO AND NANOFABRICATION**9**

Optical Lithography - Electron beam Lithography - Atomic Lithography - Molecular beam epitaxy - Nano lithography.

UNIT III CHARACTERIZATION EQUIPMENTS**9**

Principles of Electron Microscopes - Scanning Electron Microscope - Transmission Electron Microscope - Atomic Force Microscope - Scanning Tunneling Microscope.

UNIT IV NANO DEVICES - I**9**

Resonant tunneling diodes - Single electron devices - Josephson junction - Single Flux Quantum logic - Molecular electronics.

UNIT V NANO DEVICES - II**9**

Quantum computing: principles - Qbits - Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3rd Edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Thomas Heinzel	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson,	Nanotechnology - (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

COURSE OBJECTIVES

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study the image compression procedures.
4. To study the image segmentation and representation techniques.
5. To study the video processing fundamentals
6. To know the concepts of motion estimation

COURSE OUTCOMES:

1. Understand the image fundamentals and mathematical transforms necessary for image processing.
2. Understand the image enhancement techniques
3. Understand the image compression procedures.
4. Understand the image segmentation and representation techniques.
5. Understand the video processing fundamentals
6. Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS 9

Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES 9

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION 9

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING 9

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION 9

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gonzalez and Woods	Digital Image Processing	Pearson	2012
2	Yao wang, and Ya – qin Zhang	Video processing and communication	PHI	2013

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M. Tekalp	Digital video Processing	Prentice Hall International	2011
2	Aner ozdemi R	Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms	John Wiley & Sons	2012
3	Chris Solomon, Toby Breckon	Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab	John Wiley & Sons	2000

Course Objectives

1. To learn the processing steps in fabrication of VLSI devices.
2. To learn the concepts of assembling and packaging for VLSI devices.
3. To impart a good knowledge in reactive plasma etching techniques and equipment.
4. To familiarize the students with the NMOS and CMOS IC technology.
5. To make the student acquire reactive Plasma Etching techniques and Equipment.
6. To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

1. List out various fabrication techniques
2. Understand the etching principle in IC fabrication
3. Gain knowledge on deposition and diffusion methods
4. Understand the process simulation and integration.
5. Assembling and packing techniques
6. various technologies used for fabricating VLSI devices

UNIT 1 INTRODUCTION TOMOS TECHNOLOGIES**9**

MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: Ids-Vds relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II LAYOUT DESIGNANDTOOLS**9**

Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools. Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III COMBINATIONALLOGICNETWORKS**9**

Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Networktesting.

UNIT IVSEQUENTIALSYSTEMS**9**

Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V FLOOR PLANNING &ARCHITECTUREDESIGN**9**

Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TOTAL 45PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K. Eshraghian, Eshraghian. D	Essentials of VLSI Circuits and Systems	PHI	2005
2	Wayne Wolf	Modern VLSI Design	Pearson Education	1997

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N.H.EWeste, K.Eshraghian	Principals of CMOS VLSI Design	Adisson Wesley	2005

Course Objectives

1. To study materials used for MEMS and its working
2. To study the fabrication process used for MEMS
3. To study the packaging process used for MEMS
4. To familiarize the students with various micro actuators and micro sensors.
5. To learn the survey of materials central to micro engineering.
6. To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

1. Appreciate the underlying working principles of MEMS devices.
2. Understand the working of Micro sensors and actuators
3. Explain the IC fabrication processes
4. Gain knowledge on bulk manufacturing
5. Understand the Design of Micro systems.
6. Design and model MEMS devices.

UNIT I INTRODUCTION TO MEMS AND MICROFABRICATION**9**

History of MEMS Development, Characteristics of MEMS-Miniaturization - Microelectronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS**9**

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION**9**

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors-Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS AND ACTUATOR**9**

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application- Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties- quartz- PZT-PVDF - ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V POLYMER AND OPTICAL MEMS**9**

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP) - PDMS - PMMA - Parylene - Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TOTAL 45 PERIODS**TEXT BOOK**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K. Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

Course Objectives

1. To introduce the basic concepts of neural networks and its applications in various domain
2. To educate how to use Soft Computing to solve real-world problems
3. To have a solid understanding of Basic Neural Network.
4. To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
5. To gain exposure in the field of neural networks and relate the human neural system into the digital world
6. To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

1. Understand the basic concepts of neural networks and its applications in various domains
2. Gain knowledge about learning process in Neural Networks
3. Apply perception concept in design
4. Design using ART phenomena
5. Gain knowledge on SOM concepts
6. Ability to develop the use of Soft Computing to solve real-world problems

UNIT I INTRODUCTION TO NEURAL NETWORKS**9**

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks

UNIT II LEARNING PROCESS**9**

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION**9**

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm

UNIT IV ATTRACTOR NEURAL NETWORK AND ART**9**

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP

UNIT V SELF ORGANIZATION**9**

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements

TOTAL 45 PERIODS**REFERENCES**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Simon Haykin	Neural Networks and Learning Machines	Pearson/ Prentice Hall	2009
2	Satish Kumar	Neural Networks - A Classroom Approach	TMH	2008
3	Freeman J.A., Skapura D.M	Neural networks, algorithms, applications, and programming techniques	Addition Wesley	2005
4	Laurene Fausett	Fundamentals of Neural Networks: Architectures, Algorithms, and Applications	Pearson/ Prentice Hall	1997

COURSE OBJECTIVES

1. To introduce the basic concepts of Fuzzy logic and its applications in various domain
2. To educate how to use Fuzzy computation to solve real-world problems
3. To have a solid understanding of Basic fuzzy models.
4. Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
5. To learn about applications on Fuzzy based systems
6. To familiarize with fuzzy inference and defuzzy inference procedures

COURSE OUTCOMES

At the end of the course the students will be able to

1. Understand the basic concepts of Fuzzy logic and its applications in various domain
2. Gain knowledge on theory of Reasoning
3. Develop fuzzy controllers
4. Understand concepts of adaptive fuzzy control
5. Ability to develop how to use Fuzzy computation to solve real-world problems
6. Design fuzzy based model for any application

UNIT I BASICS OF FUZZY LOGIC**9**

Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT II THEORY OF APPROXIMATE REASONING**9**

Linguistic variables, Fuzzy propositions, Fuzzy if-then statements, inference rules, compositional rule of inference-fuzzy models

UNIT III FUZZY KNOWLEDGE BASED CONTROLLERS (FKBC)**9**

Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT IV ADAPTIVE FUZZY CONTROL**9**

Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Set organizing controller model based controller.

UNIT V FUZZY BASED SYSTEMS**9**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications- Introduction to ANFIS.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. Diankar, H. Hellendoom	An Introduction to Fuzzy Control	Narosa Publishers India	1996
2	G. J. Klir and T. A. Folger	Fuzzy Sets Uncertainty and Information	PHI IEEE	1995

BIOTECHNOLOGY

15BTBTOE01

BIOREACTORDESIGN

3 0 0 3100

COURSE OBJECTIVES:

1. To impart basic knowledge in bioprocessEngineering
2. To design the bioreactors for variousoperations.
3. To understand the principle and working of heat transferequipments.
4. To extend the knowledge in principle of heat transfer inside abioreactor
5. To construct the equipments used in mass transferoperations.
6. To learn the equipments used in separationprocess.

COURSE OUTCOMES:

Upon completion of this course, the students will be able to

1. Summarize the basic concepts in bioprocessEngineering.
2. Design the bioreactors for variousoperations.
3. Understand the principle and working of heat transferequipments.
4. Develop the heat transfer equipments for BioprocessEngineering.
5. Construct the equipments used in mass transferoperations.
6. Categorize the equipments used in separationprocess.

UNITI ENGINEERING PROPERTIES ANDSTORAGETANK

9

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNITII REACTORDESIGN

9

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNITIII HEATTRANSFEREQUIPMENTS

9

Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulationevaporator.

UNITIV MASS TRANSFEREQUIPMENTS

9

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNITV SEPERATIONEQUIPMENTS

9

Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker crystallizer.

TOTAL 45PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw- Hill	2007
2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw- Hill Companies, Inc.	2008

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

COURSE OBJECTIVES

1. To learn the scope and importance of food processing.
2. To impart basic knowledge in different food processing methods carried out in the food tech companies.
3. To extend the brief knowledge in food conservation operations.
4. To study the methods of food preservation by cooling.
5. To familiarize the students on the concepts of preservation methods for fruits.
6. To create deeper understanding on preservation methods for vegetables.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Describe the scope and importance of food processing.
2. Outline the various processing methods for foods.
3. Extend the knowledge in food conservation operations.
4. Describe the methods of food preservation by cooling.
5. Summarize the preservation methods for fruits.
6. Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING**9**

Properties of food - Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS**9**

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS**9**

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING**9**

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES**9**

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P. Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin no.119	1995

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

COURSE OBJECTIVES

1. To understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. To use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. To study reaction mechanisms, relative free energies and structural dynamics
4. To compute different experimental properties and spectra using computational techniques.
5. To understand how to construct, interpret and utilise potential energy surfaces.
6. To understand the theoretical and practical challenges associated with computational modeling.

COURSE OUTCOMES

1. Understand the theoretical foundation of computational chemistry, with an emphasis on electronic structure calculations using quantum chemistry and classical molecular dynamics simulation techniques
2. Can use computational chemistry software to simulate chemical processes, quantify and rationalise reactivity.
3. Study reaction mechanisms, relative free energies and structural dynamics
4. Compute different experimental properties and spectra using computational techniques.
5. Understand how to construct, interpret and utilise potential energy surfaces.
6. Understand the theoretical and practical challenges associated with computational modeling.

UNIT I MOLECULAR MODELLING**9**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima

UNIT II QUANTUM MECHANICS**9**

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semi empirical methods.

UNIT III MOLECULAR MECHANICS**9**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non – bonded interactions; force field parameterization and transferability; energy minimization; derivative and non – derivative methods, applications of energy minimization.

UNIT IV MOLECULAR DYNAMICS**9**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamic simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT V MODELLING AND DRUG DESIGN**9**

Macromolecular modeling, design of ligands for known macro molecular target sites, Drug- receptor interaction, classical SAR /QSAR studies and their implications to the 3 D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yvonne C. Martin, Peter Willett	Designing bioactive molecules :three-dimensional techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; Har	1998

COURSE OBJECTIVES

1. To understand the basics of biology
2. To gain knowledge about different biomolecules
3. To get familiarize with human diseases.
4. To learn about DNA & RNA.
5. To learn about different clinical investigations
6. To know the recent advances in biology

COURSE OUTCOMES

At the end of the course

1. Summarize the cell structures and its functions
2. Explain the Biomolecules functions
3. Classify the communicable and non-communicable human diseases
4. Illustrate the different organ function tests
5. Tell the applications of biology in environmental applications
6. Describe the concept of biomechanics

UNIT I OVERVIEW OF BIOREMEDIATION**9**

Pollution: Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT II BIOFILM PROCESSES**9**

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes

UNIT III BIOREMEDIATION FOR SOIL ENVIRONMENT**9**

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination

UNIT IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMENT**9**

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream-Biofiltration, Bio-trickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters

UNIT V BIOREMEDIATION OF METALS**9**

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Bioremediation, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rittmann, B.E., and McCarty, P.L.,	Environmental Biotechnology: Principles and Applications.	McGraw Hill,	2001
2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill Education	1995

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Prescott, L. M., Harley, and Klein, D. A	Microbiology	McGraw- Hill Higher Education	2008

COURSE OBJECTIVES

1. To study selected biological phenomena using physical principles.
2. To understand the biological and environmental sciences.
3. To gain the knowledge on technical enormous impact of the biological sciences.
4. To acquire the knowledge about molecular structure of biological systems.
5. To know the uses of proteins and its functions.
6. To understand the biological structure & function: Size and shape of macromolecules.

COURSE OUTCOMES

1. Study selected biological phenomena using physical principles.
2. Understand the biological and environmental sciences.
3. Gain the knowledge on technical enormous impact of the biological sciences.
4. Acquire the knowledge about molecular structure of biological systems.
5. Know the uses of proteins and its functions.
6. Understand the biological structure & function: Size and shape of macromolecules.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS 9

Intramolecular bonds – covalent – ionic and hydrogen bonds – biological structures -general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS 9

Primary structure – the bases – sugars and the phosphodiester bonds- double helical structure – A, B and Z forms – properties of circular DNA – topology – polymorphism and flexibility of DNA – structure of ribonucleic acids – hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS 9

Conformation of the peptide bond – secondary structures – Ramachandran plots – use of potential functions – tertiary structure – folding – hydration of proteins – hydrophathy index.

UNIT IV ENERGY & DYNAMICS OF BIOLOGICAL SYSTEMS 9

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bi molecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES 9

Techniques for the study of biological structure & function: Size and shape of macromolecules – methods of direct visualization macromolecules as hydrodynamic particles – macromolecules diffusion – ultra centrifugation – viscometry x-ray crystallography determination of molecular structures, X-ray fibre diffraction electron microscopy neutron scattering – light scattering.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Roland Glaser	Biophysics	Springer Science & Business Media	2001
2	Michel Daune	Molecular Biophysics: Structures in Motion	Oxford University Press	1999

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Charles R. Cantor	Biophysical Chemistry, Part 2: Techniques for the Study of Biological Structure and Function	W.H. Freeman and Company	1980

COURSE OBJECTIVES

1. To understand the available tools and databases for performing research in bioinformatics.
2. To expose students to sequence alignment tool in bioinformatics.
3. To construct the phylogenetic trees for evolution.
4. To get familiar with the 3D structure of protein and classification.
5. To acquire basic knowledge in protein secondary structure prediction.
6. To extend the brief knowledge in Micro array data analysis.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Summarize the basic concepts and importance of Bioinformatics in various sectors.
2. Demonstrate the sequence alignment tool in bioinformatics.
3. Construct the phylogenetic trees for evolution.
4. Analyze the three dimensional protein structure and classification using various tools.
5. Illustrate the protein secondary structure prediction by comparative modeling.
6. Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.

UNIT I OVERVIEW OF BIOINFORMATICS 9

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA 9

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS 9

Phylogenetics, cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS 9

Conceptual models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS 9

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharma informatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayme	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D., F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCE

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

COURSE OBJECTIVES

1. To impart the skills in the field of nano biotechnology and its applications.
2. To acquire knowledge in the nano particles and its significance in various fields.
3. To extend the knowledge in types and application of nano particles in sensors.
4. To define the concepts of biomaterials through molecular self assembly.
5. To equip students with clinical applications of nanodevices.
6. To describe deeper understanding of the socio-economic issues in nanobiotechnology.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Develop skills in the field of nano biotechnology and its applications.
2. Summarize the nanoparticles and its significance in various fields.
3. Extend the knowledge in types and application of nano particles in sensors.
4. Define the concepts of biomaterials through molecular self assembly.
5. Outline the clinical applications of nanodevices.
6. Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION**9**

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANOPARTICLES**9**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS**9**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**9**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinyl chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**9**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Niemeyer. C.M. and Mirkin. C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell. D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shoseyov. O., Levy. I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan. B.	Springer Handbook of Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	FreitasJrR.A	Nanomedicine	Landes Biosciences	2004
4	Kohler. M. and Fritzsche. W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

COURSE OBJECTIVES:

1. To impart the knowledge on constructional details and principle of operation of various automobile components.
2. To learn the function and working of various components in transmission and drivelines.
3. To study the concept and working of steering and suspension systems in an automobile.
4. To give the knowledge on wheels, tyres and brakes of automobiles.
5. To provide the information on current trends
6. To provide the information on future trends in automobiles.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to:

1. Demonstrate the operating principles and constructional details of various automobile components.
2. Explain the function and working of components in transmission and drivelines.
3. Identify and explain the types of steering system
4. Identify and explain the types of suspension system.
5. Classify and describe the types of wheels, tyres and brakes of automobiles.
6. Discuss the current and future trends in the automobiles.

UNIT I ENGINE AND FUEL FEED SYSTEMS**9**

Classification of Engine, construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT II TRANSMISSION SYSTEMS**9**

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft. Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT III SUSPENSION SYSTEM**9**

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension - Pneumatic suspension - Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT IV BRAKES**9**

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory. Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT V ELECTRICAL SYSTEM**9**

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods - Horn, wiper system and trafficator. Starting System and charging system.

TOTAL 45 PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2	Crouse.W.H	Automobile Electrical Equipment	McGraw-Hill Book Co., Inc., New York.	1986
3	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

COURSE OBJECTIVES

1. The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
2. Construct the frames of two and three wheelers of different layouts.
3. Demonstrate the constructional details and principle of operation of various engine components.
4. Identify and explain the types of transmission systems.
5. Identify and explain the types of steering and suspension systems.
6. Classify and describe the types of wheels, tyres and brakes for two and three wheelers

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to:

1. Construct the frames of two and three wheelers of different layouts.
2. Demonstrate the constructional details and principle of operation of various engine components.
3. Identify and explain the types of transmission systems.
4. Identify and explain the types of steering and suspension systems.
5. Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
6. Explain the servicing of two and three wheelers

UNIT I INTRODUCTION**9**

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS**9**

2 stroke and 4 stroke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION**9**

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES**9**

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS**9**

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992
2	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978
2	Bruce A. Johns and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

COURSE OBJECTIVES

1. The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems inAutomobile.
2. Describe and differentiate the types of maintenance.
3. List the procedure for dismantling, servicing and assembling of engine components.
4. Demonstrate the servicing of transmission and driveline components.
5. Discuss the procedure for steering and suspension
6. Discuss the procedure for wheel and brake maintenance.

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to:

1. Describe and differentiate the types of maintenance.
2. List the procedure for dismantling, servicing and assembling of engine components.
3. Demonstrate the servicing of transmission and driveline components.
4. Discuss the procedure for steering and suspension
5. Discuss the procedure for wheel and brake maintenance.
6. Explain the fault diagnosis in the electrical and air conditioner systems

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES 9

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE 9

Dismantling of engine components and cleaning, cleaning methods, visual and dimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE 9

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheelbalancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE 9

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY 9

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Doke	Fleet Management	McGraw Hill Co	1984
2	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011

REFERENCE

1. Service Manuals from Different VehicleManufacturers

COURSE OBJECTIVES:

1. To impart knowledge on trends in the vehicle power plants.
2. To learn the various advanced driver assistance systems.
3. To study the working of advanced suspension and braking systems in an automobile.
4. To give information about motor vehicle emission and noise pollution control.
5. To provide knowledge of the vehicle telematics.
6. To give information about the noise control techniques

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to:

1. Distinguish and describe the various modern vehicle power plant systems.
2. List and explain the various driver assistant mechanisms.
3. Identify and describe the working of advanced suspension and braking systems.
4. Apply the knowledge of motor vehicle emission and noise pollution control.
5. Describe the noise control techniques
6. Describe the vehicle telematics and its applications

UNIT I TRENDS IN POWER PLANTS**9**

Hybrid vehicles - Stratified charged / lean burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS**9**

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY**9**

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION**9**

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V TELEMATICS**9**

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ljubo Vlacic and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2	Ronald K. Jurgen	Navigation and Intelligent Transportation Systems – Progress in Technology	Automotive Electronics Series, SAE, USA.	1998

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William B Riddens	“Understanding Automotive Electronics”	Butterworth Heinemann Woburn.	1998
2	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3	Robert Bosch,	“Automotive HandBook”	SAE	2000

CIVIL ENGINEERING

15BECEO01

HOUSING, PLAN AND MANAGEMENT

3 0 0 3100

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOMES

The students will be able to

1. Know the Importance of basic housing policies and building bye laws.
2. Use Housing Programmes and Schemes.
3. Plan and Design of Housing projects.
4. Examine Innovative construction methods and Materials.
5. Know Housing finance and loan approval procedures.
6. Understand Construction as well as managing techniques.

UNIT I INTRODUCTION TO HOUSING

9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES

9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS

9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS

9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL

9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Meera Mehta and Dinesh Mehta	Metropolitan Housing Markets	Sage Publications Pvt. Ltd., New Delhi	2002
2	Francis Cherunilam and Odeyar D Heggade	Housing in India	Himalaya Publishing House, Bombay	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	CMA	Development Control Rules for Chennai Metropolitan Area	CMA, Chennai	2002
2	UNCHS	National Experiences with Shelter Delivery for the Poorest Groups	UNCHS (Habitat), Nairobi	2000

COURSE OBJECTIVES

1. Defining and identifying of engineering services systems in buildings.
2. The role of engineering services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOMES

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES**9**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS**9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN**9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS**9**

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION**9**

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.R.Ambrose	Heat Pumps and Electric Heating	John and Wiley and Sons, Inc., New York	2002
2	NBC	Handbook for Building Engineers in Metric systems	NBC, New Delhi	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	-	Philips Lighting in Architectural Design	McGraw-Hill, New York	2000
2	A.F.C. Sherratt	Air-conditioning and Energy Conservation	The Architectural Press, London	2005
3	National Building Code			

COURSE OBJECTIVES

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

COURSE OUTCOMES

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone.

UNIT I COASTALZONE**9**

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II WAVEDYNAMICS**9**

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III WAVE FORECASTING AND TIDES**9**

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV COASTAL PROCESSES**9**

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V HARBOURS**9**

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Richard Sylvester	Coastal Engineering, Volume I and II	Elsevier Scientific Publishing Co	2006
2	Quinn, A.D	Design & Construction of Ports and Marine Structures	McGraw-Hill Book Co	2007

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ed. A.T. Ippen	Coastline Hydrodynamics	McGraw-Hill Inc., New York	2002
2	Dwivedi, S.N., and Ramachandran, S	Coastal Zone Management in Tamilnadu	McGraw-Hill Inc., New York	2000

COURSE OBJECTIVES

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

COURSE OUTCOMES

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS**9**

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc)

UNIT II GAUGING**9**

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES**9**

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading - Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES**9**

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE**9**

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dally J W and Riley W.F	Experimental stress Analysis	McGraw-Hill, Inc. New York	2005
2	Srinath L S	Experimental Stress Analysis	Tata McGraw-Hill Publishing co., Ltd., New Delhi	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rangan C S	Instrumentation – Devices and Systems	Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2002
2	Sadhu Singh	Experimental Stress Analysis	Khanna Publishers, New Delhi	2006

COURSE OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

COURSE OUTCOMES

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I IRRIGATION SYSTEM REQUIREMENTS**9**

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II IRRIGATION SCHEDULING**9**

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III MANAGEMENT**9**

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV OPERATION**9**

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V INVOLVEMENT OF STAKEHOLDERS**9**

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dilip Kumar Majumdar	Irrigation Water Management – Principles and Practice	Prentice Hall of India Pvt. Ltd., New Delhi	2000
2	R.T. Gandhi	Hand book on Irrigation Water Requirement	Water Management Division, Department of Agriculture	1990

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Technical report No. 33,	Hand Book on Irrigation System Operation Practices	CWC, New Delhi	2000
2	Maloney, C. and Raju, K.V	Managing Irrigation Together - Practice and Policy in India	, Stage Publication, New Delhi, India	2000

COURSE OBJECTIVES

1. To learn how to Develop Parametric design and the conventions of formal engineering drawing
2. To learn how to Produce and interpret 2D & 3D drawings
3. To learn about how to Communicate a design idea/concept graphically/visually
4. To know how to Examine a design critically and with understanding of CAD - The student learns to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5. To discuss how to Get a Detailed study of an engineering artifact
6. To know how to Plan and design structures

COURSE OUTCOMES

The students will be able to

1. Develop Parametric design and the conventions of formal engineering drawing
2. Produce and interpret 2D & 3D drawings
3. Communicate a design idea/concept graphically/visually
4. Examine a design critically and with understanding of CAD - The student learns to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5. Get a Detailed study of an engineering artifact
6. Plan and design structures

UNIT I INTRODUCTION**9**

Fundamentals of CAD - Hardware and software requirements - Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS**9**

Graphic primitives - Transformations - Wire frame modeling and solid modeling - Graphic standards - Drafting packages

UNIT III STRUCTURAL ANALYSIS**9**

Fundamentals of finite element analysis - Principles of structural analysis - Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION**9**

Principles of design of steel and RC Structures - Applications to simple design problems - Optimisation techniques - Algorithms - Linear Programming - Simplex method

UNIT V EXPERT SYSTEMS**9**

Introduction to artificial intelligence - Knowledge based expert systems - Rules and decision tables - Inference mechanisms - Simple applications.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Groover M.P. and Zimmers E.W. Jr	CAD/CAM, Computer Aided Design and Manufacturing	Prentice Hall of India Ltd, New Delhi	2005
2	Krishnamoorthy C.S. Rajeev S	Computer Aided Design	Narosa Publishing House, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harrison H.B	Structural Analysis and Design	Part I and II Pergamon Press, Oxford	2002
2	Rao S.S	Optimisation Theory and Applications	Wiley Eastern Limited, New Delhi	2002
3	Richard Forsyth (Ed)	Expert System Principles and Case Studies	Chapman and Hall, London	2000

COURSE OBJECTIVES

1. To discuss about the various pavement types
2. To study about the stress distribution in layered systems
3. To design the flexible pavements
4. To learn about the concepts of rigid pavements
5. To learn about the performance evaluation and maintenance of pavements
6. To know how to stabilization of pavements

COURSE OUTCOMES

Students will be able to

1. Recognize the various pavement types
2. Understand the stress distribution in layered pavements
3. Design a flexible pavement
4. Explain about the rigid pavements
5. Perform pavement performance evaluation and maintenance
6. Know how to stabilize the pavements

UNIT I TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 9

Introduction - Pavement as layered structure - Pavement types - rigid and flexible - Stress and deflections in pavements under repeated loading

UNIT II DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements - Modified Westergaard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE 9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V STABILISATION OF PAVEMENTS 9

Stabilisation with special reference to highway pavements - Choice of stabilisers - Testing and field control - Stabilisation for rural roads in India - use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kadiyali, L.R	Principles and Practice of Highway Engineering	Khanna tech. Publications, New Delhi	2007
2	Croney, D	Design and Performance of Road Pavements	HMO Stationary Office	2005
3	Wright, P.H	Highway Engineers	John Wiley & Sons, Inc., New York	2001
4	Ministry of rural roads	Design and Specification of Rural Roads (Manual)	Government of India, New Delhi	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Yoder R.J and WitczakM.W	Principles of Pavement Design	John Wiley	2003
2	IRC:37	Guidelines for the Design of Flexible Pavements	The Indian roads Congress, New Delhi	2001
3	IRC:58	Guideline for the Design of Rigid Pavements for Highways	The Indian Roads Congress, New Delhi	2001

COURSE OBJECTIVES

1. To provide the knowledge on classification of rocks
2. To learn about the properties of rocks
3. To learn about the rock failure modes
4. To learn about the initial stresses and measurements
5. To know the applications of rock mechanics
6. To understand the concepts of rock bolting

COURSE OUTCOMES**Students will be able**

1. Recognize the various forms of rocks
2. Say the various properties of rocks
3. Explain the failure modes of the rocks
4. Understand the initial stresses and how to measure the same
5. Say the various applications of rock mechanics
6. Explain the concepts of rock bolting

UNIT I CLASSIFICATION AND INDEX PROPERTIES OF ROCKS**9**

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II ROCK STRENGTH AND FAILURE CRITERIA**9**

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III INITIAL STRESSES AND THEIR MEASUREMENTS**9**

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of in situ stresses.

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING**9**

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V ROCK BOLTING**9**

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Goodman P.E	Introduction to Rock Mechanics	John Wiley and Sons	2005
2	Stillborg B	Professional User Handbook for rock Bolting	Tran Tech Publications	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Brow E.T	Rock Characterisation Testing and Monitoring	Pergaman Press	2002
2	Arogyaswamy R.N.P	Geotechnical Application in Civil Engineering	Oxford and IBH	2000
3	Hock E. and Bray J	Rock Slope Engineering	Institute of Mining and Metallurgy	1991

COURSE OBJECTIVES:

1. To build on the student's background in hydrology and hydraulics and understanding of water resources systems
2. To develop the skills in modeling of flood flows and flood routing
3. To develop skills in the ground water flow, type of aquifer and yield from the well
4. To provide the knowledge of design of reservoir, operation and sedimentation
5. To study the effect, causes and remedial measures of water logging
6. To know about various concrete bunkers and silos

COURSE OUTCOMES:

Students will be able to

1. Understand about the steel water tanks
2. Understand about the concrete water tanks
3. Explain about the steel bunkers
4. Say the working of silos
5. Give basics of concrete bunkers
6. Understand the basics of prestressed concrete water tanks

UNIT I STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

UNIT II CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intake tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of underground tanks – Design of base slab and side wall – Check for uplift.

UNIT III STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Code provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS**9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL 45 PERIODS**TEXTBOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rajagopalan K	Storage Structures	Tata McGraw-Hill, New Delhi	2002
2	Krishna Raju N	Advanced Reinforced Concrete Design	CBS Publishers and Distributors, New Delhi	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.G. Hopkinson and J.D. Kay	The Lighting of buildings	Faber and Faber, London	2000
2	William H. Severns and Julian R. Fellows	Air-conditioning and Refrigeration	John Wiley and Sons, London	2000

COURSE OBJECTIVE

1. To provide knowledge on wind data
2. To explain about the various factors involved in wind engineering
3. To study about the effect on wind on various structures
4. To learn about the effect of typical buildings
5. To learn about the design of multistorey buildings
6. To know about the basics of wind tunnel

COURSE OUTCOMES

Students will be

1. Able to know about the wind data
2. Able to explain the factors involved in wind engineering
3. Able to recognize the effects of wind on various structures
4. Able to provide the details on typical buildings
5. Able to give the basics of design of multistorey buildings
6. Able to explain the basics of wind tunnel

UNIT I INTRODUCTION

9

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II EFFECT OF WIND ON STRUCTURES

9

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III EFFECT ON TYPICAL STRUCTURES

9

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV APPLICATION TO DESIGN

9

Design forces on multistorey building, towers and roof trusses.

UNIT V INTRODUCTION TO WIND TUNNEL

9

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peter Sachs	Wind Forces in Engineering	Pergamon Press, New York	2002
2	Lawson T.V	Wind Effects on Buildings, Vol. I & II	Applied Science and Publishers, London	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Devenport A.G	Wind Loads on Structures	Division of Building Research, Ottawa	2003
2	Course Notes	Wind Force on Structures	Building Technology Centre, Anna University	2002

COURSE OBJECTIVES

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

COURSE OUTCOMES:

1. The students will gain an experience in the implementation of new construction technology on engineering concepts
2. the students will learn about how to apply in field of Advanced construction technology.
3. The students will get a diverse knowledge of Advanced technology practices applied to real life problems.
4. The students will learn to understand the theoretical and practical aspects of new technology in civil engineering
5. The students will learn to design and
6. The students will learn about management applications

UNIT I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT III MODERN CONSTRUCTION EQUIPEMENTS-I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting

UNIT IV MODERN CONSTRUCTION EQUIPEMENTS-II 9

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES 9

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peurifoy, R. L., Ledbetter, W.B	Construction Planning, Equipment and Methods	Mc Graw Hill Co	2000
2	Antill J.M., PWD	Civil Engineering Construction	Mc Graw Hill Book Co	2005

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Varma, M	Construction Equipment and its Planning & Applications	Metropolitan Book Co	2000
2	Nunnally, S.W	Construction Methods and Management	Prentice – Hall	2000
3	Ataev, S.S	Construction Technology	MIR, Pub	2000

OPEN ELECTIVES
(COURSES OFFERED TO OTHER DEPARTMENTS)

15BEMEOE01

INTRODUCTION TO MEMS

3 0 0 3100

COURSE OBJECTIVES

1. To know the characteristics of micro electromechanical system.
2. To understand the working of electrostatic sensors.
3. To understand the working of actuators.
4. To learn the principle of micromachining.
5. To understand the concept of polymer MEMS.
6. To understand the concept of optical MEMS.

COURSE OUTCOMES

1. Understand the characteristics of micro electromechanical system.
2. Understand the working of electrostatic sensors.
3. Understand the working of actuators.
4. Learn the principle of micromachining.
5. Understand the concept of polymer MEMS.
6. Understand the concept of optical MEMS.

UNIT I INTRODUCTION

9

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I

9

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II

9

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING

9

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistiction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS

9

Polymers in MEMS– Polyimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TOTAL 45 PERIODS

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chang Liu	Foundations of MEMS	Pearson Education Inc	2006
2	Stephen D Senturia	Microsystem Design	Springer Publication	2000
3	Tai Ran Hsu	MEMS & Micro systems Design and Manufacture	Tata McGraw Hill, New Delhi	2002

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nadim Maluf	An Introduction to Micro Electro Mechanical System Design	Artech House	2000
2	Mohamed Gad-el-Hak	The MEMS Handbook	CRC press Baco Raton	2000
3	Julian w. Gardner, Vijay K. Varadan	Micro Sensors MEMS andSmart Devices	John Wiley & Son LTD	2002
4	James J.Allen	Micro Electro Mechanical System Design	CRC Press Publisher	2010
5	Thomas M.Adams and Richard A.Layton	Introduction MEMS, Fabrication and Application	Springer	2012

COURSE OBJECTIVES

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

COURSE OUTCOMES

Upon completion of this course, the students will be able to

1. Understand the fundamentals of therobots
2. Describe the robot celldesign
3. Know the safety considerations in roboticapplications.
4. The student with knowledge of the singularity issues associated with the operation of robotic systems.
5. The student with some knowledge and analysis skills associated with trajectory planning.
6. The student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OFROBOT**9**

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations andproblems.

UNIT II DRIVES ANDSENSORS**9**

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMINGANDAPPLICATIONS**9**

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINEVISION**9**

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION ANDROBOTECONOMICS**9**

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL 45PERIODS**TEXT BOOKS**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Klafter R.D., and Negin M	Robotic Engineering - An Integrated Approach	Prentice Hall	2003
2	Groover M.P	Industrial Robotics -Technology Programming and Applications	McGraw Hill	2001

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig J.J	Introduction to Robotics Mechanics and Control	Pearson Education	2008
2	Deb S.R	Robotics Technology and Flexible Automation	Tata McGraw Hill Book Co	1994
3	Koren Y	Robotics for Engineers	Mc Graw Hill Book Co	1992
4	Fu.K.S.,Gonzalz R.C. and Lee C.S.G	Robotics Control, Sensing, Vision and Intelligence	McGraw Hill Book Co	1987
5	JanakiramanP.A	Robotics and Image Processing	Tata McGraw Hill	1995
6	Rajput R.K	Robotics and Industrial Automation	S.Chand and Company	2008
7	Surender Kumar	Industrial Robots and Computer Integrated Manufacturing	Oxford and IBH Publishing Co. Pvt. Ltd	1991

COURSE OBJECTIVES

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

COURSE OUTCOMES

At the end of the course, student will be able to

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS 9

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN 9

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS 9

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES 9

Structuring the SC, SC and new products, functional roles in SC - SC design framework - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM 9

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP, - Case study, ERP Software's

TOTAL 45 PERIODS

TEXTBOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Shari.P.B and Lassen.T.S	Managing the global supply chain	Viva books, New Delhi	2000
2	Ayers.J.B	Hand book of supply chain management	The St. Lencie press	2000

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nicolas.J.N	Competitive manufacturing management - continuous improvement, Lean production, customer focused quality	McGrawHill, New York	1998
2	Steudel.H.J and Desruelle.P	Manufacturing in the nineteen - How to become a mean, lean and world class competitor	Van No strand Reinhold, New York	1992

COURSE OBJECTIVES

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

COURSE OUTCOMES

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS**9**

General overview of transport phenomena including various applications, Transport of momentum, heat and mass, Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS**9**

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT**9**

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non-Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT**9**

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometries in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT**9**

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion-Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

TOTAL 45 PERIODS**REFERENCE**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Geankoplis, C. J	Transport Processes and Separation Processes Principles	Prentice Hall	2003

WEB REFERENCE

1. <https://laulima.hawaii.edu/portal>

COURSE OBJECTIVES

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

COURSE OUTCOMES

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION**9**

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEYMECHANICALCONCEPTS**9**

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY**9**

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION**9**

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM**9**

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

TOTAL 45 PERIODS**REFERENCE**

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Duane Knudson	Fundamentals of Biomechanics	Springer Science+ Business Media, LLC	2007
2	C. Ross Ethier Craig A. Simmons	Introductory Biomechanics	Cambridge University Press	2007

FACULTY OF ENGINEERING
DEGREE OF BACHELOR OF
TECHNOLOGY
IN
BIOTECHNOLOGY

DEPARTMENT OF BIOTECHNOLOGY

(REGULAR PROGRAMME)

CURRICULUM & SYLLABI
(2015 -2016)



KARPAGAM ACADEMY OF HIGHER EDUCATION
(Established Under Section 3 of UGC Act 1956)
COIMBATORE 641 021 INDIA



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University Established Under Section 3 of UGC Act 1956)

Pollachi Main Road, Eachanari Post, Coimbatore – 641 021. INDIA

Phone : 0422-6471113-5, 6453777 Fax No : 0422 -2980022-3

Email : info@karpagam.com Web : www.kahedu.edu.in

FACULTY OF ENGINEERING

DEGREE OF BACHELOR OF ENGINEERING / TECHNOLOGY (B. E. /B. Tech.)

REGULAR PROGRAMME

REGULATIONS (2015)

CHIOCE BASED CREDIT SYSTEM

Phone : 0422-6453777, 6471113-5, 2980011-2980018;

Fax No : 0422 – 2980022, 2980023

Email : www.kahedu.edu.in

Web : info@karpagam.com

OBJECTIVES:

- To enable students to attain fluency and accuracy to inculcate proficiency in professional communication to meet the growing demand in the field of Global communication.
- To help students acquire their ability to speak effectively in real life situations.
- To inculcate the habit of reading and to develop their effective reading skills.
- To ensure that students use dictionary to improve their active and passive vocabulary.
- To enable students to improve their lexical, grammatical and communicative competence
- To acquire good vocabulary for sentence structure and sentence formation.

OUTCOMES:

- Use English language for communication: verbal & non –verbal.
- Enrich comprehension and acquisition of speaking & writing ability.
- Gain confidence in using English language in real life situations.
- Improve word power: lexical, grammatical and communication competence.
- Acquire good vocabulary for easy communication.
- Be familiar with sentence structure and sentence formation.

Unit I**(9)**

Listening – Types of listening - Listening to class reading - Video tapes/ Audio tapes. **Speaking** – Introduction on self - Introduction on one's friend. **Reading** - Reading for comprehension – Reading different kind of passages like descriptive, narrative, objective, conversational and argumentative. **Writing** – Free writing on any topic –My favorite place, hobbies, dreams, goals, etc- Writing short messages - To fill in different application forms. **Grammar** – Articles- WH questions –Yes/No Question - Subject Verb agreement. **Vocabulary** - Word Formation – Word expansion (Root word) - Prefix and Suffix.

Unit II**(10)**

Listening – Understanding the passage in English –Pronunciation practice. **Speaking** – Asking and answering questions - Telephone etiquette. **Reading** – Critical reading – Finding key information in a given text (Skimming - Scanning). **Writing** – Coherence and cohesion in writing – Short paragraph writing – Letters to the Editor. **Grammar** – Parts of speech – Noun – Verb – Adjectives - Adverbs. **Vocabulary** – Compound Nouns/Adjectives – Irregular verbs.

Unit III**(10)**

Listening – Listening for specific task – Fill in the gaps. **Speaking** – Phonemes – Syllables – Role play – Conversation Practice. **Reading** – Reading and Comprehension. **Writing** - Autobiographical writing – Biographical writing - Instruction writing. **Grammar** – Preposition – Infinitive – Gerund – Tenses. **Vocabulary** – Foreign words used in English – British and American usage.

Unit IV**(8)**

Listening – Responding to questions – Reading in class for complete understanding and for better pronunciation. **Speaking** – Debate- Presentations in seminars. **Reading** – Making inference from the reading passage – Predicting the content of reading passages. **Writing** - Interpreting visual materials (tables, graphs, charts, etc) – Formal and Informal letters. **Grammar** – Sentence pattern – Voice (active and passive voice). **Vocabulary** – One word substitution.

Unit V**(8)**

Listening - Listening to different accents, speeches/presentations. **Speaking**- Extempore talk – Just-a-minute talk. **Reading**-Reading strategies–Intensive reading – Text analysis. **Writing** - Creative writing – Writing circulars and notices – Writing proposal. **Grammar** – Direct and Indirect speech – Conditional sentences - Auxiliary verbs. **Vocabulary** – Abbreviations & Acronyms.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45**TEXT BOOK:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sangeeta Sharma , Meenakshi Raman	Technical Communication: Principles And Practice 2 nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2009
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES:

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

OBJECTIVES:

- To develop analytical skills for solving different engineering problems.
- To understand the concept of Matrices and Theory of equations.
- To know the basics of differential calculus and its applications.
- To impart the knowledge of integral calculus and its applications.
- To learn the basics of ordinary differential equations.
- To Apply the concept of ordinary differential Equations and solving the problems.

OUTCOMES:

- Acquire the basic knowledge and understanding of mathematics
- Apply advanced matrix knowledge to engineering problems.
- Improve their ability in evaluating problems by applying theory of equations.
- Evaluating engineering problems involving differential calculus and its applications.
- Understand the concepts involving integral calculus and its applications.
- Applying the concept of ordinary differential Equations and solving the problems.

UNIT-I MATRICES

(12)

Fundamentals of Matrix- Inverse of a matrix- Rank of a Matrix – Consistency and Inconsistency of a system of ‘m’ linear equations in ‘n’ unknowns – Eigenvalues and Eigenvectors of a real matrix .

UNIT- II THEORY OF EQUATIONS

(12)

Relations between coefficients and roots: Irrational and imaginary roots – symmetric functions of the roots – transformation of equations – reciprocal equations and formation of equations whose roots are given.

UNIT - III DIFFERENTIAL CALCULUS AND ITS APPLICATION

(12)

Differentiation and Derivatives of simple functions – Successive Differentiation – Tangent and Normal-Radius of curvature – Velocity and acceleration.

UNIT - IV INTEGRAL CALCULUS AND ITS APPLICATIONS

(12)

Various types of integration - Reduction formula for $e^{ax} x^n$, $\sin^n x$, $\cos^n x$, $\sin^n x \cos^m x$ (Statement only). – Length, Area and Volume of solid revolution.

UNIT - V ORDINARY DIFFERENTIAL EQUATIONS

(12)

Differential equations of first order and higher degree – higher order differential equations with constant coefficients.

Total : 60

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal. B.S	Higher Engineering Mathematics	Khanna Publications, Delhi.	2013
2	B.V.Ramana	Higher Engineering Mathematics	Tata McGraw Hill Education Pvt.Ltd, New Delhi.	2010

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dass H.K.	Engineering Mathematics	S.Chand & Co., New Delhi.	2008
2	Bali N.P., Manish Goyal	A text book of Engineering Mathematics	Laxmi publications Pvt. Ltd, New Delhi.	2014
3	Michael D. Greenberg	Advanced Engineering Mathematics	Pearson Education, India	2006

WEBSITES:

1. www.intmath.com
2. www.efunda.com
3. www.mathcentre.ac.uk

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various branches of Engineering and Technology
- Understand the basics of laser and optical fiber with appropriate applications.
- Introduce the concepts of quantum mechanics for diverse applications.
- Impart the basic knowledge of crystal and its various crystal structures.
- Disseminate the fundamentals of nuclear physics and their applications.
- To Illustrate the basic ideas of nuclear reactors for energy resources

OUTCOMES:

- Identify the elastic nature of materials and its thermodynamic properties.
- Infer the characteristics of laser and optical fibers for engineering applications.
- Develop the idea of quantum mechanics through applications.
- Identify the different atomic arrangements of crystals and its defects
- Make use of the concepts of sound waves for medical applications
- Illustrate the basic ideas of nuclear reactors for energy resources

UNIT I PROPERTIES OF MATTER AND THERMODYNAMICS (9)

Three types of modulus of elasticity – basic definitions, relation connecting the moduli (Derivation), poisson ratio- Torsional pendulum- bending of beams- bending moment – basic assumption of moment – uniform and non uniform bending

Concept of entropy- change of entropy in reversible and irreversible processes – refrigeration.

UNIT II LASER AND FIBER OPTICS (9)

Introduction – emission and absorption process- Einstein's coefficients derivation. Types of LASER -CO₂, Semiconductor LASER- Applications of LASER in industry and medicine.

Total internal reflection – modes of propagation of light in optical fibers – numerical aperture and acceptance angle –derivations, types of optical fibers (Material, refractive index and mode) – fiber optical communication system (block diagram).

UNIT III QUANTUM PHYSICS (9)

Introduction to quantum theory – Compton effect- dual nature of matter and radiation – de Broglie wavelength, uncertainty principle – physical significance of wave function, Schrödinger's wave equation – time dependent and time independent equations – particle in one dimensional box- scanning electron microscope.

UNIT IV CRYSTAL PHYSICS (9)

Lattice – unit cell – Bravais lattice – lattice planes – Miller indices – calculation of number of atoms per unit cell, atomic radius, coordination number, packing factor for SC, BCC, FCC and HCP structures- crystal defects – point, line and surface defects.

UNIT V ULTRASONICS AND NUCLEAR PHYSICS**(9)**

Production of ultrasonics by piezoelectric method –Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications – Sonogram Introduction – basics about nuclear fission and fusion, nuclear composition – Radiation detectors – semi conductor detector. Reactors – essentials of nuclear reactor- power reactor.

Total: 45**TEXT BOOK:**

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ganesan.S and Baskar.T	Engineering Physics I	GEMS Publisher, Coimbatore-641 001	2 nd Edition- 2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Serway and Jewett	Physics for Scientists and Engineers with Modern Physics	Thomson Brooks/Cole, Indian reprint, New Delhi	8 th Edition 2010
2	Gaur, R.K. and Gupta, S.C	Engineering Physics	Dhanpat Rai Publications, New Delhi.	9 th Edition 2011

WEBSITES:

1. www.nptel.ac.in
2. www.physicsclassroom.com
3. www.oyc.yale.edu
4. www.physics.org

OBJECTIVES:

- To gain knowledge on adsorption phenomena.
- # • To make the students conversant with basics of water technology.
- To make the student acquire sound knowledge of electrochemistry and storage devices.
- To acquaint the student with concepts of fuels and rocket propellants.
- To develop an understanding of the basic concepts of corrosion science.
- To acquaint the students with the basics of surface chemistry.

OUTCOMES:

- Outline the basic principles of chemistry for water treatment (K)
- Examine the electrochemical properties to design non – conventional energy storage devices (S)
- Apply the concepts combustion of different fuels (S)
- Identify the concepts of corrosion and its protection in the engineering field (S)
- Apply the concepts of surface chemistry in the field of engineering (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I WATER TECHNOLOGY**(9)**

Characteristics – Alkalinity – Types of alkalinity and determination – Hardness – Types and estimation by EDTA method (problems) - Domestic water treatment – Disinfection methods (Chlorination, Ozonation, UV treatment) – Boiler feed water – Requirements – Disadvantages of using hard water in boilers – Internal conditioning (Phosphate, Calgon and Carbonate conditioning methods) – External conditioning – Demineralization process – Desalination and Reverse osmosis.

UNIT II ELECTROCHEMISTRY AND STORAGE DEVICES**(9)**

Electrochemical cells – Reversible and irreversible cells – EMF – Measurement of emf – Single electrode potential – Nernst equation – Reference electrodes – Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – Glass electrode and measurement of pH – Electrochemical series – Significance – Potentiometric titrations (Redox - Fe^{2+} vs dichromate) –Batteries- Primary batteries-Leclanche cell- Secondary batteries- Lead acid battery.

UNIT III FUELS AND ROCKET PROPELLANTS**(9)**

Coal - Proximate and Ultimate analysis - Metallurgical coke - Manufacture by Otto-Hoffman method - Petroleum processing and fractions - Synthetic petrol - Bergius and Fischer-Tropsch method - Knocking - Octane number and Cetane number - Gaseous fuels - Water gas, Producer gas, An introduction to Fuel Cell, $\text{H}_2\text{-O}_2$ Fuel Cell -Rocket engines-Types of rocket engines, Basic principles, Mass fraction.

UNIT IV CORROSION SCIENCE

(9)

Chemical and Electrochemical corrosion - Galvanic corrosion - Differential aeration corrosion - Corrosion control - Sacrificial anode and Impressed current cathodic methods - Corrosion inhibitors - Protective coatings - Paints - Constituents and functions — Metallic coatings - Electroplating (Au) and Electro less plating (Ni) - Surface conversion coating and Hot dipping.

UNIT V SURFACE CHEMISTRY

(9)

Introduction-Adsorption-Types, adsorption of gases on solids, adsorption of solutes from solutions, Adsorption isotherms-Freundlich adsorption isotherm-Langmuir adsorption isotherm- Industrial adsorbent materials- Role of adsorbents in catalysis and water softening- Emulsion- Types-water/oil, oil/water- Applications of adsorption.

Total: 45

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dr. Vairam.S	Engineering Chemistry	Gems Publishers, Coimbatore.	2014
2.	Dr.Ravikrishnan.A	Engineering Chemistry I & II	Sri Krishna Hi tech Publishing Company (P) Ltd., Chennai.	2012

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Raman Sivakumar	Engineering Chemistry I & II	McGraw-Hill Publishing Co.Ltd., 3 rd Reprint NewDelhi.	2013
2.	Kuriakose. J.C. and Rajaram	Chemistry in Engineering and Technology. Vol. I & II 5 th edition.	Tata McGraw Hill Publishing Company, New Delhi.	2010
3.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009
4.	Dara.S.S	Text book of Engineering Chemistry.	S.Chand & Co.Ltd., New Delhi	2008
5.	Sharma.B. K	Engineering Chemistry	Krishna Prakasam Media (P) Ltd., Meerut	2001

WEBSITES:

- <http://www.studynotes.ie/leaving-cert/chemistry/>
- <http://www.rejinpaul.com/2011/04/engineering-chemistry-ii-second.html>
- <http://www.learnerstv.com/Free-chemistry-Video-lectures-ltv044-Page1.htm>
- <http://ocw.mit.edu/courses/#chemistry>
- <http://www.chem.qmul.ac.uk/surfaces/sec>

Semester – I

15BTCC105 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING 3 0 0 3 OBJECTIVES

1. To impart the basic knowledge about the Electric circuits.
2. To understand the working of various Electrical Machines.
3. To know about various measuring instruments.
4. To understand the basic concepts in semiconductor devices and digital electronics.
5. To understand and analyze basic electric and magnetic circuits.
6. To gain the basic knowledge about the Electric circuits

INTENDED OUTCOMES

1. The students shall develop an intuitive understanding of the circuit analysis, basic concepts of electrical machines, basics of electronics and be able to apply them in practical situation.
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low-voltage electrical installations.
4. Gained the knowledge in working of Electrical Machines and Transformers.
5. Students will gain the applications of transformers.
6. To understand and analyze basic electric and magnetic circuits.

UNIT I ELECTRIC CIRCUITS

(9)

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase balanced Circuits.

UNIT II ELECTRICAL MACHINES

(9)

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, Single Phase Induction Motor.

UNIT III MEASURING INSTRUMENTS

(9)

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT IV SEMICONDUCTOR DEVICES AND APPLICATIONS

(9)

Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation, Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

UNIT V DIGITAL ELECTRONICS

(9)

Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counter – A/D and D/A Conversion (single concepts)

Total: 45

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Mittle, V.M	Basic Electrical Engineering	Tata McGraw Hill Edition, New Delhi	2004
2	Sedha R.S	Applied Electronics	S. Chand & Co	2006

REFERENCE BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Muthusubramanian R, Salivahanan S and Muraleedharan K A	Basic Electrical, Electronics and Computer Engineering	Tata McGraw Hill, Second Edition	2006
2	Nagsarkar T K and Sukhija M S	Basics of Electrical Engineering	Oxford press	2005
3	Premkumar N	Basic Electrical Engineering	Anuradha Publishers	2003
4	Mahmood Nahvi and Joseph A. Edminister	Electric Circuits	Schaum' Outline Series, McGraw Hill	2002

ENGINEERING PHYSICS

OBJECTIVES:

- To develop basic laboratory skills and demonstrating the application of physical principles.
- To prepare for the lab experiment and perform individually a wide spectrum of experiments.
- To present experimental data in various appropriate forms like tabulation, and plots.
- To analyze, Interpret and Summarize experimental results.
- To communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
- To develop the skills for understanding basic electric circuits.

OUTCOMES:

- The students will have the knowledge on Physics practical experiments and that knowledge will be used by them in different engineering and technology applications.
- Prepare for the lab experiment and perform individually a wide spectrum of experiments.
- Present experimental data in various appropriate forms like tabulation, and plots.
- Analyze, Interpret and Summarize experimental results.
- Communicate clearly understanding of various experimental principles, instruments/setup, and procedure.
- Prepare to develop the skills for understanding basic electric circuits.

LIST OF EXPERIMENTS – PHYSICS

1. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of Young's modulus of the material – Non uniform bending or Uniform bending.
4. Determination of Viscosity of liquid – Poiseuille's method.
5. Spectrometer Dispersive power of a prism.
6. Torsional pendulum – Determination of Rigidity modulus.
7. Particle size determination using Diode Laser
8. Determination of Laser parameters – Wavelength, and angle of divergence.
9. Determination of acceptance angle in an optical fiber.
10. Determination of thickness of a thin wire – Air wedge method
11. Determination of Band Gap of a semiconductor material.
12. Determination of Specific resistance of a given coil of wire – Carey Foster Bridge

ENGINEERING CHEMISTRY LABORATORY

OBJECTIVES:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.
- To estimate the amount of alkalinity ions, hardness, chloride in water sample
- To make the student acquire practical skills in the determination of conductance of solutions, EMF etc
- To acquaint the students with the determination of molecular weight of a polymer by viscometry
- To carried out different types of titrations for estimation of concerned in materials
- To Determine the corrosion rate of steel by weight loss method.

OUTCOMES:

- The students will be outfitted with hands-on knowledge in quantitative chemical analysis of water quality parameters and corrosion measurement.
- Estimate the amount of alkalinity ions, hardness, chloride in water sample
- Measure molecular/system properties of conductance of solutions, EMF etc
- Acquaint the students with the determination of molecular weight of a polymer by visocometry
- Determine the corrosion rate of steel by weight loss method.
- Carrying out different types of titrations for estimation of concerned in materials using comparatively more qualities and quantities of materials involved for accurate results.

LIST OF EXPERIMENTS - CHEMISTRY

1. Estimation of alkalinity of Water sample
2. Estimation of hardness of Water by EDTA
3. Estimation of chloride in Water sample (Argentometric method)
4. Determination of corrosion rate by weight loss method.
5. Conductometric Titration (Simple acid base).
6. Conductometric Titration (Mixture of weak and strong acids).
7. Conduct metric Titration using BaCl_2 vs Na_2SO_4 .
8. pH Titration (acid & base).
9. Potentiometric Titration (Fe^{2+} / KMnO_4 or $\text{K}_2\text{Cr}_2\text{O}_7$).
10. Estimation of Ferric iron by Spectrophotometry.
11. Determination of water of crystallization of a crystalline salt (Copper sulphate).
12. Determination of molecular weight and degree of polymerization using Viscometry.
13. Determination of chemical oxygen demand.

Course Objectives:

- To provide hands-on training for the fabrication of components using carpentry and welding equipment/tools.
- To gain the skills for making fitting joints and household pipeline connections using suitable tools.
- To develop the skills for preparing the green sand mould.
- To present the skills for making the simple household electrical connection.
- To develop the skills for making wood/metal models using suitable tools.
- Prepare green sand mould using suitable tools.

Course Outcomes:

- Fabricate simple components using carpentry and welding equipment/tools.
- Make fitting joints and household pipeline connections using suitable tools.
- Prepare green sand mould using suitable tools.
- Make simple household electrical connections using suitable tools.
- Make simple models using wood and metal.
- Make simple plumbing work

PART – A (CIVIL & MECHANICAL)

1. WELDING

- i. Preparation of arc welding of butt joints, lap joints and tee joints.

2. BASIC MACHINING

- i. Simple Turning and Taper turning
- ii. Drilling and Tapping

3. SHEET METAL WORK

- i. Model making – Trays, funnels, etc.

4. DEMONSTRATION ON

- i. Smithy operations
- ii. Foundry operations
- iii. Plumbing Works
- iv. Carpentry Works

PART –B (ELECTRICAL & ELECTRONICS)

5. ELECTRICAL ENGINEERING

- i. Study of electrical symbols and electrical equipments.
- ii. Construct the wiring diagram for Stair case wiring and Fluorescent lamp wiring.
- iii. Construct the wiring diagram for Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- iv. Measurement of electrical quantities – voltage, current, power & power factor in R load.
- v. Measurement of energy using single phase energy meter.

6. ELECTRONICS ENGINEERING

- i. Study of Electronic components– Resistor (color coding), capacitors and inductors.
- ii. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
- iii. Study of logic gates AND, OR, NOT, NOR and NAND.
- iv. Study of HWR and FWR.

REFERENCES

1. Jeyachandran, K., Natarajan, S. and Balasubramanian, S, “A Premier on Engineering Practices Laboratory”, Anuradha Publications, Kumbakonam, 2007.
2. Jeyapoovan, T., Saravanapandian, M, “Engineering Practices Lab Manual”, Vikas PUBLISHING House Pvt. Ltd, Chennai, 2006.
3. Bawa, H.S, “Workshop Practice”, Tata McGraw – Hill Publishing Company Limited, New Delhi, 2007.

Course Objectives:

- To learn conventions and use of drawing tools in making engineering drawings.
- To impart knowledge on orthographic projection.
- To draw orthographic projections of points, line and plane surfaces.
- To draw orthographic projections of solids.
- To impart the basic concepts of isometric projections through simple examples.
- To impart knowledge of the CAD software

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Recognise the conventions and apply dimensioning concepts while drafting simple objects.
- Draw freehand sketching of multiple views from pictorial views of objects.
- Draw the orthographic projection of points, line and plane surfaces.
- Draw the orthographic projection of solids.
- Draw the isometric projection of the given objects.
- Demonstrate knowledge of the CAD software

UNIT I	INTRODUCTION	(3 + 10)
---------------	---------------------	-----------------

Introduction to Engineering Drawing, Bureau of Indian Standards (BIS), Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice geometric constructions, principles of dimensioning– linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

UNIT II SCALES AND PLANE CURVES (3 + 10)

SCALES: Reducing Scale, Enlarging Scale, Plain Scale, Diagonal Scale and Vernier Scale.
Conics – Construction of Ellipse, Parabola and Hyperbola by eccentricity method

UNIT III FREE HAND SKETCHING (3 + 12)

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.

UNIT IV PROJECTION OF POINTS, LINES AND PLANE SURFACES (3 + 12)

Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Traces–Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT V PROJECTION OF SOLIDS (3+12)

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

Introduction to Drafting Software/Package (Not for Exam)

(4)

Basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

TOTAL: 75

TEXT BOOKS

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. VTU, “A Primer on Computer Aided Engineering Drawing” Belgaum, 2006.

REFERENCES

1. Kumar M S, “Engineering Graphics”, D D Publications, Chennai, Ninth Edition, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998.

WEB REFERENCES

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 and 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 and SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 and SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods

OBJECTIVE:

- To know the value of being a human being and the value of being a useful citizen.

INTENDED OUTCOME:

- Educate the values and meaning of life in the young minds and to transform them as responsible citizens
- Educate the values and meaning of life
- to transform them as responsible citizens
- Types of values - Components of values
- Educate the values and meaning of Self Development : Self analysis – Goal Setting
- Individual Qualities

UNIT – I :**(4)**

Human life on Earth - Concept of Human Values - Value Education - Aim of education and value education - Types of values - Components of values – Attitudes – types of attitudes

UNIT – II :**(4)**

Self Development : Self analysis – Goal Setting - Thought Analysis – Guarding against Anger - Respect to age, experience, maturity, family members, neighbors, co-workers

UNIT – III :**(5)**

Individual Qualities – Truthfulness – Constructivity – Sacrifice – Sincerity - Self Control – Altruism – Tolerance - Scientific Vision – Regulating Desire

UNIT – IV:**(4)**

Mind Culture - Modern Challenges of Adolescent - Emotions and behavior - Sex and spirituality - Adolescent Emotions - Meditation

UNIT - V :**(3)**

Body and Mind Fitness : (a) Physical Exercises (b) Activities: (i) Moralization of Desires (ii) Neutralization of Anger (iii) Eradication of Worries (iv) Benefits of Blessings.

REFERENCE BOOKS:**Total: 20**

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subramanian. R	Professional Ethics	Oxford, New Delhi	2013
2	Govindarajan. M, Natarajan. S, Senthil Kumar. V.S	Engineering Ethics	Prentice Hall of India, New Delhi	2004
3	Tripathi. A.N	Human Values	New Age International	2009
4	Pope. G. U.	Thirukkural with English Translation	Uma Publication, Thanjavur.	2002

Course Objectives

- To motivate learners to acquire listening & speaking skills in both formal and informal context.
- To focus on question forms & to make them understand the importance of using question tags and also the functional use of transformation of sentences.
- To improve their reading habit and to train them in critical and analytical reading.
- To equip them to write for academic as well as work place context.
- To enable students to face interviews.
- To study the receptive and productive skills

Course Outcomes

Students undergoing this course will be able to

- Acquire second language: speaking convincingly, expressing their opinions clearly, negotiating and arguing using appropriate communicative strategies.
- Enhance their reading texts critically and analytically.
- Develop writing effectively, persuasively and producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Producing different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
- Enrich the ability to face interviews with confidence.
- Ensure the good communication with the society.

UNIT-1**(10)**

Listening - Difference between Hearing & Listening –Listening to informal conversation. **Speaking** - Spoken structures on different situations - Introduction, Greeting, Comments on topics like Films, Games etc, Excuse, Request, Agreement, Disagreement, etc., **Reading** – Extensive and Intensive reading. **Writing** – Report writing - Writing a covering letter. **Grammar** – Regular & Irregular verbs - Kinds of sentences - Question tags. **Vocabulary** – Homonyms and Homophones.

UNIT-II**(8)**

Listening – Note Taking- Improving grasping ability. **Speaking** – Welcome address - Vote of thanks - Master of ceremony. **Reading** – Active and Passive reading - Reading for vocabulary- Reading for a purpose. **Writing** - Writing a review (Film review) - Summary of a story. **Grammar** - Modal verbs – Conjunction - Expression of cause and effect. **Vocabulary** - Phrasal verbs - Idioms.

UNIT – III**(9)**

Listening - Barriers to listening (Physical, Psychological, Linguistic & Cultural). **Speaking** – Stress, Pause and Intonation. **Reading** – Rapid reading – Skimming, Scanning and Surveying. (SQ3R) **Writing** - Essay writing -Minutes of meeting - Agenda – **Grammar** - Active and Passive voice - Purpose expression. **Vocabulary** - Same words used as noun and verb - Often misspelt and confused words.

UNIT-IV**(8)**

Listening – Listening to telephone conversation - Viewing model interviews. **Speaking** – Group Discussion - Correlation between verbal & non - verbal communication. **Reading** – Reading comprehension (short & long text) - Reading job advertisements and profile of a company. **Writing** – Job application - Resume writing - Checklist preparation. **Grammar** - Numerical expressions – Collocations - **Vocabulary** - Singular and Plural (Nouns).

UNIT- V**(10)**

Listening – Types of listening- Improving listening comprehension. **Speaking** - Oral presentation - Vocal communication techniques - Voice, quality, volume, pitch etc., **Reading** -Note making - Making notes from books/ any forms of writing materials. **Writing** - Describing process & products - Recommendation writing – Short essays writing- **Grammar**- Transformation of sentences (Simple, Compound & Complex). **Vocabulary** - Collection of Technical Vocabularies with their meanings.

Note: Students shall have hands on training in improving listening skill in the language laboratory @ 2 periods per each unit.

Total: 45**TEXT BOOK:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	<u>Sangeeta Sharma</u> , <u>Meenakshi Raman</u>	<u>Technical Communication: Principles And Practice</u> 2 nd Edition	OUP, New Delhi.	2015

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Lakshminarayanan, K.R. & Murugavel, T.	Communication Skills for Engineers	SCITECH Publications, Chennai	2008
2	Rizvi Ashraf, M	Effective Technical Communication	Tata McGraw-Hill, New Delhi.	2007
3	Rutherford Andrea, J.	Basic Communication Skills for Technology	Pearson Education, New Delhi.	2006

WEBSITES :

www.learnerstv.com – Listening/ Speaking/ Presentation
www.usingenglish.com – Writing/ Grammar
www.englishclub.com – Vocabulary Enrichment/ Speaking
www.ispeakyouspeak.blogspot.com – Vocabulary Enrichment/ Speaking
www.teachertube.com – Writing Technically
www.Dictionary.com – Semantic / Grammar

OBJECTIVES:

- To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.
- To understand the concepts of Multiple integrals, Functions of several variables and Fourier series
- To Fourier series to apply physical science and signal systems.
- To understand the concepts of Boundary value problems and Statistics.
- To acquire knowledge on the Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To enhance the knowledge on the various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.

OUTCOMES:

- The students will be able to understand mathematical tools needed in evaluating multiple integrals and their usage
- To Calculate and establish identities connecting these quantities, to Evaluate line, surface and volume integrals in simple coordinate systems.
- The students will be able to familiarize functions of several variables which is used in many physical engineering problems. Apply differentiation to solve maxima and minima problems.
- To solve differential equations using Fourier series analysis which plays a vital role in engineering applications
- Introduce the Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- Compute various measures of central tendencies, dispersion, moments, skewness, kurtosis and to interpret them.

UNIT -I MULTIPLE INTEGRALS**(12)**

Double integration in Cartesian – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates.

UNIT -II FUNCTIONS OF SEVERAL VARIABLES**(12)**

Function of two variables – Taylor's expansion – maxima and minima – constrained maxima and minima by Lagrangian multiplier method – Jacobians.

UNIT- III FOURIER SERIES**(12)**

Dirichlet's conditions – statement of Fourier theorem – Fourier coefficients – change of scale – Half range series – Harmonic Analysis.

UNIT- IV BOUNDARY VALUE PROBLEMS**(12)**

Method of separation of variables – one dimensional wave equation – one dimensional heat equation – steady state conditions – zero and non – zero boundary conditions.

UNIT – V STATISTICS**(12)**

Measures of central tendency – Mean, Median, Mode, Standard deviation – moments – skewness and kurtosis-correlation – rank correlation.

Total : 60**REFERENCES:**

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Hemamalini. P.T	Engineering Mathematics I & II	McGraw-Hill Education Pvt.Ltd, New Delhi.	2014
2	Dr.P.Kandasamy , Dr.K.Thilagavathy, Dr.K.Gunavathy	Engineering Mathematics Volume III	S.Chand &Co., New Delhi.	2013
3	Veerarajan, T	Engineering Mathematics	Tata McGraw Hill Publishing Co., New Delh.	2010
4	Sundaram V., Balasubramanian R., Lakshminarayanan K.A.	Engineering Mathematics	Vikas publishing house Pvt. Ltd, New Delhi.	2005
5	Gupta S.C., Kapoor V.K	Fundamentals of Mathematical Statistics	Sultan chand & Sons, New Delhi.	2006

WEBSITES:

1. www.intmath.com
2. www.efunda.com
3. www.mathcentre.ac.uk

OBJECTIVES:

- To enrich the understanding of various types of materials and their applications in engineering and technology
- Introduce the concepts of classical and quantum electron theories for diverse applications.
- Understand the basics of magnetic materials and its properties.
- Impart the basic knowledge of superconducting and dielectric materials.
- Inculcate the technology in synthesis of nano materials.
- To Summarize the basics of nano structures and synthesizing techniques

OUTCOMES:

- Explain the ideas of classical and quantum electron theories and energy band structures.
- Illustrate the basics of semiconductor physics and its related concepts.
- Compare the different magnetic materials, its properties and infer its role in various fields.
- Identify the properties of superconducting materials and its engineering applications.
- Extend the various polarization techniques and applications of dielectric materials.
- Summarize the basics of nano structures and synthesizing techniques

UNIT I CONDUCTING MATERIALS**(9)**

Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

UNIT II SEMICONDUCTING MATERIALS**(9)**

Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect – Determination of Hall coefficient – Applications.

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS**(9)**

Origin of magnetic moment – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications. Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Temperature superconductors – Applications of superconductors – magnetic levitation.

UNIT IV DIELECTRIC MATERIALS**(9)**

Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarisation – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – Applications of dielectric materials – ferroelectricity and applications.

UNIT V ADVANCED MATERIALS**(9)**

Metallic glasses: preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, applications.

Composite materials, Aircraft materials and non-metallic materials.

Nano materials: synthesis – Physical and chemical vapour deposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: structure – properties and applications.

Total: 45

TEXT BOOK:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Ganesan.S and Baskar.T	Engineering Physics II	GEMS Publisher, Coimbatore-641 001	2 nd Edition-2015

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	William D Callister Jr	Material Science and Engineering-An Introduction	John Wiley & Sons Inc., New York.	9 th Edition 2013
2	James F Shackelford	Introduction to Materials Science for Engineers	Macmillan Publication Company, New York	8 th Edition 2014
3	Charles Kittel	Introduction to Solid State Physics	John Wiley & sons, Singapore.	8 th Edition 2005

WEBSITES:

1. www.nptel.ac.in 2. www.physicsclassroom.com 3. www.oyc.yale.edu 4. www.physics.org
--

Course Objectives:

- To give a comprehensive insight into natural resources, ecosystem and biodiversity.
- To educate the ways and means of the environment
- To protect the environment from various types of pollution.
- To impart some fundamental knowledge on human welfare measures.
- To create the awareness about environmental problems among people.
- To motivate public to participate in environment protection and improvement.

Course Outcomes (COs)**Upon completion of the course the students will be able to**

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**(9)**

Definition, Scope and Importance – Need for public awareness -Forest resources: Use and over-exploitation, deforestation- Water resources-Use and over-utilization of surface and ground water, floods, drought, conflicts over water- Land resources-Land as a resource, land degradation, man induced landslides, soil erosion and desertification –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources- Food resources-World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture- Energy resources-Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources- role of an individual in conservation of natural resources.

UNIT II ECOSYSTEM

(9)

Chemistry and Environment- Environmental segments, Composition and Structure of atmosphere- Concept of an ecosystem- Structure, components and function of an ecosystem Energy flow in the ecosystem – Food chain, Food web and Ecological pyramids, Structure and function of Terrestrial ecosystem (Forest, Desert and Grassland ecosystem) and Aquatic ecosystem (Fresh water and Marine ecosystem)

UNIT III BIODIVERSITY

(9)

Introduction to biodiversity, Definition- Genetic diversity, Species diversity and Ecosystem diversity, Biogeographical classification of India, Importance of biodiversity-Value of biodiversity – Hot Spots of biodiversity-Threats to biodiversity - Endangered and Endemic Species of India – Conservation of biodiversity- In-Situ and Ex-Situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION

(9)

Definition – causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution and Thermal pollution. Solid waste management-causes, effects and control measures of urban and industrial wastes– Role of an individual in prevention of pollution–Disaster management-earthquake, tsunami, cyclone and landslides.

UNIT V SOCIAL ISSUES AND ENVIRONMENT

(9)

From Unsustainable to Sustainable development, Urban problems related to energy sources, Water conservation, Rain water harvesting and Watershed management, Resettlement and rehabilitation of people, its problems and concerns, Environmental ethics- Issues and possible solutions- Climate change- Green house effect and Global warming, Acid rain, Ozone layer depletion, Wasteland reclamation- Environment Protection Act- Human Rights- Value education, Role of Information Technology in Environment and Human health-Population growth, Variation of population among nations-Population explosion.

Total: 45

TEXT BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Dr. Ravikrishnan, A	Environmental Science	Sri Krishna Hi tech Publishing Company Private Ltd., Chennai	2012
2.	Anubha kaushik C.P. Kaushik	Environmental Science and Engineering	New Age International (P) Ltd., New Delhi.	2010

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William P. Cunningham	Principles of Environmental Science	Tata Mc Graw -Hill Publishing Company, New Delhi.	2008
2.	Linda D. Williams	Environmental Science Demystified	Tata Mc Graw -Hill Publishing Company Ltd., New Delhi.	2005

3.	Bharucha Erach	Environmental Science Demystified	Mapin Publishing (P) Ltd., Ahmedabad.	2005
4.	Tyler Miller G. Jr	Environmental Science	Thomson & Thomson Publishers, New Delhi.	2004
5.	Trivedi, R.K. and Goel, P.K	Introduction to Air Pollution	Techno-Science Publications, Jaipur.	2003

WEBSITES:

- <http://people.eku.edu/ritchisong/envscinotes1.html>
- <http://nptel.ac.in/courses.php?disciplineId=120>
- [www.newagepublishers.com/samplechapter/0012\(8\)1](http://www.newagepublishers.com/samplechapter/0012(8)1).
- www.unesco.org/ext/field/beijing/scienceb.htm,
- www.infinitepower.org/education.htm

COURSE OBJECTIVE:

- To understand the foundations of biochemistry
- To discuss the properties of water and its interactions
- To explain the structure and properties of carbohydrates
- To explain the structure and properties of amino acids, Peptides, Proteins and lipids
- To understand the chemistry and function of nucleotides and nucleic acids.
- To discuss the various functions and properties of important biomolecule.

COURSE OUTCOMES:

1. Outline the cellular foundations of Biochemistry
2. Interpret different types of biomolecules and its interaction with water.
3. Analyze the function and properties of carbohydrates.
4. Explain the importance of amino acids, Peptides, Proteins and lipids.
5. Examine the structure, function and properties of nucleotides, nucleic acid, DNA.
6. Assess various functions and properties of important biomolecule.

UNIT-I THE FOUNDATIONS OF BIOCHEMISTRY (8)

Cellular foundations: the universal features of living cells, phylogeny of three domain of life, classification of organisms based on energy. Chemical foundation: essential elements, common functional groups of biomolecules, molecular component of an *E.coli* cell, macromolecules of cells. Physical foundation: Energy interconversion in living organisms, entropy, enthalpy, Gibbs theory, Genetic foundations: DNA to RNA to protein, Evolutionary foundations: genetic mutation, role of genetic mutation, stimulation of chemical evaluation, molecular anatomy revealing evolutionary relationship.

UNIT-II WATER (9)

Weak interactions in aqueous systems, Hydrogen bonding, structure of water molecules, bond dissociation energy, common hydrogen bonds in biological systems, directionality of hydrogen bond, electrostatic interaction of water with charged solutes, Polar, Nonpolar, and Amphipathic Biomolecules, Entropy changes upon dissolving crystalline substances, clathrates, micelles, Van der Waals interaction, hydrophobic interaction, four types of non covalent interactions in biomolecules in aqueous solvent, colligative properties, osmosis and the measurement of osmotic pressure, ionization of weak acid and weak bases, buffers.

UNIT-III (a) AMINO ACIDS, PEPTIDES, PROTEINS (10)

General structure of amino acid, properties, conventions of amino acids, classification of amino acids by R group, uncommon amino acids, Zwitterion. Peptides: Peptide bond, polypeptides, oligomers, protomers. Proteins: hierarchy, four levels of structure in protein, steps in sequencing of a polypeptide, locating di sulfide bond. Chemical synthesis of a peptide.

(b) LIPIDS

Fatty acids, structural lipids in membrane, galactolipids, sphingolipids, and sterols, lipid extraction.

UNIT-IV CARBOHYDRATES AND GLYCOBIOLOGY**(9)**

Monosaccharides: aldose, ketose, epimers, pyranoses, furanoses, anomers, Haworth formula, conformation of pyranoses, sugars as reducing agents, Disaccharides: Glycosidic bonds, hydrolysis, Polysaccharides: starch, glycogen, dextran, homopolysaccharides, chitin. Glyconjugates: Glycoproteins, proteoglycan, and glycolipids. Sugar code, methods of carbohydrate analysis

UNIT-V NUCLEOTIDES AND NUCLEIC ACIDS**(9)**

Nucleotides and nucleic acid nomenclature, Phosphodiesterase Linkage, structure of purine and pyrimidine, Absorption spectra of the common nucleotide, Nucleic acid structure: DNA stores genetic information, DNA is a Double helix, Watson-Crick structure, RNA-three dimensional structure, nucleic acid chemistry: denaturation and annealing, DNA sequences determination, chemical synthesis of DNA, purine, pyrimidine synthesis.

Total: 45**TEXT BOOK:**

S.N O	AUTHOR (S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	D. L. Nelson, M. Cox & M. M. Cox	Lehninger Principles of Biochemistry 4 th Edition	Freeman, W. H. & Company, New York	2004

REFERENCES:

S.N O	AUTHOR (S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Zubay, G.L	Principles of Biochemistry	WCB Publishers, London	1996
2	Herg, J.M., J.L. Tymoczko & L. Stryer	Biochemistry. V Edition	WH-Freeman and Co, New York	2002
3	Voet, G. & A. Voet	Fundamentals of Biochemistry. II Edition	John Wiley and Sons, Inc. New York	2015

Course Objectives:

- To identify and understand the working of key components of a computer program.
- To identify and understand the various kinds of keywords and different data types of C programming.
- To understand, analyse and implement software development tools like algorithm, pseudo codes and programming structure.
- To study, analyse and understand the logical structure of a computer program, and different construct to develop a program in C language.
- Understand, analyze and implement software development tools like algorithm, pseudo codes and programming structure.
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in 'C' language

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Formulate simple algorithms for arithmetic and logical problems.
- Translate the algorithms to programs (in C language).
- Test and execute the programs and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- Apply programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.

UNIT I OVERVIEW OF COMPUTER (8)

What is computer- Computer Components-Generation of Computers- Memory Organization-Memory Types-Input and Output Devices- Concepts of Hardware and Software- What is OS-Windows and Unix OS- Programming Languages- Basics of Computer Networks- LAN, WAN-Concept of Internet- ISP- Basics of word processing- Basics of spreadsheet – Basics of presentation Software

UNIT II OVERVIEW OF 'C' (8)

Algorithms-Representation of Algorithms-Flowchart- Introduction to programming Languages-What is C- C Character set- Constants, Variables and Keywords-General form of C Program-The First C Program-Data types-Arithmetic Instructions- Type conversions- Relational and Logical Operators- Hierarchy and associativity

UNIT III SELECTION AND ITERATION (9)

Selection Structures- If and nested if - Loops-Definition and types-While loop-for loop- do-while loop- break and continue- Nested loops- Advantages of iteration-Menu driven programs-Switch Case

UNIT IV FUNCTIONS**(10)**

Functions- Definition-types-Functions without arguments- Functions with Input arguments- Functions with output parameters-local and global variables- advantages of functions- Call by value and Call by reference- Recursion- Function as an argument

UNIT V ARRAYS AND STRINGS**(10)**

Arrays-definition- Declaring and referencing arrays- Array initialization- Using for loops for accessing arrays-Passing array elements as function arguments-2D Array - Matrix Addition and multiplication- Introduction to Strings- declaration and Initialization--String constant -Strings as Array of Characters

Total : 45

REFERENCES:

1. E. Balagurusamy, “ Computing Fundamentals and C Programming”, TMH Education, 5th Edition, 2014
2. Yashavant Kanetkar, “ Let us C”, BPB Publications, 13th Edition, 2013
3. H. M. Deitel and D. J. Deitel, ‘C: How to Program’, Prentice Hall, 7th Edition, 2012
4. E. Balagurusamy, “ Programming in ANSI C”, TMH Education, 6th edition, 2012

Semester – II
15BTCC211 COMPUTER PRACTICE AND PROGRAMMING LABORATORY 0 0 3 2

Course Objectives

- Identify and understand the working of key components of a computer program.
- Identify and understand the various kinds of keywords and different data types of C programming
- Understand, analyze and implement software development tools using algorithm
- Understand, analyze and implement software development tools using linux
- Acquire and analyse the roots of equations
- Study, analyze and understand logical structure of a computer program, and different construct to develop a program in “C” language

Course Outcomes:

The course will enable the students.

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs(in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem in to functions and synthesize a complete program using divide and conquer approach. and use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

LIST OF EXPERIMENTS

1. Working with word Processing, Spreadsheet and presentation software in Linux
2. Programming in Scratch:
Practicing fundamental concepts of programming like sequence, selection decision statements, working of loops and event driven programming
3. C Programming:
Practicing programs to get exposure to basic data types, algebraic expressions, Conditional statements, Input and Output Formatting, Decision Statements, Switch Case, Control structures, arrays, Strings and function

Total: 45

COURSE OBJECTIVE:

- To experiment with sugar quantification method
- To perform analysis to distinguish reducing and non-reducing sugars
- To understand the protein quantification using Lowry's method
- To explain the quantification of lipid and amino acid
- To experiment the separation of solutes through chromatography
- To demonstrate the DNA and RNA estimation through DPA and Orcinol method.

COURSE OUTCOMES:

1. Outline the sugar quantification through anthrone method
2. Illustrate the procedure for distinguishing reducing and non-reducing sugars
3. Perform the protein quantification
4. Recall the procedure for distinguishing imino and amino acids using ninhydrin test.
5. Interpret the solutes separated through chromatography
6. Discuss the DNA and RNA estimation.

LIST OF EXPERIMENTS:

1. Quantification of sugars (Anthrone method)
2. Distinguish reducing and nonreducing sugars.
3. Quantification of proteins (Lowry *et al* Method)
4. Using ninhydrin for distinguishing Imino and amino acids
5. Quantification of lipids
6. Analysis of oils- Acid number
7. Paper Chromatography
8. Estimation of DNA (DPA method)
9. Estimation of RNA (Orcinol method)

TEXT BOOKS:

S. NO.	AUTHOR (S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Boyer, R.	Experimental Biochemistry	Benjamin Cummings, Redwood City, California, USA	2000
2	Palanivelu, P.	Analytical Biochemistry and Separation Techniques	Kalaimani Printers, Madurai	2001

REFERENCE BOOK:

S. NO.	AUTHOR (S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sadasivam, S. & A. Manickam	Biochemical Methods	New Age International Pvt Ltd Publishers, New Delhi	2002

OBJECTIVE:

- • To understand the basics of biomolecules, human anatomy and physiology
- To have better understanding of advancements in biology
- To understand the basics of biomolecules
- To understand the basics of human anatomy
- To understand the basics of physiology
- To have better understanding of advancements

UNIT-I BASICS OF CELL BIOLOGY**(4)**

History, Cell theory, Cell Structure-Prokaryotic and Eukaryotic cells, Animal and Plant Cell. Cell cycle, Mitosis, Meiosis and Reproductive cycle.

UNIT-II BIOMOLECULES**(4)**

Carbohydrates-Classification, Qualitative tests for sugars, Lipids-Definition, Classification; Proteins- classification and functions; Nucleic acids-basic structure; Hormones-definition, importance; Vitamins.

UNIT-III HUMAN ANATOMY AND PHYSIOLOGY**(5)**

Levels of Structural organization, the eleven systems of human body, central nervous system- cardiovascular system and immune system.

UNIT-IV GENETICS AND GENETIC DISORDERS**(4)**

History of genetics-Scope and Importance of genetics, Mendel and his work, DNA stores genetic information- gene mutation, disorders due to mutant genes.

UNIT-V TECHNOLOGICAL ADVANCES IN BIOLOGY**(3)**

Biopharmaceuticals, Gene therapy, genetically modified crops, probiotics.

Total: 20**TEXT BOOK:**

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIONS
1	Verma, P. S., Agarwal, V. K.	Cell Biology, Genetics, Molecular Biology, Evolution and Ecology	S. Chand & Company Ltd., New Delhi	2006

REFERENCE BOOKS:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATIONS
1	Nelson, D. L. and Cox, M. M	Lehninger Principles of Biochemistry 4 th Edition	Freeman, W. H. & Company, New York	2004
2	Tortora, G. J., Derrickson, B	Principles of Anatomy and Physiology, 11 th Edition	John Wiley & Sons, New York	2006

WEBSITE

- | |
|--|
| 1. http://www.biotechonweb.com/Application-of-biotech-in-Medical.html |
|--|

OBJECTIVES

- To understand the basic laws and concepts of chemical calculations.
- To explain the first and second laws of thermodynamics.
- To explain the overall material balances of chemical reactions and its basic calculations.
- To discuss the fluid flow mechanics and its concepts.
- To understand the fluid transportation.
- To understand the basic principles of chemical calculations and measurements.

COURSE OUTCOMES

1. Outline the basic chemical calculations and the basic laws governing it.
2. Illustrate basic laws of thermodynamics.
3. Infer the overall material balances of chemical reactions and its basic calculations.
4. Outline the application of fluid flow mechanics in chemical engineering.
5. Discuss the fluid flow and its measurements.
6. Understand the basic principles of chemical calculations and measurements.

UNIT- I BASIC CHEMICAL CALCULATIONS (9)

SI units, stoichiometry, basic chemical calculations: mole, atomic mass and molar mass, equivalent mass, conversion of mass fraction to mole fraction, molarity, normality, density, specific gravity. Ideal gas law- Ideal mixtures and solutions – Dalton's law of additive volumes, Henry's law, Raoult's law, Concepts of Simpson's rule and their applications to different systems.

UNIT- II FIRST AND SECOND LAWS OF THERMODYNAMICS (8)

Energy balances, sensible heat, latent heat, vapour pressure, steady and unsteady state calculations.

UNIT- III MATERIAL BALANCES (10)

Overall and component balances, material balances without and with chemical reactions, degrees of freedom, steady and unsteady state, unit operations, recycle and bypass humidity calculations.

UNIT- IV FLUID MECHANICS (10)

Fluids; fluid statics and applications in chemical engineering; fluid flow; laminar; Turbulent pressure drops; compressible fluid flow concepts; multiphase flow concepts.

UNIT-V FLOW THROUGH PACKED COLUMNS (8)

Fluidisation, centrifugal and piston pumps, characteristics, compressors, work.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Bhatt B.I., and Vora S.M.	Stoichiometry	Tata McGraw- Hill,	2010
2	McCabe W.L., Smith J.C, and Harriot P.	Unit Operations In Chemical Engineering	McGraw-Hill Inc	1993

Course Objectives:

- To understand the basics of bioenergetics
- To explain the metabolism of carbohydrate
- To explain the nucleic acid synthesis and regulations
- To discuss the synthesis and catabolism of amino acids pathways
- To understand the lipid metabolism and its associated genetic disorders
- To relate the importance of metabolism and how it leads to disorders.

Course Outcomes:

1. Outline the relationship of bioenergetics in biological reactions.
2. Examine the knowledge of carbohydrate metabolic pathways.
3. Describe the concept of nucleic acid synthesis and regulations.
4. Illustrate the synthesis and catabolism of amino acids pathways.
5. Explain the lipid metabolism and its associated genetic disorders.
6. Discuss the importance of metabolism and how it leads to disorders.

UNIT-I BIOENERGETICS (8)

Energy relationship between the catabolic and anabolic pathways, Five major reactions in living cells, Bioenergetics and thermodynamics. Phosphoryl group transfers; ATP hydrolysis in two steps, Ping-Pong mechanism of nucleoside diphosphate kinase.

UNIT-II METABOLISM OF CARBOHYDRATES (9)

Major pathways of glucose utilization: glycolysis, fermentation, gluconeogenesis: carbohydrate synthesis from simple precursors. Pentose phosphate pathway; TCA cycle: Reactions and regulations.

UNIT III METABOLISM OF NUCLEIC ACIDS (9)

Biosynthesis of nucleotides, denovo and salvage pathways for purines and pyrimidines, regulatory mechanisms: Metabolic disorders associated with nucleic acid metabolism.

UNIT-IV METABOLISM OF AMINO ACIDS (10)

Biosynthesis of amino acids from acetyl coA, Biosynthesis of essential amino acids (Met, Thr, Lys, Ile, Val, Leu, Phe, Trp, Tyr). Glucose-alanine cycle, Urea cycle. Pathways of degradation of aromatic, glucogenic and ketogenic aminoacids. Human genetic disorders affecting amino acid metabolism.

UNIT-V METABOLISM OF LIPIDS (9)

Biosynthesis of fatty acid, Triacylglycerol. Biosynthesis of cholesterol. Digestion, mobilization, and transport of fats, fatty acid entry into mitochondria via the acyl-carnitine/carnitine transporter. The β -oxidation pathway. Oxidation of a monounsaturated and polyunsaturated fatty acid. Genetic defects in fatty Acyl-CoA dehydrogenases causing serious diseases.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Nelson, D. L. and Cox, M. M	Lehninger Principles Biochemistry 4 th Edition	Freeman, W. H. & Company	2004

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Voet and Voet	Biochemistry	John Wiley & Sons Inc	1995
2	Murray, R. K., Granner, B.K., Mayes, P.A., and Rodwell. V.W.	Harper's Biochemistry	Prentice Hall International	2000
3	Creighton. T.E.	Proteins, Structure and Molecular Properties	Freeman and Co	1993
4	Salway, J. G.	Metabolism at a Glance	Blackwell Science Ltd	2000

Course Objectives

- To explain the cell structure of Prokaryotes and Eukaryotes
- To understand how cells undergo mitosis
- To outline the views on transport across the cell membranes.
- To explain the signaling process involved in the cell.
- To illustrate the function of mitochondria and chloroplast.
- To recall the importance of cell signaling process to understand diseases.

Course Outcomes

1. Summarize the structure and function of cell components
2. Understand the role of the cytoskeletal proteins and link it with cell cycle.
3. Illustrate the transport process across the cell membrane.
4. Outline the basic ideas on signaling process through the receptors.
5. Explain the electron transfer in mitochondria.
6. Relate the importance of cell signaling process to understand diseases.

UNIT-I CELL STRUCTURE AND CELL ORGANELLES (9)

History of cell biology, comparison of eukaryotic and prokaryotic cells, principles of membrane organisation, membrane proteins; Structure of prokaryotic cells - cilia, flagella, cell wall; Structure of eukaryotic cell organelles: cytoplasm, endoplasmic reticulum, mitochondria, chloroplast, peroxisomes, nucleus.

UNIT-II CYTOSKELETAL PROTEINS & CELL DIVISION (9)

Cytoskeletal proteins, contractile proteins – actin & myosin; extracellular matrix; Types of cell division: mitosis & meiosis, Cell cycle and molecules that control cell cycle

UNIT-III TRANSPORT ACROSS CELL MEMBRANES (9)

Passive & active transport, permeases, sodium potassium pump, Ca²⁺ ATPase pumps, lysosomal and vacuolar membrane ATP dependent proton pumps, co transport symport, antiport, active group translocation; endocytosis and exocytosis; Entry of viruses and toxins into cells.

UNIT-IV RECEPTORS AND MODES OF CELL SIGNALLING (9)

Cytosolic, nuclear and membrane bound receptors, examples of receptors, identify cation and purification of cell surface receptors, autocrine, paracrine and endocrine modes of action

UNIT- V FUNCTION OF MITOCHONDRIA AND CHLOROPLAST (9)

Electron Transport in Mitochondria: Electron transport chain, Reduction Potentials of Electron Carriers, Electron transfer from reduced cytochrome *c* to O₂, Chloroplast: photosynthetic stages and light-absorbing pigments.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	H. Lodish, A. Berk, S. L. Zipurursky, P. Matsudaria, D. Baltimore and J. Darnell	Molecular Cell Biology	Freeman press	2000
2	B. Alberts, A. Johnson, J. Lewis, Raff, K. Roberts, an P. Walter	Molecular Biology of the Cell	Garland PUB	2002

REFERENECE

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	S. C. Rastogi	Cell Biology	New Age International Pub. Ltd	2004
2	Karp, G and Puritt, N. L	Cell and Molecular biology, Concepts and Experiments	John Wiley and Sons Inc.,	2005
3	De Robertis, E. D. P. and De Robertis, E. M. F	Cell and Molecular biology	B. I publications pvt. Ltd.	2005

Course Objectives

- To illustrate the basic concepts of microbiology and different microbial identification techniques.
- To explain the structure and multiplication of microorganism.
- To interpret the microbial growth and its metabolism.
- To outline the mechanism for the control of microorganisms.
- To infer the application of microorganism in industries.
- To explain the role of microorganisms in bioremediation.

Course Outcomes

1. Outline the history of microbiology and microbial staining techniques.
2. Discuss the microbial structural organization and multiplication.
3. Infer the basic requirements for microbial growth towards the biosynthesis of important molecules.
4. Discuss the controlling mechanism of microorganisms.
5. Illustrate the production of various metabolites and its applications.
6. Explain the role of microorganisms in bioremediation.

UNIT-I INTRODUCTION**(8)**

History of microbiology, classification and nomenclature of microorganism, Microbes in soil, air and water microscopic examination of microorganisms, light and electron microscopy, principles of different staining techniques like gram staining, acid fast, capsular staining, flagellar staining.

UNIT-II MICROBES-STRUCTURE AND MULTIPLICATION**(10)**

Structural organization and multiplication of bacteria, viruses, algae and fungi with a special mention of life history of actinomycetes, yeast, mycoplasma and bacteriophage.

UNIT- III MICROBIAL NUTRITION, GROWTH AND METABOLISM**(10)**

The cultivation of bacteria, Nutritional requirements of bacteria and different media used for bacterial culture; growth curve and different methods to quantify the bacterial growth, aerobic and anaerobic bioenergetics and utilization of energy for biosynthesis of important molecules.

UNIT – IV CONTROL OF MICROORGANISMS**(8)**

Physical and chemical control of microorganisms, host-microbe interactions, antibacterial, anti-fungal and anti-viral agents, mode of action and resistance to antibiotics, clinically important microorganisms.

UNIT – V INDUSTRIAL AND ENVIRONMENTAL MICROBIOLOGY**(9)**

Primary metabolites; secondary metabolites and their applications-preservation of food; Microorganism used for the production of penicillin, alcohol, vit.B-12; biogas; bioremediation; mycorrhiza; Biological Nitrogen fixation, microorganisms and pollution control.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	TalaronK,Casita,Pelczar And Reid.	Foundations In Microbiology	W.C.Brown Publishers	1993
2	Pelczar MJ, Chan ECS and Krein NR	Microbiology,	Tata McGraw- Hil Edition	2007
3	Prescott LM, Harley JP, Klein DA,	Microbiology, 5 th Edition	McGraw Hill	2002
4	Kolwzan, B, Adamiak, W, Grabes, K, Pawelczyk A	Introduction to Environmental Microbiology	ebook	2006

COURSE OBJECTIVES

- To explain the basic reactions in organic chemistry
- To discuss the kinetics of enzymes using different methods
- To illustrate the enzyme inhibition process
- To outline the various enzymatic reactions in relation with stereochemistry
- To determine the specific enzyme structure and mechanism
- To classify the protein folding kinetics

COURSE OUTCOMES

1. Interpret the basic reactions in stereochemistry
2. Derive and calculate the kinetics of enzymes in different orders
3. Summarize the enzymatic reactions in stereochemistry
4. Illustrate the mechanism behind specific enzymes
5. Explain the protein folding kinetics
6. Discuss the protein folding pathways

UNIT-I CONCEPTS IN ORGANIC CHEMISTRY (9)

Stereochemistry: optical activity, chiral center – enantiomers - *R*, *S* notation, stereo selective and stereospecific reactions-*Z* and *E* isomers, *Re*, *Si* faces, conformational analysis, ethane, n-butane mechanisms of S_N1 S_N2 reactions, $E1E2$ reactions, ester formation and hydrolysis, reaction rates, hammond's postulate, h/d effects, catalysis: general acid – base and covalent catalysis.

UNIT-II ENZYME KINETICS AND INHIBITION (9)

Steady state kinetics, derivation and significance of Michaelis Menten equation, Line weaver-Burke Plot, single and double displacement reactions, cooperativity with respect to oxygen binding by haemoglobin. Inhibition –reversible and irreversible – competitive, non-competitive, uncompetitive inhibition (characteristics and examples).

UNIT-III STEREOCHEMISTRY OF ENZYMATIC REACTIONS (9)

Stereospecific enzymatic reactions - fumarase catalysed reactions - NAD dependent oxidation and reduction reactions - stereochemistry of nucleophilic reactions - chiral methyl group, chiral phosphate.

UNIT-IV ENZYME STRUCTURE AND MECHANISM (9)

The dehydrogenases (alcohol dehydrogenase) - proteases (serine protease), lysozyme, Ribonucleases, Ribozymes.

UNIT-V PROTEIN FOLDING KINETICS AND FOLDING PATHWAYS (9)

Kinetics of protein folding: basic methods, two state kinetics, multistate kinetics, transition states in protein folding, $^1\text{H}/^2\text{H}$ exchange methods, folding of peptides, CI2 folding, molecular chaperones.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Fersht A. R	Structure and Mechanism in Protein Science: A Guide to Enzyme Catalysis and Protein Folding	W H Freeman	1999
2	Morrison, R. T and Boyd, R. N	Organic Chemistry	Prentice Hall of India Pvt Ltd	1999

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Dugas H	Bioorganic Chemistry	Springer Verlag	1999
2	Zubay G L,	Biochemistry	WCB/McGraw- Hill publishers	1998
3	Nelson, D. L. and Cox, M. M	Lehninger Principles of Biochemistry 4 th Edition	Freeman, W. H. & Company	2004
4	Palmer, T	Enzymes	Affiliated East West Press Pvt.Ltd	2004

Course objective:

- To understand the nature of the cells present in the biological sample through microscope.
- To explain the different staining techniques.
- To understand the stages of mitosis.
- To understand the chloroplast isolation from leaves.
- To demonstrate the different types of blood cells.
- To understand about the osmosis and tonicity.

Course outcomes:

1. Illustrate the handling of microscope and categorize the cells present in the biological sample.
2. Interpret the various staining techniques to identify the cell.
3. Outline the stages of mitosis.
4. Understand the blood cell identification.
5. Understand the knowledge about the cell concentration with osmosis and tonicity.
6. Recall assay to identify the cell condition.

1. Principles of microscopy – Phase contrast and Fluorescent Microscopy.
2. Identification of given plant, animal and bacterial cells and their components by microscopy.
3. Staining Techniques: (i) Leishmann staining (ii) Giemsa staining.
4. Staining for different stages of mitosis in *Allium cepa* (Onion).
5. Separation of plant pigments by Chromatography.
6. Identification of different types of blood cells
7. Isolation of chloroplasts from spinach leaves.
8. Osmosis and Tonicity.
9. Tryphan Blue Assay.

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Bregman, A. A	Laboratory Investigations in Cell and Molecular Biology	Wiley	2001
2	Dr.S.Rajan and Mrs.R.Selvi Christy	Experimental procedures in Life Sciences	Anjanna Book House, Chennai	2011

Course objective:

- To understand the nature of the cells present in the biological sample through microscope.
- To explain the different staining techniques.
- To discuss the different culture media preparation.
- To demonstrate the culturing, growth and control of micro organisms.
- To understand about the chemicals that controls the bacterial growth.
- To optimize the parameters on bacterial growth.

Course outcomes:

1. Illustrate the handling of microscope and categorize the cells present in the biological sample.
2. Interpret the various staining techniques to identify the cell.
3. Outline the different types of media preparation techniques.
4. Understand the growth of the organism and the parameters that influences their stability to grow.
5. Understand the knowledge about the chemicals that controls the bacterial growth.
6. Recall the growth curve and the control of microorganisms.

1. Laboratory Safety and Aseptic Techniques
2. Microscopy-Light Microscopy
3. Culture media – Types, preparation of nutrient broth and nutrient agar
4. Culturing of microorganisms – in broth and in plates (spread plate, pour plate, streak plate)
5. Staining Techniques & Motility Test
6. Quantitation of Microorganisms
7. Chemical Control of Microorganisms &Antibiotic Sensitivity Assay
8. Bacterial Growth Curve
9. Effect of different parameters on bacterial growth (temperature, UV irradiation)

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Leboffee, M. J.	Micro Biology : Laboratory Theory and applications	BE Pierce Morten Publishing House	2006

2	Aneja, K.R.,	Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology	New Age International (P) Limited Publishers, New Delhi	2001
3	Cappucino, J.G. and N. Sherman	Microbiology A Laboratory Manual	Benjamin Cummings, New York	2001

4	Dubey, R.C. and D.K. Maheshwari	Practical Microbiology	S. Chand and Company Ltd, New Delhi	2002
5	Gunasekaran, P	Lab Manual in Microbiology	New Age International (P) Ltd, Publishers, New Delhi	1996
6	Arora, B., D.R. Arora	Practical Microbiology	CBS Publishers and Distributors, Bangalore	2007
7	Chakraborty, P. and N.K. Pal	Manual of Practical Microbiology and Parasitology	New Central Book Agency (P) Ltd, India.	2008

COURSE OBJECTIVES

- To understand the synthesis of Aspirin and p-nitroacetanilide
- To explain the preparation method for Acetanilide from Aniline
- To experiment on sucrose hydrolysis
- To perform reactions for the preparation of alpha D-glucopyranose penta acetate and 1,2:5,6-dicyclohexylidene- alpha-D glucofuranose.
- To determine the extraction procedure for lycopene
- To discuss the methods for the preparation of oleic acid and casein

COURSE OUTCOMES

1. Analyze the protocol for aspirin synthesis and p-nitroacetanilide
2. Infer the preparation of Acetanilide from Aniline
3. Outline the inference on sucrose hydrolysis
4. Determine the protocol for preparation of alpha D-glucopyranose penta acetate and 1,2:5,6-dicyclohexylidene- alpha-D glucofuranose.
5. Perform the extraction of lycopene from different sources
6. Experiment the suitable method for the preparation of casein from milk

1. Synthesis of Aspirin.
2. Synthesis of p-nitroacetanilide.
3. Preparation of Acetanilide from Aniline.
4. Hydrolysis of Sucrose.
5. Extraction of Lycopene
6. Preparation of alpha D-glucopyranose penta acetate.
7. Preparation of 1,2:5,6- dicyclohexylidene- alpha-D glucofuranose.
8. Preparation of Oleic acid.
9. Preparation of casein from milk

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Leonard, J Lygo, B and Procter, G	Advanced Practical Organic Chemistry	CRC Press	1994

OBJECTIVES:

- To assist students to understand the role of thinking in all forms of communication.
- To help students with neutral accent.
- To guide students to read and comprehend articles from newspapers and magazines.
- To equip students with oral and appropriate written communication skills.
- To assist students with employability and job search skills
- To make soft skills will be incorporated and have a good listening capability.

OUTCOMES:

- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively, coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Listen to/ view and comprehend different spoken discourses/ excerpts in different accents.
- Take national and international examination and enhance the performance at Placement Interviews.
- Be motivated to lead a group and able to guide the group with confidence.
- Soft skills will be incorporated and have a good listening capability.

UNIT - I ESSENTIALS OF COMMUNICATION

Communication: Definition-Process-Scope-Types- Barriers- Dyadic Communication exercises.

UNIT - II SPEECH PROCESS

Pronunciation – Voice quality – Vowels – Consonants – Diphthongs – Syllables – Word stress - Sentence Stress – Pause - Intonation – Accent.

UNIT - III ORAL COMMUNICATION

Distinguishing between Formal and Informal speech – Defining and Describing objects and people –Self Introduction – Extempore talk on a given topic - Asking questions politely, disagreeing politely in formal contexts – Speaking to a group - Giving oral presentations – Group discussion – Debates- Types of Interview.

UNIT - IV WRITTEN COMMUNICATION

Formal Reports - Project Proposals - Book reviews - Official Correspondence - Proof Reading & Editing.

UNIT – V ENGLISH FOR COMPETITIVE EXAMINATION

Synonyms, Antonyms –Grammar and usage – Error Identification – Reading comprehension- Verbal analogy- Verbal Test.

TEXT BOOK:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Jane Summers & Brett Smith	Communication Skills Handbook: How to Succeed in Written and Oral Communication 3 rd Ed.	Hoboken, N.J. : Wiley ; Chichester : John Wiley [distributor], USA.	2009

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Anderson, Paul V	Technical Communication	Thomson and Wadsworth Publishers, USA.	2007
2	Barun, Mitra K	Effective Technical Communication – A Guide for Scientists and Engineers	Oxford University Press, New Delhi.	2006
3	Seely, John.	The Oxford Guide to Effective Writing and Speaking	Oxford University Press, New Delhi.	2005

WEBSITES :

www.learning-development.hr.toolbox.com – Unit-III- Oral Communication
www.englishclub.com - Writing/ Grammar – Unit-IV
www.ispeakyouspeak.blogspot.com- Vocabulary Enrichment/ Speaking – Unit-II
www.teachertube.com - Writing Technically – Unit- V
www.Dictionary.com - Semantic / Grammar – Unit-IV & V

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
- To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.
- To acquaint the student with concepts of sampling distributions and statistical techniques used in engineering and management problems.

OUTCOMES:

- To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- To apply the concept of testing of hypothesis for small and large samples in real life problems.
- To apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
- To have the notion of sampling distributions and statistical techniques used in engineering and management problems.
- To make the student acquire sound knowledge of techniques in quality control that model engineering problems.

UNIT- I PROBABILITY (11)
Probability – Definition – Law - conditional probability-Bayes theorem- Probability mass function - Probability density functions.

UNIT- II RANDOM VARIABLES (13)
Introduction to one dimensional random variables – Discrete – Continuous - Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression.

UNIT- III TESTING OF HYPOTHESIS (12)
Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions – Tests for independence of attributes and Goodness of fit.

UNIT – IV DESIGN OF EXPERIMENTS (12)
Analysis of variance – one way classification – CRD – Two-way classification – RBD – Latin square.

UNIT – V RELIABILITY AND QUALITY CONTROL (12)
Concepts of reliability – hazard functions – Reliability of series and parallel systems – control charts for measurement (\bar{X} and R charts) - Control charts for attributes (p, c and np charts).

Total : 60

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	P.S.S.Sundar Rao and J.Richard	Introduction to Biostatistics and Research Methods	Prentice Hall of India, New Delhi.	2012
2	R.A.Johnson and C.B.Gupta	Miller and Freund's Probability and Statistics for Engineers	Pearson Education Asia, New Delhi.	2007
3	S.C.Gupta and V.K.Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons, New Delhi	2007

WEBSITES:

1. www.cut-the-knot.org/probability.shtml
2. www.mathcentre.ac.uk
3. [www.mathworld](http://www.mathworld.wolfram.com). Wolfram.com

Course Objectives

- To outline the classical genetics concepts of eukaryotes and prokaryotes.
- To explain the structure of nucleic acids and DNA replication.
- To understand the molecular process of transcription.
- To understand the basic machinery of translation and its mechanisms.
- To understand the regulation of gene expression and various types of mutation
- To discuss the different types of mutation and DNA repair mechanisms

Course outcomes

1. Discuss the concepts related to eukaryotic and prokaryotic genetics.
2. Identify the structure of nucleic acids, DNA replication and chromosome organization.
3. Illustrate the prokaryotic and eukaryotic transcription, and its post transcriptional modifications.
4. Outline the concept of genetic code, translation process and post translational modifications.
5. Interpret the process of regulation of gene expression and its importance.
6. Identify the different types of mutation and DNA repair mechanisms.

UNIT-I CLASSICAL GENETICS**(7)**

Mendelian genetics, linkage, crossing over, classical experiments – Hershey and Chase, Avery McLeod & McCarty. Bacterial conjugation, transduction and transformation. Conformation of DNA and RNA.

UNIT- II STRUCTURE OF NUCLEIC ACIDS AND DNA REPLICATION (10)

Replication in prokaryotes, D-loop and rolling circle mode of replication, replication of linear viral DNA. Organisation of eukaryotic chromosome – cot value, replication of telomeres in eukaryotes

UNIT-III TRANSCRIPTION**(10)**

In prokaryotes and eukaryotes, features of promoters and enhancers, transcription factors, nuclear RNA splicing, regulation of transcription: prokaryote and eukaryote

UNIT-IV TRANSLATION**(9)**

Elucidation of genetic code, basic machinery of translation and its mechanism, codon usage, suppressor mutation, regulation of translation: prokaryote and eukaryote.

UNIT-V REGULATION OF GENE EXPRESSION**(9)**

Lac and trp operon, phage life cycle, mutation and repair of DNA, regulation of gene expression in eukaryotes

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	David, F	Molecular biology	NarosaPubl	2001
2	Benjamin, L	Gene VIII	Pearson Education	2004
3	Watson, J. D	Molecular Biology of the Gene	Pearson Education	2004

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Weaver, R. F	Molecular biology	Mc Graw Hill	2005

15BTBT403 CHEMICAL THERMODYNAMICS AND BIO THERMODYNAMICS 3 0 0 3 100

Course Objectives

- To explain the thermodynamic properties of fluids and its calculations.
- To discuss the basic concepts of solution properties.
- To illustrate the phase equilibria concepts for various systems.
- To outline the equilibrium criteria for various chemical reactions.
- To infer the knowledge on general thermodynamic processes.
- To explain the working principles and the process involved in the refrigeration and Liquefaction system.

Course Outcomes

1. Discuss the various properties of the fluids and its calculations.
2. Explain the concept of solution thermodynamics and composition models.
3. Analyze the criteria of phase equilibria for different components system.
4. Apply the concept of chemical reaction equilibria and equilibrium conversion.
5. Analyze the thermodynamic flow process.
6. Illustrate the working principles and the process involved in the refrigeration and Liquefaction system.

UNIT-I THERMODYNAMIC PROPERTIES OF FLUIDS (9)

Volumetric properties of fluids exhibiting non ideal behavior; residual properties; estimation of thermodynamic properties using equations of state; calculations involving actual property exchanges; Maxwell's relations and applications.

UNIT- II SOLUTION THERMODYNAMICS (9)

Partial molar properties; concepts of chemical potential and fugacity; ideal and non-ideal solutions; concepts and applications of excess properties of mixtures; activity coefficient; composition models; Gibbs Duhem equation.

UNIT- III PHASE EQUILIBRIA (9)

Criteria for phase equilibria; v-l-e calculations for binary and multi component systems; liquid-liquid equilibria and solid-solid equilibria.

UNIT- IV CHEMICAL REACTION EQUILIBRIA (9)

Equilibrium criteria for homogeneous chemical reactions; evaluation of equilibrium constant; effect of temperature and pressure on equilibrium constant; calculation of equilibrium conversion and yields for single and multiple reactions.

UNIT- V THERMODYNAMIC ANALYSIS OF PROCESSES

(9)

Thermodynamics of flow processes, Concept of lost work; entropy generation; power cycle (rankine, regenerative, reheat); liquefaction.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Smith, J. M., Van Ness H.C., and Abbot M. M.	Chemical Engineering Thermodynamics	McGraw-Hill	2001
2	Narayanan K. V.	A Text Book Of Chemical Engineering Thermodynamics	Prentice Hall India	2001

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sandler S.I.	Chemical And Engineering Thermodynamics	John Wiley	1989
2	Urs von Stockar, Luuk A. M. van der Wielen	Biothermodynamics: The Role of Thermodynamics in Biochemical Engineering	EPFL Press	2013

Course Objectives

- To explain the basic concepts of wave properties and radiation sources.
- To discuss the instrumentation and application of various molecular spectroscopy.
- To understand the concept and instrumentation of magnetic resonance spectroscopy and mass spectroscopy.
- To categorize the different separation methods for product purification.
- To outline the thermal analysis techniques and its applications.
- To understand the instrumentation and applications of different thermal analysis techniques.

Course Outcomes

1. Infer the various sources and properties of electromagnetic radiation.
2. Discuss the theory of molecular absorption spectroscopy.
3. Relate the theory, instrumentation and applications of various molecular spectroscopies.
4. Interpret the theory and instrumentation of magnetic resonance and mass spectroscopy.
5. Identify the various chromatographic and electrophoresis techniques for purification.
6. Explain the instrumentation and applications of different thermal analysis techniques.

UNIT I INTRODUCTION TO SPECTROMETRY (9)

Properties of electromagnetic radiation- wave properties – components of optical instruments – Sources of radiation – wavelength selectors – sample containers – radiation transducers – Signal process and read outs – signal to noise ratio - sources of noise – Enhancement of signal to noise - types of optical instruments – Principle of Fourier Transform optical Measurements.

UNIT II MOLECULAR SPECTROSCOPY (9)

Molecular absorption spectrometry – Measurement of Transmittance and Absorbance – Beer's law – Instrumentation - Applications -Theory of fluorescence and Phosphorescence Instrumentation – Applications – Theory of Infrared absorption spectrometry – IR instrumentation – Applications – Theory of Raman spectroscopy – Instrumentation – applications.

UNIT III MAGNETIC RESONANCE SPECTROSCOPY AND MASS SPECTROMETRY (9)

Theory of NMR – environmental effects on NMR spectra – chemical shift- NMRspectrometers – applications of ^1H and ^{13}C NMR- Molecular mass spectra – ion sources – Mass spectrometer. Applications of molecular mass - Electron paramagnetic resonance- g values – instrumentation.

UNIT IV SEPARATION METHODS (9)

General description of chromatography – Band broadening and optimization of column performance- Liquid chromatography – Partition chromatography - Adsorption chromatography – Ion exchange chromatography -size exclusion chromatographyAffinity chromatography- principles of GC and applications – HPLC- Capillary electrophoresis – Applications

UNIT V THERMAL METHODS

(9)

Different thermal analysis techniques. Differential scanning calorimetry - instrumentation & application. Differential thermal analysis - instrumentation & application, DTA curve. Thermogravimetry – instrumentation & application, TG curve.

Total Hours: 45

TEXT BOOK

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Willard, H. H and Merrit, L. L	Instrumental Methods of Analysis	Prentice Hall of India	2005
2	Skoog, D, A. Holler, J. F and Nieman, T. A.	Principles of Instrumental Analysis	Thomsan	2006

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	G. W. Ewing	Instrumental Methods of Chemical Analysis	McGraw-Hill	1985
2	Skoog, D, A. Holler, J. F and Nieman, T. A.	Instrumental Methods of Chemical Analysis	Krishna prakasan	2004

Course Objectives

- To understand the process of fermentation and basic fermentor configuration.
- To explain the medium requirements and media optimization methods for fermentation process.
- To explain the different sterilization methods and its kinetics and design.
- To discuss and solve the problems related to metabolic stoichiometry and energetics.
- To understand the modes of operations and various kinetic models for product formation.
- To analyze the different kinetic models for microbial growth and product formation.

Course outcomes

1. Discuss the general process of fermentation and fermentor configuration.
2. Analyze the medium requirements and medium formulations for fermentation process.
3. Outline the thermal death kinetics and different sterilization methods.
4. Solve problems related to stoichiometry of cell growth and energetic.
5. Illustrate the various modes of operation in fermentation process.
6. Analyze the different kinetic models for microbial growth and product formation.

UNIT-I OVERVIEW OF FERMENTATION PROCESSES**(7)**

Overview of fermentation industry, general requirements of fermentation processes, basic

configuration of Fermentor and ancillaries, main parameters to be monitored and controlled in fermentation processes.

UNIT-II RAW MATERIALS AND MEDIA DESIGN FOR FERMENTATION PROCESS**(9)**

Criteria for good medium, medium requirements for fermentation processes, carbon, nitrogen, minerals,

vitamins and other complex nutrients, oxygen requirements, medium formulation of optimal growth and product formation, examples of simple and complex media, design of various commercial media for industrial fermentations – medium optimization methods.

UNIT- III STERILIZATION KINETICS**(9)**

Thermal death kinetics of microorganisms, batch and continuous heat sterilization of liquid media,

filter sterilization of liquid media, air sterilization and design of sterilization equipment - batch and continuous.

UNIT- IV METABOLIC STOICHIOMETRY AND ENERGETICS (10)

Stoichiometry of cell growth and product formation, elemental balances, degrees of reduction of

substrate and biomass, available electron balances, yield coefficients of biomass and product formation, maintenance coefficients energetic analysis of microbial growth and product formation, oxygen consumption and heat evolution in aerobic cultures, thermodynamic efficiency of growth.

UNIT- V KINETICS OF MICROBIAL GROWTH AND PRODUCT FORMATION (10)

Modes of operation - batch, fed batch and continuous cultivation. Simple unstructured kinetic models

for microbial growth, Monod model, growth of filamentous organisms, product formation kinetics - leudeking-piret models, substrate and product inhibition on cell growth and product formation.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Bailey and Ollis	Biochemical Engineering Fundamentals	McGraw-Hill (2nd Ed.),	1986
2	Shule and Kargi	Bioprocess Engineering	Prentice Hall	1992

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline Doran	Bioprocess Engineering Calculation	Academic Press	2012
2	Peter F. Stanbury, Stephen J. Hall & Whitaker	Principles of Fermentation Technology	Butterworth- Heinemann	1999

3	Harvey W. Blanch, Douglas S. Clark	Biochemical Engineering	CRC Press	2014
---	--	-------------------------	-----------	------

Course Objectives

- To explain the basic idea on scope of biotechnology and its commercial production in modern biotechnology.
- To analyse the modern biotechnological processing techniques for the production of commercial bioproducts.
- To discuss the process of primary metabolite production in different industries.
- To discuss the process of secondary metabolite production.
- To explain the basic procedures for production of bioproducts.
- To illustrate the various methods for the production of recombinant products.

Course Outcomes

1. Outline the scope of biotechnology and its commercial potential.
2. Interpret the modern biotechnological processing techniques for the production of commercial bioproducts.
3. Illustrate the production methods of primary metabolites.
4. Illustrate the production methods of secondary metabolites.
5. Infer the knowledge on commercial enzyme and bioproduct production.
6. Explain the production of various commercially available products using recombinant technology.

UNIT-I INTRODUCTION TO INDUSTRIAL BIOPROCESS**(8)**

Biotechnology: Scope and importance, Commercial potential of Biotechnology in India. Traditional and modern biotechnology. products relating to modern biotechnology A brief survey of industrially important organisms, fermentation processes – modes of operation -pictorial representation of fermentation process

UNIT- II PRODUCTION OF PRIMARY METABOLITES**(10)**

A brief outline of processes for the production of some commercially important organic acids (e.g. citric acid, lactic acid, acetic acid) amino acids (glutamic acid, phenylalanine, aspartic acid) and alcohols (ethanol, butanol)

UNIT-III PRODUCTION OF SECONDARY METABOLITES**(10)**

Study of production processes for various classes of secondary metabolites: antibiotics: beta-lactams (penicillin, cephalosporin), aminoglycosides (streptomycin) macrolides (erythromycin), vitamins (B12) and steroids (progesterone).

UNIT- IV PRODUCTION OF ENZYMES AND OTHER BIOPRODUCTS**(9)**

Production of industrial enzymes such as proteases, amylases, lipases, cellulases etc., Production of biopesticides, biofertilizers, biopreservatives (Nisin), cheese, biopolymers (xanthan gum, PHB), single cell protein.

UNIT- V PRODUCTION RECOMBINANT DNA PRODUCTS**(8)**

Production of recombinant proteins having therapeutic and diagnostic applications, production of vaccines (hepatitis B vaccine), hormones (insulin). Production of monoclonal antibodies-commercial scale, products of plant (human growth hormone) and animal cell culture (interferons).

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Casida Jr, L.E.	Industrial Microbiology	New Age International (P) Ltd	2000
2	Presscott, S. C. and Dunn, C. G	Industrial Microbiology	Agrobios (India).	2006

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher/journal	Year of Publication
1	Cruger, W and Crueger, A	Biotechnology: A Textbook of Industrial Microbiology	Panima Publishing Corporation	2003
2	Moo, M and Young	Comprehensive Biotechnology	Pergamon	2007
3	Barta, A. <i>et al.</i>	The expression of a nopaline synthase human growth hormone chimaeric gene in transformed tobacco and sunflower callus tissue	Plant Mol. Biol	1986

Course Objectives

- To understand the basic principle of analytical techniques
- To discuss the instrumental techniques used in chemical and biochemical research labs.
- To explain the fundamentals of spectroscopy operations.
- To carry out qualitative analysis experiments using Lambert's – Beer law using absorption spectroscopy.
- To carry out different spectroscopic techniques.
- To carry out different chromatographic techniques.

Course Outcomes

1. Explain the basic principle of analytical techniques
2. Discuss the instrumental techniques used in chemical and biochemical research labs.
3. Explain the fundamentals of spectroscopy operations.
4. Perform the qualitative analysis experiments using Lambert's – Beer law using absorption spectroscopy.
5. Demonstrate the different spectroscopic techniques.
6. Demonstrate the different chromatographic techniques.

1. Precision and validity in an experiment using absorption spectroscopy and validating Lambert-Beer's law using KMnO_4
2. Determination of analytical wavelength for KMnO_4
3. Determination of iron concentration using 1,10 phenanthroline.
4. Finding the pK_a of 4-nitrophenol using absorption spectroscopy.
5. UV spectra of nucleic acids.
6. UV – spectra of proteins.
7. Estimation of Sulphate by nephelometry.
8. Estimation of AL^{+++} by fluorimetry.
9. Determination of R_f value using TLC.

Course Objectives

- To outline and evaluate the methods for isolation and purification of DNA from plant and animalsamples.
- To explain the protocol to run the agarose gel electrophoresis sampleanalysis.
- To demonstrate the DNA ligation techniques for transformation and screening ofrDNA.
- To understand the methods involved in optimization protocol for recombinant protein expression.
- To explain the procedure for competent cell preparation.
- To compile the overall structure of rDNA technology and implement its techniques in research anddevelopment.

Course Outcomes

1. Carry out agarose gel electrophoresis and isolation of DNA samplesindividually.
2. Develop the knowledge of techniques involved in DNA isolation andpurification.
3. Perform the restriction enzyme digestion and ligation of DNAsamples.
4. Produce recombinant DNA and implement blue white screening techniques to screen them.
5. Develop methods to produce competent cells.
6. Summarize the overall structure of rDNA technology and implement its techniques in research anddevelopment.

1. Agarose gel electrophoresis
2. Isolation of bacterial plasmid DNA
3. Isolation of bacterial chromosomal DNA
4. Isolation of plant cell genomic DNA
5. Isolation of animal cell genomic DNA
6. Restriction enzyme digestion
7. Competent cells preparation
8. Transformation and screening for recombinants
9. Blue and white selection for recombinants

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	David, L. G and Michael, K. W	Basic Methods in Molecular Biology	Prentice Hall Inc	1994
2	Sambrook, J. and Russel, D. W	Molecular Cloning Laboratory Manual	Cold Spring Harbor Laboratory Press	2001

Course Objectives

- To infer the basic knowledge on agitation and its flow pattern in different systems.
- To explain the concept of filtration and its industrial application.
- To understand the different modes of heat transfer and its transfer through different dimensional surfaces.
- To discuss the types of convectional heat transfer and its application.
- To explain the different types and designing parameters of heat exchangers and evaporators.
- To explain the basics of design, equipmentation and calculations of evaporators and heat exchangers.

Course Outcomes

1. Interpret the properties of mixing and agitation in different flow systems.
2. Outline the basic principle of filtration and its application in different filtration methods.
3. Discuss the modes of heat transfer.
4. Illustrate the mechanism of heat transfer through different dimensional surfaces.
5. Infer the basics of convectional heat transfer in different surfaces.
6. Appraise the basics of design, equipmentation and calculations of evaporators and heat exchangers.

UNIT- I MIXING AND AGITATION**(8)**

Purpose of agitation, equipments for agitation, flow pattern in agitator vessels, dimensional analysis; power for agitation; agitation of liquids; gas-liquid systems; gas-solid suspensions; agitator scale up.

UNIT-II FILTRATION**(8)** Filtration-

types of filtration, filter media, selection of medium, filter aids-filter theory, constant pressure filtration, constant volume batch filtration; continuous filtration; industrial filters; settling and sedimentation; centrifugation.

UNIT- III MECHANISM OF HEAT TRANSFER**(10)** Modes of

heat transfer, principles of conduction, Fourier's Law of heat conduction, thermal conductivity, steady state conduction, combined resistances, heat flow through a cylinder, unsteady state conduction, heat transfer from extended surfaces, individual and overall heat transfer coefficients

UNIT- IV CONVECTION HEAT TRANSFER**(10)**

Dimensional analysis, forced and natural convection, convection in flow over surfaces through pipes boiling and condensation.

UNIT- V HEAT EXCHANGERS**(9)**

Heat exchanger types, Equipments; overall heat transfer coefficients; design of heat exchangers; NTU concept; Evaporators; single and multiple effects; mass and enthalpy balances.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Geankoplis C.J.	Transport Process And Unit Operations	Prentice Hall India	2002
2	McCabe W.L., Smith J.C, and Harriot P.	Unit Operations In Chemical Engineering	McGraw-Hill Inc	1993

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Incropera F.P.	Fundamentals Of Heat And Mass Transfer	John Wiley and Sons	2000

Course Objectives

- To understand the basic concepts of fermentation processes.
- To apply the knowledge about the design of bioreactors
- To explain the scale up of bioreactors.
- To illustrate the bioprocess simulation and modeling
- To explain the immobilized enzyme kinetics and its significance.
- To discuss the commercial production of bioproducts.

Course outcomes

1. Understand the fermentation processes.
2. Interpret the design of bioreactors
3. Describe the scale up of bioreactors.
4. Infer the different types of bioprocess simulation and modeling
5. Examine the immobilized enzyme kinetics and its significance.
6. Outline the commercial production of bioproducts.

UNIT-I ANALYSIS OF STR**(8)**

Analysis of STR: Stirred tank reactor - non-ideality, RTD and stability analysis, tanks in series and dispersion models – application to design of continuous sterilizer.

UNIT-II ANALYSIS OF OTHER CONFIGURATIONS**(9)**

Analysis of other configurations: Packed bed reactor, airlift reactor, fluidized bed reactor bubble column reactors – non- ideality, RTD and stability analysis.

UNIT-III BIOREACTOR SCALE – UP**(8)**

Bioreactor scale-up: Regime analysis of bioreactor processes, oxygen mass transfer in bioreactors - microbial oxygen demands; methods for the determination of mass transfer coefficients; mass transfer correlations. Scale up criteria for bioreactors based on oxygen transfer, power consumption and impeller tip speed.

UNIT-IV MODELLING AND SIMULATION OF BIOPROCESSES**(10)**

Modelling and simulation of bioprocesses: Study of structured models for analysis of various bioprocess – compartmental models, models of cellular energetics and metabolism, single cell models, plasmid replication and plasmid stability model. Dynamic simulation of batch, fed batch, steady and transient culture metabolism.

UNIT-V BIOREACTOR CONSIDERATION IN ENZYME SYSTEMS**(10)**

Bioreactor consideration in enzyme systems: Analysis of film and pore diffusion effects on kinetics of immobilized enzyme reactions; formulation of dimensionless groups and calculation of effectiveness factors. Design of immobilized enzyme reactors – packed bed, fluidized bed and membrane reactors.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Anton Moser	Bioprocess Technology, Kinetics and Reactors	Springer Verlag	1988
2	James E. Bailey & David F. Ollis	Biochemical Engineering Fundamentals	McGraw- Hill	1986
3	Shuler and Kargl	Bioprocess Engineering	Prentice Hall	1992

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James M. Lee	Biochemical Engineering	PHI	1991
2	EMT.EL- Mansi.CFA.Bryce, A.L.Demain, AR.Allman	Fermentation Microbiology And Biotechnology	CRC Press	2011
3	Harvey W. Blanch, Douglas S. Clark	Biochemical Engineering	CRC Press	2014

Course Objectives

- To understand the knowledge on enzyme mechanism of action.
- To explain the production & purification of enzymes.
- To explain about the kinetics of single substrate enzyme action
- To understand the kinetics of multi substrate enzyme action
- To illustrate on immobilization and applications.
- To understand the features of enzyme biosensors and its application.

Course Outcomes

1. Discuss the overview of enzyme mechanism of action.
2. Outline the knowledge on extraction, purification and characterization of enzymes.
3. Understand the kinetics of multi substrate enzyme action.
4. Interpret the various enzyme immobilization techniques and its application in bioreactor.
5. Summarize the basics of enzyme engineering.
6. Explain the features of enzyme biosensors and its application.

UNIT-I INTRODUCTION TO ENZYMES**(9)**

Chemical nature, apoenzyme, coenzyme, cofactor, prosthetic group. Nomenclature – IUB system of classification - Six main classes with examples. Mechanisms of enzyme action; Specificity, type of enzyme specificity, Active site, Models of enzyme action – Lock and key, induced fit, transition state theory. metal ion catalysis, proximity & orientation. metal-activated enzyme and metalloenzyme.

UNIT- II EXTRACTION, PURIFICATION AND CHARACTERIZATION OF ENZYMES (9)

Production and purification of crude enzyme extracts from plant, animal and microbial sources; methods of characterization of enzymes; development of enzymatic assays,

UNIT- III KINETICS OF MULTISUBSTRATE - ENZYME ACTION**(9)**

Kinetics of Single substrate reaction – estimation of Michaelis-Menten parameters and Multisubstrate reactions mechanisms; Turnover number; types of inhibition Allosteric regulation of enzymes, Monod - Changeux - Wyman model, pH and temperature effect on enzymes & deactivation kinetics.

UNIT- IV ENZYME IMMOBILIZATION**(9)**

Physical and chemical techniques for enzyme immobilization – adsorption, matrix entrapment, encapsulation, cross-linking, covalent binding etc., - examples, applications, advantages and disadvantages. applications. Immobilised enzyme bioreactors.

UNIT- V ENZYME ENGINEERING AND BIOSENSORS

(9)

Chemical and genetic methods, Property alteration, Prediction of enzyme structure, design and construction of novel enzymes; Classification and Design of enzyme biosensors. Application of enzyme biosensor in industry, healthcare, food and environment.

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Palmer, T	Enzymes	Affiliated East West Press pvt. Ltd	2004
2	Wiseman	Enzyme Biotechnology	Ellis Horwood Publishers	1995
3	Chaplin and Bucke	Enzyme Technology	Cambridge University Press	1990
4	Price and Stevens	Fundamentals of Enzymology	Oxford University Press	2002

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	H. W. Blanch and D. S. Clark	Biochemical Engineering	Marcel Dekker, Inc.	1996
2	J. E. Bailey and D. F. Ollis,	Biochemical Engineering Fundamentals	McGraw Hill	1986
3	E. K. Pye and L. B. Wingard	Enzyme Engineering II,	Plenum Press	1974

Course Objectives

- To understand the basics of operating systems and biological databases.
- To explain the various methods for analysis of DNA, RNA and protein sequences.
- To explain the dynamic programming approach and methods of pair wise alignment.
- To explain the multiple sequence alignment techniques for analysis.
- To understand the machine learning techniques and protein structure analysis.
- To understand the basics on available tools and databases for performing research in bioinformatics.

Course Outcomes

1. Illustrate the basics of operating systems and biological databases.
2. Analyze the DNA, RNA AND protein sequences using common databases.
3. Discuss the different algorithms for the pairwise sequence analysis
4. Outline the various biological databases used for multiple sequence alignment.
5. Summarize the machine learning techniques and various techniques for protein structure analysis.
6. Understand the use of bioinformatics tools for research.

UNIT-I INTRODUCTION TO BIOLOGICAL DATABASES (9)

Introduction- types, Biological databases, Information Retrieval from Biological Databases: for example Nucleic acid databases: Genbank, Protein Databases- Swissprot, Sequence Formats, Sequence storage, Sequence submission to sequence Database.

UNIT-II ANALYZING DNA, RNA AND PROTEIN SEQUENCES IN DATABASES (9)

Introduction to biological databases and database technology, Genbank: organisms in Genbank, genomic DNA databases, cDNA databases corresponding to expressed genes, Expressed sequence tags, Sequence tagged sites, Genome survey sequences, High throughput genomic sequence

UNIT-III PAIRWISE SEQUENCE ALIGNMENT**(9)**

Alignment Types: Local alignment, Global alignment, Scoring matrices- PAM, BLOSUM, Gaps, Dot Plots. Dynamic programming Approach: Needleman and Wunsch Algorithm, Smith and waterman Algorithm, Heuristic Approach: BLAST, FASTA

UNIT-IV MULTIPLE SEQUENCE ALIGNMENT**(9)**

Exhaustive Algorithm- Divide and Conquer alignment, Heuristic Algorithm: Progressive Alignment- ClustalW Tcoffee, Iterative Alignment- PRRN, Block based method- Match-Box, DIALIGN2

UNIT-V INTRODUCTION TO PROTEIN STRUCTURE PREDICTION**(9)**

Secondary structure prediction for Globular and Trans-membrane proteins, 3D Protein structure file format: PDB, mmCIF, MMDB, Methods of Tertiary structure prediction: Threading and fold recognition methods, Homology modeling, Fold recognition databases.

TEXT BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayme	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley- Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

Course Objectives

- To understand chemical engineering principles and its operations.
- To understand the concept of pressure drops in pipes
- To understand the concept of pressure drops in different reactors.
- To understand the concept of filtration and heat transfer.
- To explain the different separation techniques.
- To understand the process involved in leaching

Course outcomes

Students undergoing this course will be able to

1. Outline the chemical engineering principles and operations.
 2. Calculate the flow measurements and pressure drop in pipes and different reactors.
 3. Analyze the process of filtration and heat transfer.
 4. Perform the distillation and extraction.
 5. Demonstrate the process involved in adsorption equilibrium.
 6. Demonstrate the process involved in leaching
-
1. Flow measurement and Pressure drop in pipes.
 2. Pressure drop across Fluidized bed.
 3. Pressure drop across packed column
 4. Continuous rotary filtration
 5. Heat exchanger
 6. Simple and steam distillation
 7. Liquid-liquid equilibria in extraction
 8. Adsorption equilibrium
 9. Leaching

Course Objectives

- To perform the NCBI database search.
- To understand the usage of BLAST for similar DNA sequence search.
- To predict the nucleotide and protein sequence using various database.
- To perform the gene prediction.
- To understand the protein sequence analysis tools.
- To build the phylogenetic tree

Course Outcomes

1. Discuss the database search through NCBI.
2. Perform the similar DNA sequence search using BLAST.
3. Identify the nucleotide and protein sequence.
4. Demonstrate the experiment to predict the genes.
5. Tell the method to build the phylogenetic tree.
6. Interpret the protein sequence using analysis tools.

1. NCBI database.
2. BLAST – Similar DNA sequences search
3. EMBL – Nucleotide sequence database
4. SWISSPROT/TREMBL – Protein sequence database
5. Analysis of Protein sequence using PIR database
6. Analysis of structural features of proteins using protein data bank and SWISS PDB viewer
7. Eukaryotic gene prediction
8. Phylogenetic tree.
9. Protein sequence analysis tools
10. Multiple sequence alignment

Course Objectives

- To understand the concept of thermal death kinetics.
- To understand the concept of batch sterilization.
- To predict the design for media components using Plackett Burman and RSM.
- To perform the batch cultivation and practice k_{La} estimation methods.
- To understand the procedure to calculate the residence time distribution.
- To demonstrate enzyme kinetics and enzyme immobilization techniques.

Course Outcomes

1. Evaluate the thermal death kinetics.
2. Perform the batch sterilization batch cultivation.
3. Identify and perform media optimization using Plackett Burman and RSM.
4. Demonstrate the different k_{La} estimation methods.
5. Perform the experiment on residence time distribution.
6. Interpret enzyme kinetics and enzyme immobilization techniques.

1. Thermal death kinetics
2. Batch sterilization design
3. Media designing using Plackett Burman and RSM
4. Batch cultivation, estimation of k_{La} – dynamic gassing method
5. Batch and Fed batch cultivation
6. Estimation of k_{La} – sulphite oxidation method
7. Estimation of k_{La} – power correlation method
8. Residence time distribution
9. Enzyme kinetics – Michaelis Menten parameters.
10. Enzyme immobilization

OBJECTIVES

- To equip the students for effective technical presentation
- To improve body language and posture for effective public speaking.

During the seminar session each student is expected to prepare and present a topic on biotechnology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present seminars. A faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews.

Course Objectives

- To understand the basics of molecular diffusion and mass transfer concepts.
- To explain the gas absorption and its related concepts.
- To explain the various vapour liquid operations and its concepts.
- To understand the HETP, HTU and NTU concepts.
- To outline the extraction and leaching principles.
- To outline the Solid Fluid operations.

Course Outcomes

1. Discuss the molecular diffusions and mass transfer operation in different system.
2. Outline the absorption principles and its concepts for gas liquid operations.
3. Infer the basic concept of equilibria and distillation concepts in vapour liquid operations.
4. Understand the HETP, HTU and NTU concepts.
5. Interpret the equilibria of different systems in extraction and leaching operations.
6. Outline the concepts of adsorption and drying in solid – fluid operations.

UNIT- I DIFFUSION AND MASS TRANSFER (9)

Molecular diffusion in fluids and solids; Inter phase Mass Transfer; Mass Transfer coefficients; Analogies in Transport Phenomenon.

UNIT- II GAS LIQUID OPERATIONS (9)

Principles of gas absorption; Single and Multi component absorption; Absorption with chemical reaction; Design principles of absorbers; Industrial absorbers; HTU, NTU concepts.

UNIT- III VAPOUR LIQUID OPERATIONS (9)

V-L Equilibria; Simple, Steam and Flash Distillation; Continuous distillation; McCabe- Thiele & Ponchon-Savarit Principles; Industrial distillation equipments, HETP, HTU and NTU concepts.

UNIT- IV EXTRACTION OPERATIONS (9)

L-L equilibria, Staged and continuous extraction, Solid-liquid equilibria, Leaching principles.

UNIT- V SOLID FLUID OPERATIONS (9)

Adsorption equilibria – Batch and fixed bed adsorption; Drying-Mechanism-Drying curves -Time of Drying; Batch and continuous dryers.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Treybal R.E.	Mass Transfer Operations	McGraw-Hill,	1981
2	Geankoplis C.J.	Transport Processes and Unit Operations	Prentice Hall	2002
3	Coulson and Richardson	Chemical Engineering Vol. I & II	Asian Books Pvt Ltd	1998

Course Objectives

- To understand the foundation and advanced information on biopharmaceutical aspects in relation to drug development.
- To understand the basics of pharmacokinetics.
- To discuss the drug manufacturing, process and its application.
- To explain the manufacture of solid dosage forms of drugs.
- To understand the manufacture process of liquid orals and topical.
- To discuss the legal steps involved in progressing a new drug to market.

Course Outcomes

1. Illustrate the different pharmaceutical parameters for the current and future biotechnology related products on the market.
2. Outline the concepts of Pharmacokinetics.
3. Infer the basic knowledge on drug process, manufacturing methods and its application.
4. Discuss about the solid dosage forms of drug manufacturing.
5. Explain the manufacturing process of liquid orals and topical.
6. Interpret the legal steps involved in progressing a new drug to market.

UNIT- I INTRODUCTION**(7)**

History of pharmacy, pharmacopeia, monograph, types of various dosage forms, economics and regulatory aspects.

UNIT- II BASICS OF PHARMACOKINETICS**(10)**

Mechanism of drug action; physico-chemical properties and principles of drug metabolism; pharmacokinetics.

UNIT- III MANUFACTURE OF DRUGS, PROCESS AND APPLICATIONS**(9)**

Types of reaction process and special requirements for bulk drug manufacture.

UNIT- IV MANUFACTURE OF SOLID DOSAGE FORMS**(9)**

Compressed tablets; dry and wet granulation; slugging or direct compression; tablet presses; coating of tablets; capsule preparation.

UNIT- V MANUFACTURE OF LIQUID ORALS AND TOPICALS**(10)**

Oral liquids – vegetable drugs – topical applications; preservation of drugs; analytical methods and other tests used in drug manufacture; packing techniques; quality management; GMP.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	David B. Troy, Paul Beringer	Remington: The science and practice of pharmacy	Lippincott Williams & Wilkins	2006
2	Gareth Thomas	Medicinal Chemistry. An introduction	John Wiley	2000
3	Katzung B.G.	Basic and Clinical Pharmacology	Prentice Hall of Intl	1995

Course Objectives

- To understand the basic concepts in rDNA technology.
- To explain the importance of recombinant molecules in rDNA technology.
- To understand the gene libraries construction and to perform blottings.
- To outline the concepts involved in gene library construction and differentiate between different gene libraries.
- To explain about the different types of PCR, the main concept in genetic engineering.
- To understand the vast applications of rDNA technology in diverse fields.

Course Outcomes

1. Discuss the knowledge on the basics of rDNA technology.
2. Outline the usage of recombinant molecules in research and development.
3. Understand gene libraries construction and to perform blottings.
4. Interpret the in-depth knowledge acquired to perform PCR reactions and their types.
5. Infer the importance of DNA sequencing methods.
6. Summarize the concept of rDNA technology and its importance in cloning, gene therapy and relate its applications.

UNIT-I BASICS OF RECOMBINANT DNA TECHNOLOGY (6)

Role of genes within cells, genetic elements that control gene expression, restriction and modifying enzymes, safety guidelines of recombinant DNA research.

UNIT-II CREATION OF RECOMBINANT MOLECULES (9)

Creation of recombinant molecules: Restriction mapping, design of linkers and adaptors. Characteristics of plasmid and phage vectors, prokaryotic and eukaryotic expression vectors. Insect, Yeast and Mammalian vectors.

UNIT-III CONSTRUCTION OF LIBRARIES (10)

Construction of cDNA and genomic libraries. Screening of libraries with DNA probes and with antisera. Cloning : Characterization of recombinant clones by southern, Northern, western and PCR analysis.

UNIT-IV POLYMERASE CHAIN REACTION (10)

Polymerase chain reaction: Inverse PCR, Nested PCR, Taqman assay, RT - PCR, RACE PCR, RAPD, site directed mutagenesis, methods of nucleic acid sequencing- Sangers method, (Kunkel's Method).

UNIT-V APPLICATIONS OF RECOMBINANT DNA TECHNOLOGY (10)

Applications of recombinant DNA Technology: Cloning in plants, Ti plasmid, transgenic and knockout animals, gene therapy.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Old RW, Primrose SB	Principles of Gene Manipulation, An Introduction To Genetic Engineering	Blackwell Science Publications	1993

2	Ansabel FM, Brent R, Kingston RE, Moore DD.	Current Protocols In Molecular Biology	Greene Publishing Associates	1988
----------	---	---	------------------------------------	------

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Berger Sl, Kimmer AR	Methods In Enzymology	Academic Press	1987

INTENDED OUTCOMES:

- To know the fundamentals of cost analysis and economics.
- To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.
- To make the students to understand capital market, break even point analysis and depreciation

UNIT- I FUNDAMENTALS OF ENGINEERING ECONOMICS

Introduction to Engineering Economics – Definition and Scope – Significance of Engineering Economics- Demand and supply analysis-Definition – Law of Demand – Elasticity of Demand – Demand Forecasting. Supply – Law of supply – Elasticity of Supply.

UNIT- II FINANCIAL MANAGEMENT

Objectives and functions of financial management – financial statements, working capital management – factors influencing working capital requirements – estimation of working capital. Capital budgeting - Need for Capital Budgeting – Project Appraisal Methods - Payback Period – ARR – Time Value of Money.

UNIT- III CAPITAL MARKET

Stock Exchanges – Functions – Listing of Companies – Role of SEBI – Capital Market Reforms. Money and banking - Money – Functions – Inflation and deflation – Commercial Bank and its functions – Central bank and its functions.

UNIT- IV NEW ECONOMIC ENVIRONMENT

National Income – concepts – methods of calculating national income - Economic systems, Economic Liberalization – Privatization – Globalization. An overview of International Trade – World Trade Organization – Intellectual Property Rights.

UNIT- V COST ANALYSIS AND BREAK EVEN ANALYSIS

Cost analysis - Basic cost concepts – FC, VC, TC, MC – Cost output in the short and long run. Depreciation - meaning – Causes – Methods of computing Depreciation (simple problems in Straight Line Method, Written Down Value Method). Meaning – Break Even Analysis - Managerial uses of BEA.

TEXT BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Ramachandra Aryasri .A, and V. V.Ramana Murthy	Engineering Economics & Financial Accounting	Tata McGraw Hill,–,New Delhi	2007
2	Varshney R. L., and K.L Maheshwari	Managerial Economics	Sultan Chand & Sons, New Delhi	2001

REFERENCE BOOKS:

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	M.L.Jhingan	Principles of Economics	Konark Publications	2010
2	Prasanna Chandra	Fundamentals of Financial Management	Tata McGraw Hill, New Delhi.	2007
3	D.M.Mithani	Money, Banking, International Trade & Public Finance	Himalaya Publishing House	2004

WEBSITES:

1. <http://economictimes.indiatimes.com>
2. <http://www.economist.com/>
3. <http://www.managementstudyguide.com/financial-management.htm>

Course Objectives

- To understand the wet granulation method for granules preparation.
- To explain the dry and wet granulation protocol for tablet preparation.
- To predict the steps for the analysis of tablets for its quality control.
- To perform the preparation of liquid orals-syrup.
- To understand the procedure for the preparation of topical formulations.
- To illustrate the assay techniques for tablets and injection..

Course Outcomes

1. Perform the granules preparation using wet granulation method.
2. Experiment the tablet preparation using wet and dry granulation techniques.
3. Identify the quality of tablets using different analysis.
4. Demonstrate the protocol for liquid-orals syrup preparation.
5. Perform the assay for riboflavin tablets.
6. Interpret dextrose injection using basic assays.

1. Preparation of granules by wet granulation
2. Preparation of Tablets by wet and dry granulation
3. Quality control test for tablets
4. Preparation of liquid orals-syrup
5. Preparation of topical preparation-lotion, ointment, cream
6. Assay of Riboflavin tablets
7. Assay of Dextrose Injection

Course Objectives

- To outline and evaluate the methods for preparation of plasmid DNA from plant and animal samples.
- To explain the protocol to run the agarose gel electrophoresis for DNA sample elution.
- To demonstrate the DNA ligation and digestion techniques.
- To understand the methods involved in optimization protocol for recombinant protein expression.
- To explain the importance of high throughput screening, SDS PAGE and PCR.
- To understand the basic techniques for DNA analysis.

Course Outcomes

1. Carry out agarose gel electrophoresis and isolation of DNA samples individually.
2. Develop the knowledge of techniques involved in DNA isolation and purification.
3. Perform the restriction enzyme digestion and ligation of DNA samples.
4. Produce recombinant DNA and implement blue white screening techniques to screen them.
5. Develop methods to produce recombinant proteins and understand their applications and perform SDS PAGE and PCR reactions.
6. Summarize the DNA properties from various sources.

1. Preparation of plasmid DNA.
2. Elution of DNA from agarose gels.
3. Restriction enzyme digestion
4. Ligation of DNA into expression vectors.
5. Transformation.
6. Optimization of inducer concentration for recombinant protein expression.
7. Optimization of time of inducer for recombinant protein expression.
8. SDS-PAGE
9. PCR.

15BTBT651 COMPUTATIONAL RESOURCES FOR DRUG DISCOVERY 1101 100

Course Objectives

- To explain the selection of lead and target molecule in drug discovery
- To explain the protocol to optimize the target and lead molecule in drug discovery.
- To infer the knowledge on basic properties of drug in the human system.
- To understand the ADME concept of drug molecules.
- To perform the receptor – ligand interactions in biological samples.
- To experiment the enzyme – inhibitor reactions for biological samples.

Course Outcomes

1. Carry out target and lead molecule selection.
2. Determine the perfect procedure for optimizing lead and target molecules.
3. Summarize the basic properties of drug in the human system.
4. Explain the ADME role of drug molecules inside the body.
5. Develop methods to study receptor-ligand interactions.
6. Perform the enzyme – inhibitor interactions in developing drugs.

UNIT-I DRUG DISCOVERY

Choosing a therapeutic area, choosing a drug target, bioassay, lead molecule, lead optimization

UNIT-II DRUG-LIKE MOLECULES

Lipinski's rule of five, Lipophilicity, Log P vs Log D, ADME

UNIT-III LABORATORY EXERCISES

Receptor-Ligand interactions, Enzyme-inhibitor interactions

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Lemki, T. L., Williams, D. A., Roche, V. G., Zito S. W.	Foye's Principles of Medicinal Chemistry	Lippincot Williams and Wilkins	2013

15BTBT681

MINI PROJECT

0 0 2 1 100

OBJECTIVES

- | |
|---|
| <ul style="list-style-type: none">• To provide exposure in practical aspects• To equip the students to meet the industry standards |
|---|

The students will be directed to do a project work during VI semester and their projects will be evaluated for, forty percentages for Continuous Internal Assessment and sixty percentage for End Semester Examination.

End Semester Examination evaluation will be based on the report submitted by the student after the completion of the project work.

Course Objectives:

- To create an awareness on Engineering Ethics
- To incorporate Moral and Social Values and Loyalty
- To appreciate the rights of other
- To motivate the leadership skills
- To train to become an entrepreneur
- To learn the management skills

Course Outcomes:

1. Explain the engineering ethics
2. Outline the Moral and Social Values and Loyalty
3. Justify the rights of other
4. Illustrate the values of leadership skills
5. Assess the skills of entrepreneur
6. Discuss the management skills

UNIT I MANAGEMENT, PLANNING, AND ORGANISING

Definition of Management – Management and Administration – Contribution of Taylor and Fayol – Functions of Management – Steps involved in Planning – Objectives – Setting Objectives – Process of Managing By Objectives – Forecasting – Decision-making – Formal and informal organization – Organization Chart.

UNIT II DIRECTING AND CONTROLLING

Human Factors – Creativity and Innovation – Harmonizing Objectives – Leadership – Types of Leadership, Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Process of Communication – System and process of Controlling – Requirements for effective control – Control of Overall Performance – Direct and Preventive Control .

UNIT III ENGINEERING ETHICS

Senses of Engineering Ethics – variety of moral issues – types of inquiry – moral dilemmas – moral autonomy – Kohlberg's theory – Gilligan's theory – consensus and controversy – Models of Professional Roles – theories about right action – Self-interest – customs and religion – uses of ethical theories.

UNIT IV FACTORS OF CHANGES

Forces that shape culture, social control – Meaning, Agencies, Institution, Customs, Values, Folkways, Norms and Laws. Social changes – Meaning and nature – Theories.

UNIT V ENTREPRENEURSHIP AND MOTIVATION

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur

– Entrepreneurship in Economic Growth – Major Motives Influencing an Entrepreneur –

Achievement Motivation Training, self rating, Business Game, Thematic Apperception Test

– Stress management, Entrepreneurship Development Programs – Need, Objectives.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harold Koontz and Heinz	Essentials of Management	Tata McGraw–Hill, New Delhi.	1998
2	S. S. Khanka	Entrepreneurial Development	S.Chand and Co. Ltd., New Delhi	1999

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Tripathy P.C and P.N.Reddy	Principles of Management	Tata McGraw–Hill, New Delhi.	1999
2	JAF Stomer, R. E Freeman and Daniel R Gilbert	Management	Pearson Education, New Delhi.	2004
3	Fraidoon Mazda	Engineering Management	Addison Wesley, New Delhi	2001
4	John R Boatright	Ethics and the Conduct of Business	Pearson Education, New Delhi	2003
5	Charles E Harris, Michael S. Protchard a Michael J Rabins	Engineering Ethic Concepts and Cases	Wadsworth Thompson Learning, New Delhi	2000

WEBSITES

1. ethics.tamu.edu/ – United States
2. management.about.com/cs/generalmanagement/a/PlanOrg010603.htm

Course Objectives:

- To understand the importance of downstream processing and various cell disruption techniques.
- To discuss the various cell disruption techniques for product release.
- To explain the physical methods of separation.
- To understand the methods for the isolation of products.
- To understand the methods for the purification of the bioproducts.
- To explain the various methods for final product formulation and finishing operations.

Course Outcomes:

1. Outline the principles involved in downstream processing and characteristics of biomolecules.
2. Discuss the various cell disruption techniques for product release.
3. Illustrate the different physical methods of separation of bioproducts.
4. Relate and apply the methods available for the isolation of products.
5. Discuss the techniques used for the product purification.
6. Outline the principles for the final product formulation and finishing operations.

UNIT-I DOWNSTREAM PROCESSING (9)

Introduction to downstream processing principles characteristics of biomolecules and bioprocesses. Cell disruption for product release – mechanical, enzymatic and chemical methods. Pretreatment and stabilization of bio-products.

UNIT-II PHYSICAL METHODS OF SEPARATION (9)

Unit operations for solid-liquid separation - filtration and centrifugation, flocculation and sedimentation

UNIT-III ISOLATION OF PRODUCTS (9)

Adsorption, liquid-liquid extraction, aqueous two-phase extraction, membrane separation, ultrafiltration and reverse osmosis, dialysis, precipitation of proteins by different methods.

UNIT-IV PRODUCT PURIFICATION (9)

Chromatography – principles, instruments and practice, adsorption, reverse phase, ion-exchange, size exclusion, hydrophobic interaction, bio-affinity and pseudo affinity chromatographic techniques.

UNIT-V FINAL PRODUCT FORMULATION AND FINISHING OPERATIONS (9)

Crystallization: principles, batch crystallizers, process crystallization of proteins; Drying: Principles, heat and mass transfers, dryers description, batch and continuous dryers, freeze and spray dryers in final product formulation.

Total Hours: 45 +15 = 60

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	P.A. Belter, E.L. Cussler And Wei-Houhu	Bioseparations – Downstream Processing For Biotechnology	Wiley Interscience Pub	1988
2	R.O. Jenkins, (Ed.)	Product Recovery In Bioprocess Technology – Biotechnology By Open Learning Series	Butterworth-Heinemann	1992

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	J.C. Janson And L. Ryden, (Ed.)	Protein Purification – Principles, High Resolution Methods And Applications	VCH Pub Press	1989
2	R.K. Scopes	Protein Purification – Principles And Practice	Narosa Pub	1994
3	Roger.G . Harrison , Paul Todd , Scott R.Rudge and Demetr P.Petrides	Bioseparation Science and Engineering	Oxford University Press	2003

Course objectives:

- To understand the basic knowledge of cells and organs of Immune system.
- To explain the different cellular responses and its functions.
- To understand the basic views on monoclonal antibodies and antigen- antibody interactions.
- To outline the Immune responses to various disease and different immunologic reactions in Human body.
- To explain the organ transplantation and tumor immunology.
- To outline the basics of autoimmunity.

Course outcomes:

1. Discuss the cells and components of immune system.
2. Explain the basics of B, T cells, genes and generation of antibody and its functions.
3. Infer the basic views on monoclonal antibodies and antigen- antibody interactions.
4. Discuss the concept of immunity and various immunological responses to infections.
5. Discuss the basics of Transplantation and tumor therapies.
6. To illustrate the current trends in treatment of autoimmune disease.

UNIT-I INTRODUCTION**(7)**

Cells of immune system, innate and acquired immunity, primary and secondary lymphoid organs, antigens, haptens, adjuvants, types of immune responses, theory of clonal selection.

UNIT-II CELLULAR RESPONSES**(10)**

Development, maturation, activation and differentiation of T-cells and B-cells: TCR, antibodies, structure and functions; antibodies: genes and generation of diversity; antigen-antibody reactions; monoclonal antibodies: principles and applications; antigen presenting cells; major histocompatibility complex; antigen processing and presentation; regulation of T-cell and B-cell responses.

UNIT-III INFECTION AND IMMUNITY**(11)**

Injury and inflammation; immune responses to infections: immunity to viruses, bacteria, fungi and parasites, cytokines, complement, immunosuppression, tolerance, allergy and hypersensitivity, resistance and immunization: Vaccines.

UNIT-IV TRANSPLANTATION IMMUNOLOGY**(10)**

Transplantation: genetics of transplantation, laws of transplantation, problems in transplantation: Basis of Graft rejection, specificity and memory of graft rejection; Role of cell mediated response in graft rejection, Transplantation antigens, Mechanisms involved in Graft rejections.

UNIT-V AUTOIMMUNITY**(7)**

Autoimmunity, Auto immune diseases and diagnosis, proposed mechanisms for induction of Autoimmunity, Treatment of Autoimmune diseases; current therapies, monoclonal antibody and diagnosis, treatment.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Roitt I, Male, Brostoff	Immunology	Mosby Publ	2002
2	Kuby J,	Immunology	WH Freeman &	2000
3	David W Mount	Bioinformatics: Sequence And Genome Analysis	cold Spring Harbor Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Ashim K. Chakravarthy	Immunology	Tata McGraw- Hil	1998

Course Objectives

- To illustrate the rate equation with different parameters.
- To explain the basic ideas on first order reaction in reactor design.
- To list the various functions of Non Ideal flow of fluidized bed.
- To label the basic theory of rate equation systems in heterogenous reactions.
- To develop a picture about rate controlling mechanism in solid catalyzed reaction.
- To understand the various biochemical reactions.

Course Outcomes

1. Summarize about the rate equation.
2. Determine the first order reaction in reactor design.
3. Express the functions of non ideal flow of fluidized bed.
4. Be aware of the conceptualization behind various rate equations in heterogenous systems.
5. Describe the various rate controlling mechanism in solid catalyzed reaction.
6. Summarize and predict the various reactions.

UNIT-I KINETICS OF HOMOGENOUS REACTIONS**(9)**

Concentration and temperature dependent term of rate equation – searching for mechanism–predictability of reaction rate from theory; Interpretation of batch reactor data – constant volume and variable volume batch reactors – temperature and reaction rate - development of rate equations for different homogeneous reactions (up to second order reactions both reversible and irreversible reactions).

UNIT-II REACTOR DESIGN**(9)**

Ideal batch reactors–steady state MFR & PFR – holding time for flow systems; Design for single reactions–performance equations for single reactors ; multiple reactor systems – PFR in series/ parallel – equal size and different size Mixed reactors in series; reactors of different types in series. Design for Multiple reactions (first order reactions only)

UNIT-III NON IDEAL FLOW**(9)**

RTD of fluid in vessel – relationship between F, C & E curve – conversion from tracer information; non-ideal flow models–Dispersion model and Tanks in series Model; Multi parameter models–models for fluidized beds.

UNIT-IV DESIGN FOR HETEROGENOUS SYSTEMS**(9)**

Rate equations – contacting patterns for two phase systems; fluid particle reactions – un reacted core model for spherical particles of unchanging size – rate of reaction for shrinking spherical particles – determination of rate controlling step – application to design; reactions steps; resistances and rate equations; Fluid–Fluid reactions – rate equations.

UNIT-V SOLID CATALYSED REACTIONS

(9)

Rate equation – rate controlling mechanisms – experimental methods for finding rates – product distribution in multiple reactions–application of design; Deactivating catalysts–mechanism–rate equation.

Total Hours: 45+15 = 60

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication s
1	Levenspiel O	ChemicalReactionEngineering.	JohnWiley	1999
2	FoglerH.S..	Elements of Chemical Reaction Engineering	Prentice Hall India	2002

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Missen R.W.,Mims C.A.,Saville B.A	Introduction to Chemical Reaction Engineering and Kinetics	John Wiley	1999

Course Objectives

- To illustrate the rate equation with different parameters.
- To explain the basic ideas on first order reaction in reactor design.
- To list the various functions of Non Ideal flow of fluidized bed.
- To label the basic theory of rate equation systems in heterogenous reactions.
- To develop a picture about rate controlling mechanism in solid catalyzed reaction.
- To understand the various biochemical reactions.

Course Outcomes

1. Summarize about the rate equation.
2. Determine the first order reaction in reactor design.
3. Express the functions of non ideal flow of fluidized bed.
4. Be aware of the conceptualization behind various rate equations in heterogenous systems.
5. Describe the various rate controlling mechanism in solid catalyzed reaction.
6. Summarize and predict the various reactions.

1. Protein Purification by isoelectric point precipitation.

2. Ammonium Sulphate precipitation.

3. Liquid – Liquid extraction.

4. Solid – Liquid extraction.

5. Crystallization.

6. Cell fractionation using centrifuge.

7. Drying of solid by heat source.

8. Dialysis

9. Purification of α – Amylase from *Bacillus*.

Course Objectives

- To discuss the handling techniques of animals and immunization.
- To understand the isolation and identification of cells and blood group.
- To explain the methods for the detection of antigen-antibody.
- To outline the techniques for antigen identification.
- To understand the techniques of T-cell rosetting.
- To understand the techniques of Western blotting.

Course Outcomes:

1. Infer the basic handling techniques for animal studies.
2. Outline the basics of isolation and identification of cells and blood group.
3. Illustrate the Immuno electrophoresis and Immuno diffusion for determination of antibody.
4. Understand the knowledge about ELISA and western blotting for identification of various diseases.
5. Explain the identification of typhoid antigens by Widal test.
6. Discuss principles of T-cell rosetting.

1. Handling of animals, immunization and raising antisera

2. Identification of cells in a blood smear

3. Identification of blood group

4. Immuno diffusion

5. Immuno electrophoresis

6. Testing for typhoid antigens by Widal test

7. Enzyme Linked Immuno Sorbent Assay (ELISA)

8. Isolation of peripheral blood mononuclear cells

9. Identification of T cells by T-cell rosetting using sheep RBC.

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Hay, F.C. and M.R. Westwood	Practical Immunology	Blackwell Science, Publishers	2004
2	Janeway, C.A., and P. Travers.	Immunobiology	Garland Publishing Inc.	1994
3	Kuby, J.	. Immunology	W.H. Freeman and Company	1994
4	Talwar, G. P. and S. K. Gupta,	A Handbook of Practical and Clinical Immunology. Vol 1 and	CBS Publications	1992
5	. Weir, D.M	Immunological Techniques	Blackwell Scientific Publications	1992

Course Objective

- To explain the basic concepts of natural product isolations.
- To explain the principles of chromatography.
- To discuss the applications of modern NMR.
- To understand the extraction process.
- To demonstrate the extraction and isolation of caffeine from tea leaves.
- To understand the concept of separation of bioactive compounds.

Course Outcome

- Outline the general concepts of bioproduct isolation from various natural sources.
- Elaborate the principles of chromatography.
- Summarize the applications of modern NMR.
- Outline the extraction process.
- Carry out the experiments related to extraction and isolation of caffeine from Tea Leaves.
- Discuss the concept of separation of bioactive compounds.

UNIT-I GENERAL CONCEPT OF NATURAL PRODUCT ISOLATION

Natural Product Isolation, Extraction of Plant Secondary Metabolites, Selecting General Separation Conditions, Principles of Chromatography, An Introduction to Planar Chromatography, Applications of Liquid Chromatography, Isolation of Natural Products by Low-Pressure Column Chromatography, Crystallization in Final Stages of Purification, Determination of the Nature of the Compound, Applications of Modern NMR Techniques in the Structural Elucidation, Identification and Characterization

UNIT-II LABORATORY- EXTRACTION AND ISOLATION OF CAFFEINE FROM TEA LEAVES

General background and overview of the experiment, Caffeine extraction: Solid-liquid Extraction, Overview of the extraction process, Purification, Isolation of caffeine from tea leaves

REFERENCES

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Satyajit D. Sarker, ZahidLatif, Alexander I. Gray	Methods in biotechnology: Natural products isolation	Springer	2005

DEPARTMENT ELECTIVES

Course Objectives

- To illustrate the genetic material and its biological significance in organization.
- To explain the basic ideas on structure and function on genetic material.
- To list the various functions of Nitrogen fixation.
- To label the basic theory of genes involved in the pathogenesis.
- To develop a picture about applications of plant biotechnology.
- To discuss the different stages of developments in gene analysis and its recombination.

Course Outcomes

1. Summarize about the importance of genetic material and its uses.
2. Determine the structure and function of the genetic material.
3. Express the functions of fixing nitrogen to soil through microbes.
4. Be aware of the conceptualization behind various genes involved in pathogenesis.
5. Describe the various functions and application of plant biotechnology through tissue culture.
6. Summarize and predict the different stages of developments in gene analysis and its recombination.

UNIT- I ORGANIZATION OF GENETIC MATERIAL (9)

Genetic material of plant cells – nucleosome structure and its biological significance; junk and repeat sequences; outline of transcription and translation.

UNIT II CHLOROPLAST & MITOCHONDRIA (9)

Structure, function and genetic material; rubisco synthesis and assembly, coordination, regulation and transport of proteins. Mitochondria: Genome, cytoplasmic male sterility and import of proteins.

UNIT- III NITROGEN FIXATION (9)

Nitrogenase activity, nod genes, nif genes, bacteroids.

UNIT- IV AGROBACTERIUM & VIRAL VECTORS (9)

Pathogenesis, crown gall disease, genes involved in the pathogenesis, Ti plasmid – t- DNA, importance in genetic engineering. Viral Vectors: Gemini virus, cauliflower mosaic virus, viral vectors and its benefits.

UNIT- V APPLICATION OF PLANT BIOTECHNOLOGY (9)

Outline of plant tissue culture, transgenic plants, herbicide and pest resistant plants, molecular pharming, therapeutic products.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Gamburg OL, Philips GC,	Plant Tissue & Organ Culture fundamental Methods	Narosa Publications	1995
2	Singh BD.	Text Book of Biotechnology	Kalyani Publishers	1998

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Heldt HW	Plant Biochemistry & Molecular Biology	Oxford University Press	1997
2	Ignacimuthu .S	Applied Plant Biotechnology	Tata McGraw-Hill	1996

Course Objectives

- To explain basic knowledge on biotech industries in various field.
- To demonstrate the various lab construction through new ventures.
- To construct various parameters of research and development in production of bio based products.
- To explain the case studies of different industries and their strategic planning.
- To outline the basic concepts of IPR and ethics in biotechnology.
- To discuss the different techniques for entrepreneurship in biotechnology.

Course Outcomes

1. Summarize the characteristics of different biotech industries.
2. Evaluate the different lab construction through new ventures.
3. List the various parameters of research and developmental techniques.
4. Explain the opportunities to know different industrial strategic plans.
5. Recognize basic concepts of IPR and ethics in biobased product production.
6. Identify and list different techniques for entrepreneurship in biotechnology.

UNIT I OVERVIEW OF BIOTECHNOLOGY INDUSTRIES (9)

Scope - Biotechnology Industries in India and Abroad - Fundamentals of Biotechnology for biobusiness - Trends and key issues in Biotechnology and devices industries - Technology basis in industry segment, emerging technologies and technical convergences issues.

UNIT II NEW VENTURE CREATION – ENTREPRENEURSHIP (9)

Plant tissue culture lab construction – Equipment, glassware and chemical requirements - techniques in culturing of plants. Export of tissue cultured plants to abroad – Vermiculture technology – Mushroom cultivation - single cell protein - Biofertilizer technology - production - Commercialization of R&D- Fermentation technology: Bakery, Dairy products.

UNIT III PRODUCT DEVELOPMENT (9)

Beer, wine and ethanol production using different sources– Enzyme: production, purification and characterization - Organic acids (Citric, lactic) production - Antibiotic production - Biogas technology - Azolla cultivation - Product development and project management, transition from R&D to business units. Institute– industry interaction and partnership/ alliances.

UNIT IV INTELLECTUAL PROPERTY, BIOETHICS AND LEGAL ISSUES (9)

Intellectual property rights in Biotech, Patent laws - Bioethics and current legal issues - Marketing and public perceptions in product development – Genetically modified products and organisms (Transgenic products) - Technology licensing and branding concerns.

UNIT V BIOBUSINESS PLANS

(9)

Healthcare, the Biomedical Sciences, agriculture and Agrobiotechnology. Transfer and business planning - Bank loan and finance strategy – Budget plan – licensing and Branding Concerns and Opportunities, Policy and regulatory Concerns and Opportunities Financial assistance for R&D projects and entrepreneurship. Corporate partners marketing – Model project: Case studies of different industries and their strategic planning.

Total Hours: 45

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Richard Oliver	The coming Biotech age: The business of Biomaterials	McGraw Hill Publications, New York	1999
2	Karthikeyan, S. and Arthur Ruf	Biobusiness	MJP Publications. Chennai, Indi	2009

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	GurinderShahi	BioBusiness in Asia: How countries Can Capitalize on the Life Science Revolution	Pearson Prentice Hall	2004
2	Ruth Ellen Bulger	The ethical dimensions of the Biological sciences	Cambridge University Press	1993

Course Objectives

- To explain the fundamentals of cancer biology
- To understand the principles of carcinogenesis
- To explain the principles of molecular cell biology
- To explain the principles of cancer metastasis
- To outline the different types of cancer therapy.
- To understand the molecular tools for cancer diagnosis.

Course Outcomes

At the end of the course students will be able to

1. Understand the fundamentals of cancer biology
2. Interpret the mechanism of carcinogenesis
3. Outline the principles of molecular cell biology
4. Understand the significance of cancer metastasis
5. Summarize the different types of cancer therapy
6. Recall the molecular tools of cancer diagnosis

UNIT I FUNDAMENTALS OF CANCER BIOLOGY (8)

Epidemiology of cancer: environmental factors: tobacco, alcohol, diet, occupational exposure, hormones. Regulation of cell cycle, modulation of cell cycle in cancer. Different forms of cancers. Specific type of cancer hepato cellular, melanoma, breast, lung cancer. Genetic basis of cancer- DNA repair. mutations that cause changes in signal molecules, signal switches.

UNIT II PRINCIPLES OF CARCINOGENESIS (9)

Theory of carcinogenesis, Chemical carcinogenesis, metabolism of carcinogenesis, principles of physical carcinogenesis, x- ray radiation-mechanisms of radiation carcinogenesis.

UNIT III PRINCIPLES OF MOLECULAR CELL BIOLOGY OF CANCER (10)

Signal targets and cancer, activation of kinases; tumor suppressor genes, Oncogenes, identification of oncogenes, Virus and cancers: DNA virus-retroviruses detection of oncogenes. Oncogenes/proto oncogene activity. Growth factors related to transformation. Telomerases.

UNIT IV PRINCIPLES OF CANCER METASTASIS (10)

Clinical significances of invasion, heterogeneity of metastatic phenotype, metastatic cascade, basement

membrane disruption, three step theory of invasion, proteinases and tumour cell invasion.

UNIT V CANCER THERAPY

(8)

Cancer screening and early detection, Detection using biochemical assays, tumor markers, molecular tools for early diagnosis of cancer. Advances in cancer detection. Different forms of therapy, chemotherapy, radiation therapy, immunotherapy, molecular therapy, use of signal targets towards therapy of cancer; Gene therapy.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Ian F.Tannock	The Basic Science of Oncology”	McGraw Hill Professional,	2005
2	Dunmock. N. J and Primrose S. B	Introduction to modern Virology,	Blackwell Scientific Publications, Oxford	1988
3	L.M. Franks, N.M. Teich	Introduction to the Cellular and Molecular Biology of Cancer	Oxford Medicine Publications	1991
4	Maly B. W. J	Virology a practical approach	IRL press, Oxford	1987
5	Ruddon, R. W.	Cancer Biology	Oxford University Press	1995

Course Objectives

- To illustrate the origin of developmental biology.
- To explain the basic ideas on specifications of germ layers.
- To list the various functions of vertebrates development by its differentiation.
- To discuss the basic theory of morphogenesis and organogenesis.
- To understand embryogenesis and its functions.
- To discuss the different stages of developmental biology.

Course Outcomes

1. Summarize about the cell commitment and differentiation in developmental biology.
2. Determine the postulation of germ cells and patterning of vertebrate body plan.
3. Express the functions of cell differentiation in vertebrate development.
4. Explain the conceptualization behind morphogenesis and organogenesis.
5. Describe the various functions and stages in embryogenesis.
6. Summarize and predict the different stages of developmental biology.

UNIT I INTRODUCTION**(8)**

Origins of developmental biology; Concepts in development – Developmental signals in cell division & differentiation; Role of gene expression in development; Identifying developmental genes, Cell commitment & differentiation; Determination & induction of cell fate, Concept of morphogen & positional information; Model vertebrate organisms: Mouse, Zebrafish, Model invertebrate organisms: *D. melanogaster*, *C. elegans*, Model plant: *A. thaliana*

UNIT II GERM CELLS AND PATTERNING THE VERTEBRATE BODY PLAN (9)

Genotypic & phenotypic sex-determination in mammals, *D. melanogaster* and *C. elegans*, Structure & Formation of germ cells, Fertilization; axes & germ layers; Setting up the body axes; the origin & specification of the germ layers.

UNIT III DEVELOPMENT OF VERTEBRATES**(10)**

Development of the Drosophila, Nematodes & Cellular Slime Molds: Body Plan; Specification of body axes & role of maternal genes; Polarization of body axes during oogenesis; Patterning, Segmentation- & role of pair-rule genes; cell differentiation and aggregation.

UNIT IV MORPHOGENESIS AND ORGANOGENESIS**(10)**

Morphogenesis; Kinds of cleavage & blastulation; Types of tissue movement in gastrulation; Gastrulation in amphibians & mammals; Neural tube formation & neural crest migration; Cell Differentiation & Organogenesis; Models of cell differentiation; Insect imaginal disc & wing development; metamorphosis.

UNIT V EMBRYOGENESIS

(8)

Plant development; Pattern development in early embryogenesis of angiosperms; floral development.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Scott F. Gilbert	Developmental Biology	Sinauer Associates,	2013
2	Arumugam. A	Developmental Biology	Saras Publications	1995

Course Objectives

- To explain descriptive views of fire and explosion.
- To illustrate Differentiating relief systems in various explosions.
- To descriminate various hazards and toxicity.
- To evaluate various spills and leakage of liquids.
- To interpret different situations of explosions and toxicity through case studies.
- To discuss the different global and local explosive issues.

Course Outcomes

1. Elaborate the concept of fire and explosion.
2. Learn and evaluate relief systems in various explosions.
3. Explain the hazards and toxicity in various situations.
4. Discuss the various spills and leakage preventive measures.
5. Identify basic views in different situations of explosions and toxicity.
6. Make up perspective techniques and create data on different global and local explosive issues.

UNIT I FIRE AND EXPLOSION

(9)

Introduction-Industrial processes and hazards potential, mechanical electrical, thermal and process hazards. Safety and hazards regulations, Industrial hygiene. Factories Act, 1948 and Environment (Protection) Act, 1986 and rules thereof.Shock wave propagation, vapour cloud and boiling liquid expanding vapours explosion (VCE and BLEVE), mechanical and chemical explosion, multiphase reactions, transport effects and global rates.

UNIT II RELIEF SYSTEMS

(9)

Preventive and protective management from fires and explosion-inerting, static electricity passivation, ventilation, and sprinkling, proofing, relief systems – relief valves, flares, scrubbers.

UNIT III TOXICOLOGY

(9)

Hazards identification-toxicity, fire, static electricity, noise and dust concentration; Material safety data sheet, hazards indices- Dow and Mond indices, hazard operability (HAZOP) and hazard analysis (HAZAN).

UNIT IV LEAKS AND LEAKAGES

(9)

Spill and leakage of liquids, vapors, gases and their mixture from storage tanks and equipment; Estimation of leakage/spill rate through hole, pipes and vessel burst; Isothermal and adiabatic flows of gases, spillage and leakage of flashing liquids, pool evaporation and boiling; Release of toxics and dispersion. Naturally buoyant and dense gas dispersion models; Effects of momentum and buoyancy; Mitigation measures for leaks and releases.

UNIT V CASE STUDIES

(9)

Flixborough, Bhopal, Texas, ONGC offshore, HPCL Vizag and Jaipur IOC oil-storage depot incident; Oil, natural gas, chlorine and ammonia storage and transportation hazards.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Crowl D.A. and Louvar J.F	Chemical Process Safety Fundamentals with Applications	Prentice Hall.	2001
2	Mannan S.	Lee's Loss Prevention in the Process Industries	Butterworth- Heinemann	2005

Course Objectives

- To explain the variations of renewable and nonrenewable energy and its usage.
- To classify the different sources for the production of biomass and bioenergy.
- To record the basic notion on assorted properties of fuels.
- To design the bioenergy production through agricultural wastes.
- To differentiate and organize the distinct agricultural wastes used for bioenergy production.
- To understand the basic theory of bioprocess principles.

Course Outcomes

1. Compare and contrast energy use as renewable and non-renewable energy.
2. Synthesize the biomass for renewable energy production.
3. Prioritize diverse properties of fuels.
4. Construct and design the bioenergy production through agricultural wastes.
5. Apply the knowledge on downstream processing for bioenergy production.
6. Examine and solve the problems related to bioenergy production.

UNIT I OVERVIEW OF ENERGY USE (9)

Fossil fuels - past, present & future, Remedies & alternatives for fossil fuels, Today's energy use, Fossil fuels and environmental impact, Renewable energy source and devices, Solar Energy, wind energy and hydro energy.

UNIT II BIOMASS AND BIO-ENERGY (9)

Biomass potential - terrestrial, aquatic and marine - collection- storage and utilization, Dedicated bioenergy crops, Woody biomass, Liquid biofuels, Synthetic fuels from the biomass, biomass to biofuel conversion, Alcohol production - cellulose degradation.

UNIT III PROPERTIES OF FUELS (9)

Fuel properties - alcohol, biogas, producer gas, vegetable oil. Combustion - air requirement – Octane and Cetane numbers. Analysis of products of combustion. Fuel blending - fuel efficiency in dual fuel operation, Biogas and producer gas engines.

UNIT IV AGRICULTURE AS BIOMASS (9)

Bioenergy from wastes, agricultural wastes and byproducts - sources and availability, utilisation pattern - as fuel, Biochemical conversion of organic wastes, anaerobic digesters, methane production - sludge treatment - suitability of wastes as fuel.

UNIT V DOWNSTREAM PROCESSING (9)

Introduction to downstream processing principles, characteristics of biomolecules and bioprocesses. Cell disruption for product release– mechanical, enzymatic and chemical methods, filtration, centrifugation, chromatography, esterification, pyrolysis.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Stout. B.A.	Biomass energy	Texas University Press, College Station	1985
2	Chahal.D.S	Food, Feed and Fuel from Biomass	Oxford & IBH Publishing Co. Pvt LTD.	1991

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Chakraverty, A	Biotechnology and other alternate technologies for utilisation of biomass	Oxford and IBH publising Co., New Delhi	1993.
2	Donald. L.Klass and Emert H. George	Fuels from Biomass and wastes	AnnArbo Science Publishers, Inc. Michigan	1981.
3	Chavla, O.P	Advances in Biogas Technology	ICAR Pub	1986

Course Objectives

- To define the basic view of tissue culture techniques.
- To illustrate the breeding of farm animals.
- To propose an opinion on transgenic animal technology.
- To explain the characterization techniques for bacterial and viral diseases in animals.
- To justify the basic concept on recombinant cytokines.
- To discuss the diverse techniques on animal cell culturing and its mechanism.

Course Outcomes

1. Identify the different views on tissue culturing.
2. Differentiate various breeding farm animals.
3. Illustrate the concept behind transgenic animal technology.
4. Evaluate the bacterial and viral diseases that attack animals.
5. Analyze and categorize the best approach on recombinant cytokines.
6. Discuss the diverse techniques on animal cell culturing and its mechanism.

UNIT I ANIMAL CELL CULTURE (10)

Introduction to basic tissue culture techniques, equipments and instruments in ATC - chemically defined and serum free media - animal cell cultures - maintenance and preservation – various types of cultures; suspension cultures - continuous flow cultures - immobilized cultures – somatic cell fusion - organ cultures.

UNIT II ANIMAL DISEASES AND THEIR DIAGNOSIS (9)

Bacterial and viral diseases in animals - monoclonal antibodies – diagnosis - molecular diagnostic techniques; PCR - in-situ hybridization - northern -southern blotting - RFLP.

UNIT III THERAPY OF ANIMAL DISEASES (9)

Recombinant cytokines – therapeutic applications of monoclonal antibody, vaccines - DNA, sub unit, cocktail vaccines - gene therapy for animal diseases

UNIT IV MICROMANIPULATION OF EMBRYOS (9)

Micromanipulation technology - equipments - enrichment of x and y bearing sperms from semen samples - artificial insemination - germ cell manipulations – In vitro fertilization - embryo transfer - micromanipulation technology and breeding of farm animals.

UNIT V TRANSGENIC ANIMALS (8)

Concepts of transgenic animal technology; strategies for the production of transgenic and knock out animals– significance in biotechnology - stem cell cultures and induced pluripotent stem cells in the production of transgenic animals.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Masters J.R.W	Animal Cell Culture: Practical Approach	Oxford University Press	2000

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Ranga M.M.	Animal Biotechnology	Agrobios India Limited	2002
2	Ramadass P, Meera Rani S	Text Book Of Animal Biotechnology	Akshara Printers	1997

Course Objectives

- To explain the electromagnetic wave properties.
- To discuss the functional properties of infrared spectroscopy.
- To propose an idea on the instrumentation and physical properties of mass spectrometry.
- To illustrate the electron spin detection through NMR.
- To define the scattering mechanism of X-Ray diffraction.
- To interpret the biological samples functional and physical properties using different advanced analytical instruments.

Course Outcomes

1. Define the wave properties of EMR in spectroscopy.
2. Discuss the basic functional and physical properties of molecules through infrared spectroscopy.
3. Outline the instrumentation and molecule properties using mass spectrometry.
4. Evaluate the molecules structure and properties through NMR.
5. Analyze the molecules for its structural properties using X-Ray diffraction.
6. Summarize the mechanism of various advanced analytical instruments.

UNIT I SPECTROSCOPY (8)

Interaction of radiation with matter, Definition frequency, Wave number, types of electromagnetic radiation, interparticle forces and energies, energy levels. Population of energy levels, Scattering, Absorption and Emission.

UNIT II INFRARED SPECTROSCOPY (9)

Measurement of Infrared spectrum-Physical basis of infrared spectra, Infrared of Polyatomic molecules, biological examples, infrared of oriented samples.

UNIT III MASS SPECTROMETRY (9)

Ion sources sample introduction – mass analyzers and ion detectors – biomolecule mass spectrometry – peptide and protein analysis – carbohydrates and small molecule – specific applications.

UNIT IV NUCLEAR MAGNETIC RESONANCE (10)

Chemical shifts – spin – spin coupling – relaxation mechanisms – nuclear overhauser effect – multidimensional NMR spectroscopy – determination of macromolecular structure by NMR – magnetic resonance imaging.

UNIT V X-RAY DIFFRACTION

(9)

Scattering by x-rays-diffraction by a crystal – measuring diffraction pattern – Bragg reflection – unit cell – phase problem – anomalous diffraction – determination of crystal structure – electron and neutron diffraction.

Total Hours: 45

TEXTBOOK

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Campbell I.D and Dwek R.A.	Biological Spectroscopy	Benjamin Cummins and Company	1986.

REFERENCE BOOK

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Atkins P.W	Physical Chemistry	Oxford IV Edition	1990

Course Objectives

- To identify the basic structural principles of protein.
- To classify the different techniques of mutagenesis in bioimprinting.
- To record the basic notion on enzyme engineering and protein purification.
- To differentiate and organize the distinct metagenomics and ecosystem biology.
- To explain the basic theory of protein engineering in industries.
- To examine the problems related to engineering enzymes.

Course Outcomes

1. Compare and contrast structural and functional properties of proteins.
2. Summarize the diverse techniques of mutagenesis.
3. Prioritize diverse methods for protein purification.
4. Construct and design the techniques of metagenomics and ecosystem biology.
5. Apply the knowledge on applications of protein engineering in industries.
6. Examine and solve the problems related to engineering enzymes.

UNIT- I BASIC STRUCTURAL PRINCIPLES OF PROTEINS (9)

Amino Acids properties (size, solubility, charge, pKa), Kyle-Doolittle (Hydropathy) Index; Peptides as building blocks of proteins; Torsional (dihedral) angles, Ramachandran Plot; Secondary Structures of proteins; Loops – Types and Functions; Biosynthesis and chemical synthesis of Peptides. Lesk, Richardson and Topology Schematics

UNIT- II TECHNIQUES OF MUTAGENESIS (9)

Rational Design, Non rational design , Mutagenesis library construction- Chemical, Staggered Extension, Random Elongation, Random priming, Error prone PCR , Impact of structure analysis and prediction- structure and modeling, role of biocomputing, denova design, Effect of protein conformation and bioimprinting.

UNIT- III ENGINEERING ENZYMES (9)

Engineering stability (*Bacillus subtilis* natural protease, *Pseudomonas* isoamylase, carbamylase from *Agrobacterium radiobacter*), specificity and features to ease protein purification, Engineering antibodies- Engineering signal molecules (hormones/ receptors), Engineering protein to facilitate recovery. Affinity purification (Strep-Tag)

UNIT- IV METAGENOMICS (9)

Metagenomics and ecosystems Biology- conceptual framework, tools and methods- Analyses of metagenomics, Single gene approach, Targeted partial metagenome sequencing, Analyses of metatranscriptome- Limitation in analysing the metatranscriptome- 16s rRNA sequencing and metatranscriptome pyrosequencing, metaproteome-molecular methods to study complex microbial communities, metabolomics- metabolome of an ecosystem and metagenomics.

Metabolomics for natural product perception

UNIT-V PROTEIN ENGINEERING IN INDUSTRIES

(9)

Protein engineering for industrial enzymology, Biosensor- chemically engineered electronic protein, genetically fused protein, Gene engineering for molecular networking and protein assembly; molecular bioscreening in oncology- mechanism based drug discovery. Protein engineering in vaccine development.

Total Hours: 45

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Lilia Alberghina	Protein Engineering in Industrial Biotechnology	Harwood Academic publications	2005
2	P. C. E. Moody and A. J. Wilkinso	Protein Engineering	IRL Press, Oxford	1990
3	Karen E. Nelson	Metagenomics of Human Body	Springer	2010

REFERENCES BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	T. E. Creighton	Proteins, Structure and Molecular properties	Freeman W. H & Company	1993
2	C. Branden and J. Tooze	Introduction to Protein Structure	Garland Publications	1999

Course Objectives

- To define the basic view of infectious diseases in host microbe interactions.
- To illustrate the diverse host defense mechanism and pathogenic strategies.
- To propose an opinion on molecular pathogenesis.
- To explain the characterization techniques for host pathogen interactions.
- To understand the basic concept on modern approaches to control pathogens.
- To explain the diverse pathogens and its controlling measures.

Course Outcomes

1. Identify different views on host microbe interactions.
2. Differentiate various host defense mechanisms.
3. Illustrate the concept behind molecular pathogenesis.
4. Evaluating and characterizing host pathogen interactions.
5. Analyze and categorize the best approach to control pathogens.
6. Explain the diverse pathogens and its controlling measures.

UNIT- I HOST-MICROBE INTERACTIONS**(7)**

Normal Flora-Protective role-dynamic nature, principles of Infectious diseases-pathogenicity-course of infectious diseases-distribution of the pathogen, establishing the cause of infectious disease-Koch's postulates molecular postulates-mechanisms of pathogenesis. Epidemiology-principles.

UNIT- II HOST-DEFENSE AGAINST PATHOGENS AND PATHOGENIC STRATEGIES (10)

Host defense: skin, mucosa, cilia, secretions, physical movements, limitation of free iron, antimicrobial compounds, mechanism of killing by humoral and cellular defense mechanisms, complements, inflammation process, general disease symptoms, Pathogenic adaptations to overcome the above defenses.

UNIT- III MOLECULAR PATHOGENESIS**(10)**

Virulence factors - gene regulation in virulence of pathogens - labile & stable toxins; *Vibrio Cholerae* - Cholera toxin -*E.coli* pathogens: - ETEC – EPEC - EHEC - EIEC Hemolytic Uremic Syndrome - Shigella toxin - Plasmodium Life cycle- Antimalarials based on transport processes - Influenza virus - action of amantidine.

UNIT- IV EXPERIMENTAL STUDIES ON HOST-PATHOGEN INTERACTIONS**(9)**

Virulence assays: adherence, invasion, cytopathic, cytotoxic effects. Criteria & tests in identifying virulence factors, attenuated mutants, molecular characterization of virulence factors, signal transduction & host responses.

UNIT-V**MODERN APPROACHES TO CONTROL PATHOGENS****(9)**

Classical approaches based on serotyping. Modern diagnosis based on highly conserved virulence factors, immuno & DNA-based techniques. New therapeutic strategies based on recent findings on molecular pathogenesis of a variety of pathogens, Vaccines - DNA, subunit and cocktail vaccines

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Eduardo A. Groisman	Principles of Bacterial Pathogenesis	Academic Press,	2001
2	Tizard.	Immunology: An introduction	Cengage Learning	1994
3	Peter Williams, Julian Ketley & George Salmond,	Methods in Microbiology: Bacterial Pathogenesis,	Academic Press	1998
4	Abigali A. Salyers and Dixie D. Whitt,	Bacterial Pathogenesis – A molecular Approach	ASM Press, Washington	2002

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Nester, E. W. Anderson, D. G Roberts, C.E. Jr. and Nester, M. T.	Microbiology: A Human Perspective, Fifth Edition	McGraw-Hill,	2007

Course Objectives

- To illustrate about the biosafety in biotechnology.
- To explain basic knowledge on Intellectual property rights.
- To rephrase different views on policies of IPR.
- To solve the IPR issues and Bioethics.
- To list and examine about the case studies of copyright and patents.
- To understand the basics of IPR and ethical issues in biotechnology.

Course Outcomes

1. Classify the different techniques involved in biosafety in biotechnology based industries.
2. Manage and organize the knowledge about the intellectual property rights.
3. Label an idea about the policies of IPR.
4. Relate about the IPR issues and bioethics.
5. Diagnose about the case studies on patents.
6. Summarize the basics of IPR and ethical issues in biotechnology.

UNIT I BIOSAFETY**(8)**

Biosafety – Biotechnology development in India, Safety issues concerning biotechnological products, governing biosafety, Cartagena protocol on biosafety, Conservation of Biodiversity.

UNIT II INTELLECTUAL PROPERTY RIGHTS**(10)**

Introduction - Invention and Creativity - Intellectual Property (IP) - Importance - Protection of IPR - Basic types of property (i. Movable Property ii. Immovable Property and iii. Intellectual Property). IP - Patents - Copyrights and related rights - Trade Marks and rights arising from Trademark registration - Definitions - Industrial Designs and Integrated circuits - Protection of Geographical Indications at national and International levels - Application Procedures.

UNIT III IPR – POLICIES**(9)**

International convention relating to Intellectual Property - Establishment of WIPO - Mission and Activities -History - General Agreement on Trade and Tariff (GATT). Indian Position Vs WTO and Strategies - Indian IPR legislations - commitments to WTO-Patent Ordinance and the Bill - Draft of a national Intellectual Property Policy - Present against unfair competition.

UNIT IV CASE STUDIES**(9)**

Case Studies on - Patents (Basmati rice, turmeric, Neem, etc.) - Copyright and related rights - Trade Marks - Industrial design and Integrated circuits - Geographic indications - Protection against unfair competition.

UNIT V BIOETHICS

(9)

Bioethics – Disease prevention Vs right to privacy, patentability of DNA, pre implantation embryo diagnosis, Engineered organisms into environment, Genetic tests in diagnostics and therapy.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	V.H Heywood.R.T Watson	Global Biodiversity Assessment	Cambridge University Press	1996
2	Brody BA and Engelhardt	Bioethics : Readings and Cases	Prentice John- Wiley and Sons	2007
3	Joshi. R	Biosafety and Bioethics	Isha Books, New Delhi	2006.

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Subbaram N.R	Handbook of Indian Patent Law and Practice	S. Viswanathan Printers and Publishers Pvt. Ltd.,	1998.
2	Sasson A	Biotechnologies and Development	UNESCO Publications,	1988.
3	Singh K	Intellectual property rights on Biotechnology	BCIL	2015

Course Objectives

- To understand the constituents of food and energy.
- To classify the different sources of microbes in food that assist food spoilage.
- To record the basic notion on fermented food products.
- To differentiate and organize the distinct food additives used.
- To explain the basic theory of food processing and preservation.
- To discuss the problems related to food deterioration and its preventive measures.

Course Outcomes

1. Compare and contrast different food constituents and their effectiveness.
2. Summarize the controlling measures for food spoilage.
3. Prioritize diverse properties of fermented foods.
4. Construct and design the food additives for food preservation.
5. Apply the knowledge on basics of food processing and preservation methods.
6. Examine and solve the problems related to food deterioration and its preventive measures.

UNIT I FOOD AND ENERGY (9)

Constituents of Food- Water : importance, water in food, activity and shelf life of food; Carbohydrates: functional properties of sugars and polysaccharides in food; Lipids: uses, physical and chemical properties; Proteins and amino acids: physical and chemical properties, distribution, functions and functional properties; Vitamins and Minerals: Dietary sources; Nutritive value of foods, food as a source of energy, food health and disease.

UNIT II FOOD MICROBIOLOGY (9)

Types of micro-organism normally associated with food -mold, yeast, and bacteria. Micro-organisms in natural food products. Biochemical changes caused by micro-organisms. Food poisoning and microbial toxin. Spoilage of vegetables, fruit, meat, poultry , beverages and other food products. Food safety.

UNIT III FERMENTATION PRODUCTS (9)

Enzymes in foods and food industry, Nature and type of starters, Role of starters in Fermented foods, Fermentation of Milk products-Fermented soy and peanut milk , Idli, Fermented fish products, Pickles, Fermented Olives ; Production of distilled beverage alcohol ,wine, brandy, and beer. Mycoprotein production.

UNIT IV FOOD ADDITIVES (9)

Chemical and physical methods of food analysis for determination of food composition; Pigments in food, food flavours, food additives and toxicants. Natural sweeteners and artificial sweeteners - role in controlling diseases.

UNIT V FOOD PROCESSING & PRESERVATION

(9)

Basic principles, unit operations Involved in the food processing methods; Objectives, importance and functions of quality control. Principles involved in the use of sterilization, pasteurization and blanching, thermal death curves of micro organisms, canning, frozen storage characteristics of foods, microbial activity at low temperatures, factors affecting quality of foods in frozen storage; irradiation preservation of foods.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James M. Jay, Martin J. Loessner David A. Golden	Modern Food Microbiology	Springer Science & Business Media	2005
2	William C.Frazier	Food Microbiology	Tata MC Graw hill	1987

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	H.-D. Belitz, Werner Grosch, Peter Schieberle	Food Chemistry	Springer Science & Business Media	2009
2	B.Sivashankar	Food processing and preservation	Prentice – Hall of India Pvt.Ltd.New Delhi	2002.

15BTBT6E08 PROCESS INSTRUMENTATION DYNAMICS AND CONTROL 3 0 0 3 100

Course Objectives

- To understand the basic concept of transformation and dynamics reactions in chemical system.
- To classify the control systems based on their functions and properties.
- To understand the concept and classification of closed loop system in process instrumentation.
- To discuss the mechanism of control systems in the dynamic reactions.
- To explain the control mechanism in the process instrumentation.
- To tell about the different types and its functional parameters of process instruments.

Course Outcomes

1. Explain the concept behind transformation and dynamic reactions in chemical systems.
2. Summarize the functions of control systems.
3. Prioritize the importance of closed loop systems.
4. Outline the working mechanism of control systems.
5. Tell about the properties of control mechanism.
6. Differentiate the process control instruments.

UNIT I INTRODUCTION (9)

Laplace transformation, transform of standard functions, derivatives and integrals, inversion, theorems in Laplace transformation, application. Open-loop systems, first order systems and their transient response for standard input functions, first order systems in series, linearization and its application in process control, second order systems and their dynamics, transfer function for chemical reactors and dynamics.

UNIT II CONTROL SYSTEMS (9)

Closed loop control systems, development of block diagram for feed-back control systems, servo and regulator problems, Transfer function for controllers and final control element, principles of pneumatic and electronic controllers, transportation lag, transient response of closed-loop control systems and their stability.

UNIT III CLOSED LOOP SYSTEMS (9)

Introduction to frequency response of closed-loop systems, control system design by frequency, Bode diagram, stability criterion, Nyquist diagram; Tuning of controller settings.

UNIT IV CONTROL MECHANISM (9)

Controller mechanism, introduction to advanced control systems, cascade control, feed forward control, control of heat exchangers, introduction to microprocessors and computer control of chemical processes.

UNIT V CONTROL INSTRUMENTS

(9)

Principles of measurements and classification of process control instruments, measurements of temperature, pressure, fluid flow, liquid weight and weight flow rate, viscosity and consistency, pH, concentration, electrical and thermal conductivity.

Total Hours: 45

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Coughnowr and Koppel	Process Systems Analysis and Control	McGraw-Hill	2009
2	George Stephanopolous	Chemical Process Control	Prentice-Hall of India Pvt- Ltd	1990

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Emenule, S.Savas	Computer Control of Industrial Processes	McGraw-Hill	1965
2	Eckman	Industrial Instrumentation’’	Wiley	1978.

Course Objectives

- To explain the human nervous system,
- To demonstrate about neuro physiology
- To manage and diagnose about neuro pharmacology.
- To categorize the mechanism of neurological behaviour.
- To interpret basic impression about the disorders associated with nervous system.
- To discuss the applications of neurobiology

Course Outcomes

1. Outline the basis of central and peripheral nervous system and describe the structure of neurons and supporting cells.
2. Demonstrate the mechanism of action potential conduction and working of voltage dependent channels.
3. Illustrate the concept of synaptic transmission and mechanism of action of neurotransmitters.
4. List the basic mechanisms of sensations and skeletal muscle contraction.
5. Enumerate the mechanisms associated with motivation behaviours.
6. Describe the various disorders of nervous system

UNIT I NEUROANATOMY (9)

Central and peripheral nervous systems; Structure and function of neurons; types of neurons; Synapses; Glial cells; myelination; Blood Brain barrier; Neuronal differentiation; Characterization of neuronal cells; Meninges and Cerebrospinal fluid; Spinal Cord.

UNIT II NEURO PHYSIOLOGY (9)

Resting and action potentials; Mechanism of action potential conduction; Voltage dependent channels; nodes of Ranvier; Chemical and electrical synaptic transmission; information representation and coding by neurons.

UNIT III NEURO PHARMACOLOGY (9)

Synaptic transmission, neurotransmitters and their release; fast and slow neurotransmission; characteristics of neurites; hormones and their effect on neuronal function.

UNIT IV APPLIED NEUROBIOLOGY (9)

Basic mechanisms of sensations like touch, pain, smell and taste; neurological mechanisms of vision and audition; skeletal muscle contraction.

UNIT V BEHAVIOUR SCIENCE (9)

Basic mechanisms associated with motivation; control of feeding, sleep, hearing and memory; Disorders associated with the nervous system.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Gordon M. Shepherd	Neurobiology	Oxford University Press, USA	1994

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Mathews G.G.	Neurobiology	Blackwell Science, UK	2000
2	William Bechtel, George Graham	A Companion to Cognitive Science	Blackwell Science, UK	1999

Course Objectives

- To explain the genetic disorders.
- To determine protocol for biological sample diagnosis.
- To discuss the hybridoma technology.
- To distinguish the therapies for various diseases.
- To tell about the generation, differentiation and uses of stem cells.
- To develop biological pharma products using recombinant technology

Course Outcomes

1. Outline the basic idea on genetic disorders.
2. Demonstrate the biological sample diagnostic methods.
3. Illustrate the concept behind hybridoma technology.
4. List the detection and therapies of harmful diseases.
5. Explain the generation, differentiation and uses of stem cells.
6. Describe the development of pharmaceutical products using recombinant technology.

UNIT I GENETIC DISEASES**(9)**

Chromosomal disorders – Numerical disorders e.g. trisomies & monosomies, Structural disorders e.g. deletions, duplications, translocations & inversions, Gene controlled diseases – Autosomal and X-linked disorders, Molecular basis of human diseases - Pathogenic mutations. Gain of function mutations: Oncogenes, Huntingtons Disease, Loss of function - Tumour Suppressor Genes,

UNIT II DIAGNOSTICS**(9)**

Prenatal diagnosis - Invasive techniques - Amniocentesis, Fetoscopy, Non-invasive techniques - Ultrasonography, X-ray, maternal serum and fetal cells in maternal blood. Diagnosis using protein and enzyme markers, DNA/RNA based diagnosis Hepatitis, Microarray technology- genomic and cDNA arrays, application to diseases

UNIT III HYBRIDOMATECHNOLOGY**(9)**

Monoclonal Antibodies – Production, Target drug delivery using monoclonal antibodies; Human Gene Therapy, Detection and Therapy of Tuberculosis, Yellow Fever, Japanese encephalitis, Dengue fever, Acquired Immune Deficiency Syndrome (AIDS), Cholera, Malaria; Cancer.

UNIT IV STEM CELL**(9)**

Embryonic and adult stem cells, Totipotent, pluripotent and multipotent cells testing and generation of embryonic stem cells, testing of adult stem cells and differentiation, potential uses of stem cells –cell based therapies, Gene products in medicine – Humulin, erythropoietin, Growth hormone-somatostatin, TPA, Interferon; functional cloning-anti haemophilic factor positional cloning-Dystrophin.

UNIT V PHARMACEUTICAL BIOTECHNOLOGY

(9)

Vaccines- Preparation and testing, standardization and storage study, generation of vaccines- hepatitis, AIDS, Malaria. Production of recombinant pharmaceutical products – Biotechnologically derived products (therapeutic proteins); Study of Haematopoietic growth factors Recombinant coagulation factors and thrombolytic agents.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Berger S.L.,ET.Al	Methods in Enzymology	Academic press Inc	1992
2	De Kalyan kumar	Plant tissue culture	New Central Book Agency (P) Ltd.	1997
3	Freifelder David	Molecular Biology	Narosa Publishing.	1987

Course Objectives

- To explain the gene expression and its regulation.
- To determine the methods for the synthesis of primary metabolites.
- To discuss the procedure for biosynthesis of secondary metabolites.
- To distinguish the features of bioconversion.
- To tell about the regulation of enzyme production.
- To summarize the repressions in enzyme production.

Course Outcomes

1. Illustrate the gene expression and its regulation.
2. Demonstrate the primary metabolite synthesis.
3. Discuss the methods for secondary metabolites production.
4. Outline the features of bioconversion.
5. Explain the regulation of enzyme production.
6. Describe the repressions in enzyme production.

UNIT I INTRODUCTION**(9)**

Jacob Monod model for gene expression regulation – Lac operon, catabolite regulation - glucose effect - cAMP deficiency. Regulation of RNA synthesis by amino acid. Feed back regulation, regulation in branched pathways-differential regulation in isozymes, concerted feedback regulation, cumulative feedback regulation, permeability control: passive diffusion, active transport, group transportation.

UNIT II SYNTHESIS OF PRIMARY METABOLITES**(9)**

Alteration of feedback regulation, limiting accumulation of end products, feedback resistant mutants, alteration of permeability for metabolites.

UNIT III BIOSYNTHESIS OF SECONDARY METABOLITES**(9)**

Producers of secondary metabolites, Precursor effects, trophophase- idiophase relationship, enzyme induction, feedback regulation, catabolite regulation by passing control of secondary metabolism.

UNIT IV BIOCONVERSIONS**(9)**

Advantages of Bioconversions, specificity, yields, factors important for bioconversion, regulation of enzyme synthesis, mutation, permeability, co-metabolism, avoidance of product inhibition, mixed or sequential bioconversions, conversion of insoluble substances.

UNIT V REGULATION OF ENZYME PRODUCTION

(9)

Strain selection, improving fermentation, recognizing growth cycle peak, induction, feedback repression, catabolite repression, mutants resistant to repression, gene dosage.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Peter F. Stanbury, Stephen J. Hall & A. Whitaker	Principles of Fermentation Technology	Butterworth- Heinemann	2005
2	G.Stephanopoulos , AristosA. Aristidou, Jens Hoiris Nielson	Metabolic Engineering: Principles and Methodologies	Academicpress	1998

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Wang D.I.C., Cooney C.L., Demai A.L., Dunnill P., Humphrey A.E., Lill M.D	Fermentation and Enzyme Technology	JohnWiley and Sons	1980
2	Cruger, W and Crueger, A	Biotechnology: A Textbook of Industrial Microbiology	Panama Publishing Corporation	2003
3	Zubay, G.L	Principles of Biochemistry	WCB Publishers, London	1995

Course Objectives

- To explain basic knowledge on soil microbes and its characteristics.
- To demonstrate the effects of xenobiotic compounds.
- To discuss various methods for industrial waste water management.
- To explain the effects of various industrial wastes and to infer basic concepts for its management.
- To outline the natural and engineered bio-treatment methods to remediate the pollutants.
- To discuss the different environmental issues using biotechnology.

Course Outcomes

1. Summarize the characteristics of soil microbes and its interactions.
2. Evaluate the different xenobiotics present and methods to degrade them.
3. Describe the industrial waste management systems.
4. List the opportunities in waste treatment industries and its management.
5. Recognize natural and engineered biotreatment methods to remediate pollutants.
6. Identify and list different environmental issues and its remedy.

UNIT I INTRODUCTION (8)

Microbial flora of soil, growth and ecological adaptations of soil microorganisms, interactions among soil microorganisms, biogeochemical role of soil microorganisms.

UNIT II DEGRADATION OF XENOBIOTIC COMPOUNDS (9)

Aromatics - benzene, pentachlorophenol, Polyaromatic hydrocarbons (PAHs) – naphthalene, , Polychlorinated biphenyls (PCBs) hexachloro biphenyl, Pesticides-DDT and Surfactants–LAS

UNIT III INDUSTRIAL WASTE WATER MANAGEMENT (10)

Wastewater characteristics – physical, chemical and biological, Biological processes - unit operations, aerobic treatment processes, activated sludge process–characteristics of activated sludge and process configuration, anaerobic treatment by methanogenesis

UNIT IV TREATMENT OF INDUSTRIAL WASTES (9)

Dairy, Paper & Pulp, Textile, leather, hospital and pharmaceutical industrial waste management, e-waste-radioactive and nuclear power waste management.

UNITV DEVELOPMENTS PERTAINING TO ENVIRONMENTAL BIOTECHNOLOGY (9)

Solid waste management, Role of biosensors in Environmental monitoring, Heavy metal pollution and their control strategies, Prevention of environmental damage with respect to nitrogen fixation, Bioremediation, Production of bioelectricity from microbial fuel cell (MFC), Improvement of water quality by denitrification, Role of biotechnology on agricultural chemical use.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	BruceE. Rittmann and perr L. Mccarty	Environmental Biotechnology: Principle and Applications	McGraw Hill	2001
2	Mecalf and Eddy	Waste water Engineering: Treatment Disposal Reuse	Mc Graw Hill	1991
3	DesW. Connell,	Basic concepts of Environmental chemistry	Lewis publishers	2005

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Alan Scragg	Environmental Biotechnology	Oxford University press	2005
2	Prescott, Harley, Klein	Microbiology	WCB publishers	1996

Course Objectives

- To explain basic knowledge on genome organization of prokaryotes and eukaryotes.
- To discuss the effects of cytogenetic mapping.
- To construct various methods for gene finding and annotations in functional genomics.
- To explain the effects of various protein level estimation in proteomics
- To understand the different protein analysis techniques.
- To outline the post translational modification and other protein interactions.

Course Outcomes

1. Summarize the characteristics of genomic organization of prokaryotes and eukaryotes.
2. Evaluate the different physical mapping techniques.
3. Discuss the gene findings in functional genomics.
4. Explain the protein estimation through different techniques.
5. Recognize different protein analysis techniques.
6. Identify and list different protein interactions.

UNIT I OVERVIEW OF GENOMES OF BACTERIA, ARCHAE AND EUKARYOTA (9)

Genome organization of prokaryotes and eukaryotes, gene structure of bacteria, archaebacterial and eukaryotes, Human genome project, Introduction of functional and comparative genomics.

UNIT II PHYSICAL MAPPING TECHNIQUES (9)

Cytogenetic mapping, radiation hybrid mapping, Fish, STS mapping, SNP mapping optical mapping, Top down and bottom up approach, linking and jumping of clones, gap closure, pooling strategies, genome sequencing.

UNIT III FUNCTIONAL GENOMICS (9)

Gene finding; annotation; ORF and functional prediction; Subtractive DNA library screening; differential display and representational difference analysis; SAGE.

UNIT IV PROTEOMICS TECHNIQUES (9)

Protein level estimation; Edman protein microsequencing; protein cleavage; 2 D gel electrophoresis; metabolic labeling; detection of proteins on SDS gels. Mass spectrometry- principles of MALDI- TOF; Tandem MS-MS; Peptide mass fingerprinting.

UNIT V PROTEIN PROFILING (9)

Post translational modification; protein-protein interactions; glycoprotein analysis; phosphor protein analysis.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Cantor and Smith	Genomics	John Wiley & Sons	1999
2	Pennington and Dunn	Proteomics	BIOS Scientific Publishers	2001
3	T.ABrown	Genomes	Bios Scientific Publishers Ltd	2002

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Liebler	Introduction to Proteomics	Humana Press	2002
2	Hunt and Livesey	Functional Genomics	Oxford University press	2000
3	Primrose and Twyman	Principles of genome analysis and genomics	Blackwell Publishing Co	2003

Course Objectives

- To discuss the mass and energy balance.
- To explain the scale up of equipments.
- To describe the scale down of equipments.
- To explain design of equipments.
- To understand the facility design with safety.
- To outline the process economics in biological products production.

Course Outcomes

1. Calculate the mass and energy balance.
2. Evaluate the scaling up process for equipments.
3. Discuss the scale down process for equipments.
4. Describe the design of equipments.
5. Tell about the facility design in euipmentation.
6. Summarize the process economic calculations in plant design.

UNIT I MASS AND ENERGY BALANCE (9)

Introduction: General design information - Material and energy balance calculations - Process Flow sheeting.

UNIT II SCALE UP AND SCALE DOWN OF EQUIPMENTS (9)

Heat and Mass Transfer studies: Effect of scale on oxygenation, mixing, sterilization, pH, temperature, inoculum development, nutrient availability and supply. Bioreactor scale-up - constant power consumption per volume, mixing time, impeller tip speed (shear) - mass transfer coefficients. Scale up of downstream processes - Adsorption (LUB method), Chromatography (constant resolution etc.), Filtration (constant resistance etc.) - Centrifugation (equivalent times etc.) - Extractors (geometry based rules) - Scale-down related aspects.

UNIT III DESIGN OF EQUIPMENTS (9)

Selection of bioprocess equipment (upstream and downstream) - Specifications of bioprocess equipment - Mechanical design of reactors, heat transfer and mass transfer equipment. Design considerations for maintaining sterility of process streams and process equipment - Piping and instrumentation - Materials of construction for bioprocess plants.

UNIT IV FACILITY DESIGN (9)

Facility design aspects - Utility supply aspects - Equipment cleaning aspects - Culture cell banks - cGMP guidelines – Validation - Safety.

UNIT V ECONOMICS AND CASE STUDY

(9)

Process economics - Case studies. Commodity chemicals and production of pharmaceutical products.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Robert H. Perry and Don W. Gree (eds.)	Perry's Chemical Engineers' Handbook	McGraw Hill Book Co	1997
2	Shuler M and Kargi F	Bioprocess Engineering: Basic Concepts	Prentice Hall, Englewood Cliffs, NJ	2002
3	Max S. Peters and Klaus, D. Timmerhaus	Plant Design and Economics for Chemical Engineers	McGrawHill Book Co	1991

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Coulson J.M. and J. F. Richardson (Eds.) R.K.Sinnott	Chemical Engineering, Volume 6: An Introduction to Chemical Engineering Design	Asian Books Private Limited, New Delhi	1983
2	Joshi M. V. and V.V.Mahajani	Process Equipment Design	Macmillan India Ltd	2000
3	Michael R. Ladisch	Bioseparations Engineering: Principles, Practice and Economics	Wiley	2001

Course Objectives

- To explain the general properties of viruses.
- To discuss the cultivation of viruses.
- To describe the viral genetics.
- To tell about the structure and properties of DNA and RNA viruses.
- To infer the knowledge on mechanism and action of viral vaccines and antivirals.
- To outline the modern approaches of virus control.

Course Outcomes

1. Summarize the general properties of viruses.
2. List the cultivation methods of viruses.
3. Discuss the genetic importance of viruses.
4. Describe the action mechanism of DNA and RNA virus.
5. Explain the production and importance of viral vaccines and antivirals.
6. Summarize the modern approaches of viral control.

UNIT I GENERAL PROPERTIES OF VIRUSES (8)

Early development of virology – properties of viruses: morphology, structure and shape–chemical properties – Resistance – viral agglutination – viral multiplication.

UNIT II CULTIVATION OF VIRUSES & VIRAL GENETICS (9)

Cultivation of viruses: Animal inoculation – cell culture – tissue culture types, detection of virus growth in cell cultures – Virus purification – viral assay – viral genetics –non genetic interactions - Bacteriophages.

UNIT III DNA AND RNA VIRUSES (10)

DNA viruses: Morphology, properties and pathogenesis – pox viruses – herpes viruses –adeno viruses. RNA viruses – entero viruses – polio virus – influenza – rabies virus –hepatitis viruses.

UNIT IV VIRAL VACCINES AND ANTIVIRALS (9)

Conventional vaccines -killed and attenuated, modern vaccines—recombinant proteins, subunits, DNA vaccines, peptides, immuno modulators (cytokines), vaccine delivery and adjuvants, Interferons, designing and screening for antivirals, mechanisms of action, antiviral libraries, antiretrovirals—mechanism of action and drug resistance.

UNIT V MODERN APPROACHES OF VIRUS CONTROL (9)

Anti-sense RNA, siRNA, ribozymes, in silico approaches for drug designing

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Ranga MM	Animal biotechnology	Agrobios India Limited	2002
2	Ramadass P, Meera Rani S	Text Book of Animal Biotechnology	Akshara Printers	1997

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Masters JRW	Animal Cell Culture: Practical Approach	Oxford University Press	2000

Course Objectives

- To explain the general concepts of pharmacology.
- To discuss the systemic pharmacology with drug action.
- To describe the experimental pharmacology in drug discovery.
- To tell about the general aspects on the pharmacognosy.
- To infer the knowledge on methods and quality control for following pharmacognosy.
- To discuss the protocol for isolation of phytochemicals.

Course Outcomes

1. Tell about the basics of pharmacology in drug action.
2. Explain the systemic pharmacology.
3. Discuss the methods for experimental pharmacology.
4. Describe the action of drugs in pharmacognosy.
5. Outline the methods for isolation of phytochemicals.
6. Understand the characterization of phytochemicals.

UNIT I BASICS OF PHARMACOLOGY (9)

General concepts of Pharmacology, ADME process, drug action- mechanism, factors affecting drug action. Dose-effect relationship

UNIT II SYSTEMIC PHARMACOLOGY (9)

Drugs Affecting the Central Nervous System, Cardiovascular and Renal Systems, Immune system, Respiratory System, Gastrointestinal System and Nutrition, Endocrine System, Integumentary system and Eyes/Ears. Drugs affecting uterine motility, Chemotherapy of parasite infections, Chemotherapy of microbial diseases. Antineoplastic agents, Immunomodulators. Drugs acting on blood and blood forming organs

UNIT III EXPERIMENTAL PHARMACOLOGY (9)

Experimental methodologies involved in the discovery of drugs (*in vivo*, *in vitro*, *ex vivo*). Animal handling and animal care. Methods of anaesthetising animals and methods of euthanasia. Restraining and blood collecting methods.

UNIT IV PHARMACOGNOSY (9)

General aspects of sources of natural medicinal products. Marine Pharmacognosy and its applications. General cultivation of medicinal plants, their merits and Demerit -a. General aspects, b. Factors involved, c. Methods used to improve the Quality and d. Pest control. Role of natural pesticides – Preparation and uses.

UNIT V ISOLATION AND CHARACTERIZATION OF PHYTOCHEMICALS (9)

General methods and Principles of extraction methods, types of extraction and their merits and demerits. Selection and purification of solvents for extraction, methods of isolation, purification and identification of phytoconstituents.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Bertram G. Katzung	Basic & clinical pharmacology	Mc Graw Hill	2004
2	Richard A. Harvey PhD, Pamela C. Champ	Lippincott's Illustrated Reviews: Pharmacology	Wolters Kluwer	2008

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	G.E. Trease, W.C. Evans	Pharmacognosy	ELBS	2002
2	Varro E.Tyler, Lynn. R.Brady, James E.Robbers	Pharmacognosy	Lee & Febiger	1988
3	T.E. Wallis	Text Book of Pharmacognosy	CBS Pub	1985

Course Objectives

- To explain basic knowledge on definition and scope of stem cells.
- To demonstrate the structural and functional principles of in vitro fertilization.
- To discuss the various identification and cell differentiation of somatic stem cells.
- To explain the effects of stem cell in drug discovery and tissue engineering.
- To outline the basic concepts of cellular therapy and gene therapy of stem cells.
- To compile the application of stem cells.

Course Outcomes

1. Summarize the characteristics stem cells.
2. Evaluate the different structural and functional parameters of invitro fertilization.
3. List the properties of adult stem cells in differentiation.
4. Explain the uses of stem cells in drug discovery and tissue engineering.
5. Recognize various stem cell therapies.
6. Summarize the application of stem cells.

UNIT I STEM CELLS AND CELLULAR PEDIGREES (9)

Scope of stem cells – definition of stem cells – concepts of stem cells – differentiation, maturation , proliferation , pluripotency, self – maintenance and self – renewal – problems in measuring stem cells – preservation protocols.

UNIT II EMBRYONIC STEMCELLS (9)

In vitro fertilization –culturing of embryos-isolation of human embryonic stem cells – blastocyst – inner cell mass – growing ES cells in lab – laboratory tests to identify ES cells – stimulation ES cells for differentiation – properties of ES cells.

UNIT III ADULT STEM CELLS (9)

Somatic stem cells – test for identification of adult stem cells – adult stem cell differentiation – trans differentiation – plasticity – different types of adult stem cells.

UNIT IV STEM CELL IN DRUG DISCOVERY AND TISSUE ENGINEERING (9)

Target identification – Manipulating differentiation pathways – stem cell therapy Vs cell protection - stem cell in cellular assays for screening – stem cell based drug discovery, drug screening and toxicology.

UNIT V POTENTIAL USES OF STEM CELLS (9)

Cellular therapies – vaccines – gene therapy – immunotherapy – tissue engineering – blood and bone marrow – Fc cells.

TEXT BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	CS Potten	Stem cells	Elsevier	1997
2	Kursad and Turksen	Embryonic Stem cells	Humana Press.	2002
3	Robert Paul Lanza	Essentials of stem cell biology,	O'Reilly	2006
4	Clive Svendsen , Allison D.Ebert.	Encyclopedia of stem cell research vol 1 & 2	Sage pub	2008

Course Objectives

- To present basic knowledge about the various cloning vectors and its features.
- To demonstrate the various techniques and enzymes involved in cloning.
- To explain and practice diverse concepts on expression vectors for cloning.
- To practice the basic views on preparation of genomic and cDNA library.
- To identify and organize differing views on applications of gene cloning in rDNA research.
- To compile the basic concepts of rDNA technology.

Course outcomes

1. Compose about basic concepts about the features of cloning vectors.
2. Assemble different techniques and enzymes involved in cloning.
3. Classify about expression vectors for cloning.
4. List the techniques in preparation of genomic and cDNA library.
5. Propose knowledge on applications for rDNA research.
6. Summarize concepts of rDNA technology.

UNIT I CLONING VECTORS (9)

Ideal features of cloning vectors – plasmids and bacteriophages – cloning vectors for E.coli ; pBR322, pUC vectors, M13 and other plasmid vectors – Cosmids, Phagemids – vectors for Bacillus, Streptomyces Restriction mapping and analysis

UNIT II ENZYMES AND TECHNIQUES FOR CLONING (9)

DNA modifying enzymes – ligases – Nucleic acid probe preparation; Radioactive and nonradioactive labels – Hybridization techniques – PCR; different types and applications – DNA sequencing – DNA fingerprinting – RFLP, RAPD – chromosome walking.

UNIT III EXPRESSION VECTORS (9)

Expression vectors in prokaryotes – Expression vectors in Eukaryotes-Yeast cloning vectors – selectable markers for eukaryotes – SV40, Papilloma, Retrovirus, Baculoviral vectors – mammalian cell expression system – Gene transfer techniques – Agrobacterial plasmids – Ti plasmid and viral vectors – cloning in plants.

UNIT IV GENOMIC AND cDNA LIBRARY (9)

Different strategies for in vitro and in vivo cloning – Preparation of rDNA, Preparation of cDNA and genomic DNA libraries – screening procedures – linkers, adapters, homopolymer tailing and TA cloning – gene transfer technologies – Mutagenesis – site directed mutagenesis – application.

UNIT V APPLICATION OF GENE CLONING

(9)

Fusion protein- down-stream processing of recombinant proteins Applications in medicine – Gene therapy- Diagnostics, pathogenesis, recombinant vaccines –humanized antibodies and their applications genetically modified food – bioremediation with recombinant micro organisms– forensic science – genetic diversity – Agriculture, crop improvement – production of biosensors, enzymes – safety guidelines in rDNA research – containment and disposal.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Jeremy W. Dale, Malcolm von Schantz, Nicholas Plant	From Genes to Genomes: Concepts and Applications of DNA Technology	Wiley- Blackwell	2011
2	Sandy B. Primrose and Richard Twyman	Principles of Gene Manipulation and Genomics	Wiley	2009
3	Michael R. Green and Joseph Sambrook	Molecular Cloning: A Laboratory Manual	Cold Spring Harbor Press	2012

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	T. A. Brown	Gene Cloning and DNA Analysis: An Introduction	Blackwell	2010
2	Jocelyn E. Krebs, Elliott S. Goldstein and Stephen T. Kilpatrick	Lewin's GENES XI	Jones & Bartlett Learning	2012

Course Objectives

- To illustrate the scope and importance of crude drugs.
- To understand the basic ideas on cultivation and utilization of medicinal and aromatic plants.
- To list the various functions of plant tissue culture as a source.
- To label the basic theory of methods of drug evaluation.
- To develop a picture about applications of phytochemicals in industry and healthcare.
- To discuss the different stages of developments in using phytochemicals and medicinal plants.

Course Outcomes

1. Summarize about the importance of crude drugs in different medicinal system.
2. Determine the modern cultivation techniques through plants.
3. Express the functions of plant tissue culturing.
4. Be aware of the conceptualization behind various methods for drug evaluation.
5. Describe the various functions and application of phytochemicals in different industries.
6. Summarize and predict the different stages of developments in using phytochemicals and medicinal plants.

UNIT I CRUDE DRUGS (9)

Crude Drugs – Scope & Importance, Classification (Taxonomical, Morphological Chemical, Pharmacological); Cultivation, Collection & processing of Crude Drugs. Indian System of medicine: Ayurveda, Siddha and Unani and its significance

UNIT II MEDICINAL & AROMATIC PLANTS (9)

Cultivation and Utilization of Medicinal & Aromatic Plants in India. Genetics as applied to Medicinal herbs. Modern Biotechnological tools and its influence in Medical and Aromatic plant cultivation.

UNIT III TISSUE CULTURE OF MEDICINAL PLANTS (9)

Plant Tissue Culture as source of medicines, Secondary metabolite production in plants; Plant Tissue Culture for enhancing secondary metabolite production (Withania somnifera, Rauwolfia serpentina, Catharanthus roseus, Andrographis paniculata, Dioscorea sp.); Anticancer, Antiinflammatory, Antidiabetic, Analgesic drugs, Biogenesis of Phytopharmaceuticals.

UNIT IV ANALYSIS OF PHYTOCHEMICALS (9)

Methods of Drug evaluation (Morphological, Microscopic, Physical & Chemical). Preliminary screening, Assay of Drugs – Biological evaluation / assays, Microbiological methods. Types of Phytochemicals: Glycosides - extraction methods (Aloe); Volatile Oils - extraction methods (Clove); Alkaloids - extraction methods (Cinchona); Flavonoids extraction methods, Resins- extraction methods; Lectins.

UNIT V APPLICATIONS OF PHYTOCHEMICALS

(9)

Application of phytochemicals in industry and healthcare; Biocides, Biofungicides, Biopesticides. Nutraceuticals and their significance.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	C. K. Kokate, A. P. Purohit & S. B. Gokhale	Pharmacognosy	NiraliPrakashan	1996
2	Paul M. Dewick	Natural Products in medicine: A Biosynthetic approach	Wiley	2009

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Hornok, L.	Cultivation & Processing of Medicinal Plants	Wiley & Sons	1992
2	Trease & Evans	Pharmacognosy	Harcourt Brace & Company	1989

Course Objectives

- To illustrate the modification of biomolecules.
- To describe the chemical reactions of active biomolecules.
- To list the importance and uses of bioconjugate reagents.
- To infer the chemical modifications of enzymes and nucleic acids.
- To tell about the enzyme and nucleic acid conjugation
- To discuss the various applications of bioconjugation of molecules.

Course Outcomes

1. Tell about the modifications of common biomolecules.
2. Determine the basic chemical reactions for active groups.
3. Express the functions of bioconjugate reagents.
4. Summarize the steps for enzyme and nucleic acid modification.
5. Describe the protocol for enzyme and nucleic acid conjugation.
6. Summarize applications of bioconjugation.

UNIT I FUNCTIONAL TARGETS**(9)**

Modification of Amino Acids, Peptides and Proteins Modification of sugars, polysaccharides and glycoconjugates – modification of nucleic acids and oligonucleotides.

UNIT II CHEMISTRY OF ACTIVE GROUPS**(9)**

Amine reactive chemical reactions–Thiol reactive chemical reactions–carboxylate reactive chemical reactions – hydroxyl reactive chemical reactions–aldehyde and ketone reactive chemical reactions – Photoreactive chemical reactions.

UNIT III BIOCONJUGATE REAGENTS**(9)**

Zero length crosslinkers – Homo bifunctional crosslinkers–Hetero bifunctional crosslinkers–Trifunctional crosslinkers – Cleavable reagent systems–tags and probes.

UNIT IV ENZYME AND NUCLEIC ACID MODIFICATION AND CONJUGATION**(9)**

Properties of common enzymes – Activated enzymes for conjugation – biotinylated enzymes– chemical modification of nucleic acids – biotin labeling of DNA – enzyme conjugation to DNA – Fluorescence of DNA.

UNIT V BIOCONJUGATE APPLICATIONS**(9)**

Preparation of Hapten - carrier Immunogen conjugates – antibody modification and conjugation – Immunotoxin conjugation techniques–liposome conjugation and derivatives-Colloidal–gold-labeled proteins–modification with synthetic polymers.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	G.T.Hermanson	Bioconjugate Techniques	AcademicPress	2013

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	RavinNarain	Chemistry of Bioconjugates: Synthesis, Characterization, and Biomedical Applications	Wiley	2013

Course Objectives

- To explain basic knowledge on antigen structure and preparation.
- To discuss the structural and functional principles of antibodies and immunodiagnosis.
- To construct various parameters of B cells and T cells.
- To explain the effects of preparation and storage of tissues in immunopathology.
- To outline the basic concepts of preparations of vaccine in molecular immunology.
- To discuss the different techniques for antigen and antibody synthesis.

Course Outcomes

1. Summarize the characteristics of different methods of antigen production.
2. Evaluate the different structural and functional principles of antibodies and immunodiagnosis.
3. List the various parameters of B cells and T cells.
4. Explain the preparation and storage of antibodies and immunodiagnosis.
5. Recognize basic concepts of vaccine preparation in molecular immunology.
6. Identify and list different techniques for antigen and antibody synthesis.

UNIT I ANTIGENS**(7)**

Types of antigens, their structure, preparation of antigens for raising antibodies, handling of animals, adjuvants and their mode of action.

UNIT II ANTIBODIES & IMMUNODIAGNOSIS**(10)**

Monoclonal and polyclonal antibodies – their production and characterization, Western blot analysis, Immunoelectrophoresis, SDS-PAGE - purification and synthesis of antigens, ELISA – principle and applications, radioimmunoassay (RIA) - principles and applications, nonisotopic methods of detection of antigens-enhanced chemiluminescence assay.

UNIT III ASSESSMENT OF CELL MEDIATED IMMUNITY**(10)**

Identification of lymphocytes and their subsets in blood. T cell activation parameters, estimation of cytokines, macrophage activation, macrophage microbicidal assays, in-vitro experimentation – application of the above technology to understand the pathogenesis of infectious diseases.

UNIT IV IMMUNOPATHOLOGY**(9)**

Preparation and storage of tissues, identification of various cell types and antigens in tissues, isolation and characterization of cell types from inflammatory sites and infected tissues, functional studies on isolated cells, immune cytochemistry – immunofluorescence, immune enzymatic and immunoferritin techniques, immunoelectron microscopy.

UNIT V MOLECULAR IMMUNOLOGY

(9)

Preparation of vaccines, application of recombinant DNA technology for the study of the immune system, production of anti idiotypic antibodies, catalytic antibodies, application of PCR technology to produce antibodies and other immunological reagents, immuno therapy with genetically engineered antibodies – Tetramer, recombinant vaccines.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Talwar G.P., and Gupta S.K	A hand book of practical and clinical immunology (Vol 1&2)	CBS Publications	1992
2	WeirD.M	Practical Immunology	Blackwell Scientific Publications, Oxford	1990

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Austin J.M. and Wood K.J.	Principle of cellular and molecular immunology	Oxford university press	1993

Course Objectives

- To explain the various cell types and their advances in tissue engineering.
- To demonstrate the various biomaterials for tissue engineering.
- To explain and practice diverse concepts on tissue engineering and tissue creation.
- To discuss the techniques in tissue typing.
- To practice the basic views on gene therapy.
- To identify and organize differing views on advances on tissue engineering.

Course outcomes

1. Compose about basic concepts in tissue engineering
2. Assemble different biomaterials for tissue engineering
3. Classify about methods for Tissue Engineering.
4. List the techniques in tissue typing
5. Explain the principles of gene therapy
6. Summarize the concepts of tissue engineering in different fields.

UNIT I INTRODUCTION TO TISSUE ENGINEERING (9)

Cell therapies. Tissue Constructs, Organ Modules, Cosmetic Measures. Concepts of Tissue Creation: Sources, Stem Cells, Cells from Tissues, Culture Methods for Tissue Engineering. Maturation of Tissue Constructs. Musculo– skeletal tissue engineering; Modifications of tissue ring; Receptors ligand interaction; Receptor.

UNIT II BIOMATERIALS FOR TISSUE ENGINEERING (9)

Biomaterials: Degradable polymeric scaffolds, Acellular Bio- Matrices, Biological derived polymers in tissue engineering: Natural BD Polymers & Synthetic BD polymers, Cell seeding of scaffolds, Cell source: Allogenic cells, Autologous cells & stem cells. Bioreactors used in tissue engineering: Nail Naughton's Bioreactor, Pulsatile Bioreactor.

UNIT III BIOLOGICAL STUDY OF DIFFERENT CELL TYPES (9)

Cell line, Establishment of cell lines, Different cell types: Endothelial cell, Fibroblast cells, Epithelial cell, Myoblast cells, chromaffin cell, Smooth muscle cells & plasma cell.

UNIT IV PRINCIPLES AND PRACTICE GENE THERAPY (9)

Introduction to gene therapy, Requirements of gene therapy, Genetic defects, Target cells for gene therapy, process of gene therapy, Factors responsible for gene therapy for making effective treatment of genetic disease, Recent developments in gene therapy research, ethical considerations of gene therapy.

UNIT V ADVANCES IN TISSUE ENGINEERING

(9)

Development of artificial tissues; Transplantation biology: Tissue typing, Techniques of tissue typing, Minor histocompatibility antigens, Immuno-suppression, Side effects of immuno- suppression.

Total Hours: 45

TEXT BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Bhojwani, S. S. Razdan, M. K.	Plant Tissue Culture (Theory and Practice)	Elseveir	1996
2	Ranga , M. M	Animal Biotechnology	Agrobios	2010
3	Watson, J. D. and Gilman, M.	Recombinant DNA	Scientific American Books	1992

Course Objectives

- To understand the variations of stoichiometry and kinetics of biochemical operations.
- To classify the different activities of microbes in waste water treatment.
- To record the basic notion on design and evaluation of growth process.
- To differentiate and organize the distinct methods for modeling reactors..
- To explain the basic applications of bioreactors.
- To discuss the problems related to biochemical operations in different industries.

Course Outcomes

1. Compare and contrast fundamentals and properties of biochemical operations.
2. Demonstrate various waste water treatment activities through biological methods.
3. Prioritize design and evaluation of growth process in bioreactors.
4. Construct and design the methods for modeling bioreactors.
5. Apply the knowledge on applications of modeling bioreactors.
6. Examine and solve the problems related to biochemical operations in different industries.

UNIT I BIOCHEMICAL OPERATIONS (8)

Classification of Biochemical operations, fundamentals of biochemical operations, Stoichiometry and Kinetics of Biochemical Operations.

UNIT II REACTORS IN WASTE WATER TREATMENT (10)

Theory, modeling of ideal suspended Growth Reactors, Modeling Suspended Growth Systems. Aerobic Growth of Heterotrophs in a single Continuous Stirred Tank, Reactor Receiving Soluble Substrate, Multiple Microbial Activities in a Single Continuous Stirred Tank Reactor, Multiple Microbial Activities in Complex Systems, Techniques for Evaluating Kinetics and Stoichiometric parameters.

UNIT III PROCESSES IN WASTE WATER TREATMENT (9)

Applications: Suspended Growth Reactors, Design and Evaluation of Suspended Growth Processes, Activated Sludge, Biological Nutrient Removal, Aerobic – digestion, Anaerobic Processes, Lagoons.

UNIT IV MODELING OF REACTORS (9)

Theory: Modeling of Ideal Attached Growth Reactors, Bio- film Modeling. Aerobic Growth of Biomass in Packed Towers, Aerobic Growth of Heterotrophs in Rotating Disc Reactors, Fluidized Bed Biological Reactors.

UNIT V APPLICATIONS OF BIOREACTORS (9)

Attached Growth Reactors, Trickling Filter, Rotating Biological Contactor, Submerged Attached Growth Bioreactors, Future Challenges, Fate and Effects of Xenobiotic Organic Chemicals.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M. Henze	Biological Wastewater Treatment: Principles, Modelling and Design	IWA Publishing	2008
2	Graty. C.P.L.Daigger, G and Lim, H.C	Biological Wastewater Treatment	Marcel Dekker	1998

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Mizahi A	Biological Waste Treatment	John Wiley Sons Inc	1989

Course Objectives

- To understand the basic properties of biomaterials.
- To explain the biocompatibility of biomaterials.
- To discuss the properties of various implant materials.
- To infer the basic knowledge on various polymeric implant materials.
- To explain about the tissue replacement implants.
- To describe the functions and importance of artificial organs.

Course Outcomes

1. Summarize the basic properties of biomaterials.
2. Discuss the biocompatibility of biomaterials.
3. List the properties and importance of various implant materials.
4. Explain the properties and functions of polymeric implant materials.
5. Tell about the tissue replacement implants.
6. Describe the importance and functions of artificial organs.

UNIT I STRUCTURE OF BIO-MATERIALS AND BIO-COMPATIBILITY (9)

Definition and classification of bio-materials, mechanical properties, visco elasticity, wound healing process, body response to implants, blood compatibility.

UNIT II IMPLANT MATERIALS (9)

Metallic implant materials, stainless steels, co-based alloys, Ti-based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite glass ceramics carbons, medical applications.

UNIT III POLYMERIC IMPLANT MATERIALS (9)

Polymerisation, polyolefin, polyamides, Acrylic, polymers, rubbers, high strength thermoplastics, medical applications.

UNIT IV TISSUE REPLACEMENT IMPLANTS (9)

Soft-tissue replacements, sutures, surgical tapes, adhesive, percutaneous and skin implants, maxillofacial augmentation, blood interfacing implants, hard tissue replacement implants, internal fracture fixation devices, joint replacements.

UNIT V ARTIFICIAL ORGANS (9)

Artificial Heart, Prosthetic Cardiac Valves, Limb prosthesis, Externally Powered limb Prosthesis, Dental Implants.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Park J.B	Biomaterials Science and Engineering	Plenum Press	1984
2	Rater B.D	Biomaterials Sciences – An Introduction to Materials in Medicine	Academic Press	2004
3	Joon Bu Park, Joseph D. Bronzino	Biomaterials: principles and applications'	CRC press, USA	2003

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	TeohSweeHin, SweeHinTeoh	Engineering materials for biomedical applications	World Scientific Publishing Co, USA	2004
2	Sujata V. Bhat	Biomaterials	Narosa Publishing House, New Delhi	2002

Course Objectives

- To understand the basic concept on animal cell as bioreactors.
- To explain the gene expression and cell based expression.
- To describe the media preparation for animal cells to grow.
- To infer the basic knowledge on cellular metabolism for obtaining optimum yield.
- To explain the various downstream processing for cell culture production.
- To discuss the characterization techniques for the produced recombinant products.

Course Outcomes

1. Summarize the basic concepts on animal cell as bioreactor.
2. Discuss the gene expression and cell based expression.
3. Describe the generation of biomass as media source for cells to grow.
4. Explain the cellular metabolism for optimum yield.
5. Tell about the basic downstream process for purification.
6. Describe the characterization of produced recombinant products.

UNIT I INTRODUCTION (9)

Introducing animal cells as bioreactors-genetically engineered microbial system –limitations-Animal cell technology for Industrial products-

UNIT II ENGINEERING OF CELLS (9)

Engineering cells for maximum expression- transient expression system- stable expression system- dominant control regions- Factors governing heterologous gene expression- production of heterologous protein using lymphoid cell based expression system- improving translational efficiency

UNIT III GENERATION OF BIOMASS (9)

Generation of Biomass-media for animal cell culture- serum free media- medium design- Engineering a new medium-Fermentor design for animal cell culture-suspension cell culture- Immobilised cells

UNIT IV CELLULAR METABOLISM AND OPTIMUM YIELD (9)

Cellular metabolism for optimum yields-Effect of culture condition on protein glycosylation-culture parameters that affect yield

UNIT V DOWNSTREAM PROCESSING (9)

Downstream processing- production of effective and safe biopharmaceuticals-challenges in purification-Characterisation of recombinant protein production-regulatory aspects of using cells as bioreactors-viral contamination of animal cell derived pharmaceuticals and prevention

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	. R.IanFreshney	Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications	Wiley- Blackwell	2010
2	Glyn Stacey, John Davis	Medicines from Animal Cell Culture	John Wiley & Sons, Ltd.	2007
3	Terence Cartwright	Animal cells as bioreactors	Cambridge University Press.	2009

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Basant Kumar Sinha and RineshKumar	Principles of Animal cell culture	International book distributing Co.ltd.	2008.
2	Jeffrey W.Pollard and John M.Walker	Animal cell culture.	Springer- Verlag.	1990

Course Objectives

- To explain basic knowledge on nanotechnology.
- To demonstrate the structural and functional principles of bionanotechnology.
- To discuss various methods for microfluidic components.
- To explain the effects of various protein and DNA based nanostructures.
- To outline the basic concepts of nanoparticles in cancer therapy.
- To identify the different nanoparticles using different controlling measures.

Course Outcomes

1. Summarize the characteristics different nanoparticles.
2. Evaluate the different structural and functional principles of biotechnology.
3. Explain the microfluidic devices.
4. Discuss the protein and DNA based nanostructures.
5. Recognize cancer curingnanoparticles.
6. Identify and list different nanoparticles for different controlling measures.

UNIT-I INTRODUCTION TO NANOTECHNOLOGY (9)

Background and definition of nanotechnology, chemical bonds in nanotechnology – Scales at the bio-nano interface – Basic capabilities of nanobiotechnology and nanomedicine – Biological tradition and mechanical tradition biotechnology – Applications in biotechnology.

UNIT-II STRUCTURAL AND FUNCTIONAL PRINCIPLES OF BIONANOTECHNOLOGY (9)

Biomolecular structure and stability – Protein folding – Self-assembly – Self-organization –Molecular recognition – Flexibility – Information – Driven nanoassembly – Energetics –Chemical transformation – Regulation – Biomaterials – Biomolecular motors – Traffic across membranes – Biomolecular sensing – Self-replication – Machine-phase bionanotechnology.

UNIT-III MICROFLUIDICS MEETS NANO (9)

Concepts and advantages of microfluidic devices – Materials and methods for the manufacture of microfluidic component – Fluidic structures – Surface modifications – Lab-on-a-chip for biochemical analysis.

UNIT-IV PROTEIN-BASED NANOSTRUCTURES (9)

S-Layers – Engineered nanopores – Microbial nanoparticle production – Magnetosomes –Nanoscale magnetic iron minerals in bacteria – Nanoparticle – Biomaterial hybrid systems.

UNIT-V DNA-BASED NANOSTRUCTURES

(9)

DNA-Protein nanostructures – Biomimetic fabrication of DNA based metallic nanowires and networks –
DNA-Gold nanoparticle conjugates – Nanoparticles as non-viral transfection agents.

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer- Verlag Berlin Heidelberg	2004
3	Freitas Jr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

Course Objectives

- To explain descriptive views of clinical practices and its scope.
- To illustrate Differentiating ethical theories and foundations of clinical trials.
- To discuss various evolution and regulation of clinical research.
- To evaluate various designing protocols and amendments of clinical research.
- To interpret different biostatistics and data management.
- To create data on different clinical research.

Course Outcomes

1. Elaborate the concept of scope and types of clinical research.
2. Evaluate the ethical theories of clinical research.
3. Discuss the history and regulation of clinical research.
4. Explain the various protocol developments in clinical research.
5. Identify basic views in different situations of biostatistics in clinical trials.
6. Make up perspective techniques and create data on different clinical research.

UNIT I INTRODUCTION TO CLINICAL RESEARCH (9)

Definition, Types and Scope of Clinical Research, Good Clinical Practices - Introduction to study designs and clinical trials - Careers in Clinical Research.

UNIT II ETHICS IN CLINICAL RESEARCH (9)

Ethical Theories and Foundations, Ethics Review Committee, Ethics and Historically derived principles - Nuremberg Code, Declaration of Helsinki, Belmont Report, Equipoise, Informed consent, Integrity & Misconduct.

UNIT III REGULATIONS IN CLINICAL RESEARCH (9)

Evolution and History of Regulations in Clinical Research, Patents US Regulatory Structure, IND, NDA, ANDA, Post Drug Approval Activities, PMS, FDA Audits and Inspections EU Regulatory Affairs, EMEA Organization and Function, INDIAN Regulatory system, Schedule Y- Rules and Regulations, Description of trial phases (Phase 0, Phase I, II, III, and IV), Trial contexts (types of trials: pharma, devices, etc.), Trial examples

UNIT IV CLINICAL RESEARCH METHODOLOGY AND MANAGEMENT (9)

Designing of Protocol, CRF, e-CRF, IB, ICF, SOP ; Study Protocol -Introduction, background, Objectives - Eligibility, Design, Randomization - Intervention details, assessments and data collection, case report forms –Violations -. Amendments. Study/ Trial Design- Phase I designs - Dose-finding designs. Phase II designs - Pilot studies, Single arm, Historical control designs. Phase III designs - Factorial designs, Crossover designs, Multicenter studies, Pilot studies. Phase IV designs- Preparation of a successful clinical study, Study management, Project management Documentation, Monitoring, Audits and Inspections, Pharmacovigilance training in clinical research budgeting in clinical research, Supplies and vendor management.

UNIT V BIostatISTICS AND DATA MANAGEMENT (9)

Introduction to Power and Sample Size- Hypothesis testing, P-values, confidence intervals, General power/sample size, estimating effect size, Matching sample size calculations to endpoints. Importance of statistics in clinical research Statistical considerations at the design, analysis and reporting stage Data management - Data collection, Paper or electronic, Parsimony, Data validation, SAE reconciliation, query management Software considerations. Data Monitoring, Trial Conduct - Data quality assurance, Data delinquency, Data Monitoring, d. Trial Conduct, Occurrence and control of variation and bias.

Total Hours: 45

TEXT BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Friedman,L. M., Furberg, C. and DeMets, D.	Fundamentals of Clinical Trials (4th Edition)”	Springer	2010
2	Machin, D. and Fayers, P	Randomized Clinical Trials: Design, Practice and Reporting	Wiley-Blackwell	2010
3	Piantadosi, S.	Clinical Trials: A Methodologic Perspective	John Wiley & Sons	2005

Course Objectives

- To explain descriptive properties of seawater.
- To illustrate differentiating marine organisms and their industrial applications.
- To discriminate various pollution controlling marine organisms.
- To evaluate various marine toxins used in pharmaceutical industries.
- To interpret recombinations in marine aquaculture.
- To understand the usage of marine organism for different situations.

Course Outcomes

1. Discuss the basic knowledge on biogeochemical cycles.
2. Organize and manage marine organism in different industries.
3. Organize and manage pollution controlling measures through marine organisms.
4. Perceive the basics on combining marine toxins in pharma industries.
5. Compile different proteins of marine organism to develop a new variety.
6. Explain how to use marine organism for different situations.

UNIT I INTRODUCTION TO MARINE ENVIRONMENT (9)

World oceans and seas – ocean currents – physical and chemical properties of sea water – abiotic and biotic factors of the sea – ecological divisions of the sea – history of marine biology – biogeochemical cycles – food chain and food web.

UNIT II MARINE ORGANISMS AND THEIR INDUSTRIAL APPLICATIONS (9)

Phytoplanktons – zooplanktons – nektons – benthos – marine mammals – marine algae – mangroves – coral reefs – algal products, fuels from algae, algal cell culture

UNIT III MARINE ENVIRONMENTAL BIOTECHNOLOGY (9)

Marine pollution – biological indicators (marine micro , algae) – biodegradation & bioremediation – marine fouling and corrosion.

UNIT IV MARINE PHARMACOLOGY (9)

Medicinal compounds from marine flora and fauna – marine toxins , anti cancer agents, antiviral and antimicrobial agents. Marine Toxins

UNIT V AQUACULTURE TECHNOLOGY (9)

Importance of coastal aquaculture – marine fishery resources – common fishing crafts and gears – Aqua farm design and construction, transgenic fish.

Total Hours: 45

TEXT BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	M.Fingerman , R . Nagabhushanam	Recent advances in marine biotechnology volume 3	Mary Frances Thomson	1999
2	M.Fingerman , R . Nagabhushanam	Recent advances in marine biotechnology volume 2	Science publishers	1999
3	E. W. Becker	Microalgae: Biotechnology and Microbiology	Cambridge University Press	1994
	Jasper S. Lee, Michael E. Newman	Aquaculture: An Introduction	Interstate Publishers, Incorporated	1992

UNIT IV FORENSIC DIGITAL IMAGING

(9)

Introduction, Digital cameras and forensic imaging, image acquisition technique. Methods and applications, Authenticity, image processing. Technical investigation on image storage media. Digital image processing- sharpening, contrast, blur soomthing, digital videos and scanners, presenting pictures in courtroom, internet crime. Forgery and stegnography, Voice analysis. Detecting compression and forgeries and Maintaining Records, Hand Writing analysis. Computerized facial reconstruction.

UNIT V FORENSIC ETHICS

(9)

Introduction and importance of Professional ethics in Forensic Science, organizational forensic Science ethics, Code of ethics in Forensic Science Practice. Standard for Good Forensic practice. Ethical problems in ethical forensic sciences. Ethical Dilemmas

Total Hours: 45

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Jay Siegal, Geoffrey Knuper, Pekku Saukko	Enyclopedia of Forensic Sciences, Three-volume SET1- 3	Elsvier book publication	2000
2	Max M. Houck	Forensic Science: Modern methods of solving problems	Praeger West Port London	2007
3	Ayn Embar- Seddon, Allan D. Pals	Forensic Science	Salem Press, Inc. Paradena, California	2009
4	Jami J. St Clair	Crime Laboratory Management	Academic Press	2002

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Richard Saperstein	Criminalistics: An Introduction to Forensic Science	Prentice Hall	2001
2	David Ellen	The Scientific Examination of Documents Methods and Techniques	Taylor and Francis	2003

Course Objectives

- To explain cell disruption techniques.
- To illustrate different chromatographic methods for separation of active components.
- To discriminate separation techniques for analyzing the biological samples.
- To discuss the importance of separation of biomolecules from a mixture..
- To describe the isolation, purification and behavior of biomolecules.
- To understand the basic downstream process for treating the samples.

Course Outcomes

1. Discuss the basic knowledge on forensic activities.
2. Analyze the forensic criminalities.
3. Describe the analysis for the evidences of forensic samples.
4. Perceive the procedure for forensic sample analyzing using different assays.
5. Compile different properties and functions of digital imaging in forensic.
6. Explain the forensic ethics.

UNIT I CELL DISRUPTION (9)

Mechanical and enzymatic methods of cell disruption, importance of cell disruption in product release, homogenization, ultrasonication, extraction, absorption, adsorption.

UNIT II CHROMATOGRAPHIC METHODS (9)

Chromatographic methods, paper chromatography, thin layer chromatography, gas chromatography, GLC, HPLC, affinity chromatography, ion exchange chromatography, reverse phase chromatography

UNIT III SEPARATION TECHNIQUES (9)

Basic separation techniques: sedimentation, centrifugation, ultra centrifugation, gradient centrifugation, filtration, micro/ ultra filtration, use of membranes (semi permeable) in purification, reverse osmosis. Separation of bioconversion products/ secondary metabolites e.g. Steroids and antibiotics.

UNIT IV PHYSICO-CHEMICAL SEPARATION (9)

Importance of separation techniques in biotechnology, its scope from research to industry, chemical, physical and biochemical aspects of separation and isolation, purification of biomolecules. Behavior of biomolecules in body fluids

UNIT V DOWNSTREAM PROCESSES (9)

Leaching, crystallization, lyophilization, drying. Chemistry of extraction, selection of solvent, use of solvent extraction in antibiotic separation, affinity extraction/ chromatography. Industrial applications with examples.

TEXTBOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	P.A. Belter, E.L. Cussler And Wei-Houhu	Bioseparations – Downstream Processing For Biotechnology	Wiley Interscience Pub	1988
2	R.O. Jenkins, (Ed.)	Product Recovery In Bioprocess Technology – Biotechnology By Open Learning Series	Butterworth-Heinemann	1992

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R.K. Scopes	Protein Purification – Principles And Practice	Narosa Pub	1994
2	Roger.G . Harrison , Paul Todd , Scott R.Rudge and DemetriP.Petrides	Bioseparation Science and Engineering	Oxford University Press	2003

OPEN ELECTIVES

OPEN ELECTIVES OFFERED BY BIOTECHNOLOGY

Course Objectives:

- To impart basic knowledge in bioprocess Engineering
- To design the bioreactors for various operations.
- To understand the principle and working of heat transfer equipments.
- To extend the knowledge in principle of heat transfer inside a bioreactor
- To construct the equipments used in mass transfer operations.
- To learn the equipments used in separation process.

Course Outcomes:

- Summarize the basic concepts in bioprocess Engineering.
- Design the bioreactors for various operations.
- Develop the heat transfer equipments for Bioprocess Engineering.
- Elaborate the principle of heat transfer in bioreactor.
- Construct the equipments used in mass transfer operations.
- Categorize the equipments used in separation process.

UNIT I ENGINEERING PROPERTIES AND STORAGE TANK (9)

Introduction to various mechanical properties of material to be used material of construction, design of cylindrical storage tank.

UNIT II REACTOR DESIGN (9)

Design of Airlift fermentor, Bubble column reactor and Continuous stirred tank reactor.

UNIT III HEAT TRANSFER EQUIPMENTS

(9) Design of Shell and tube Heat exchanger, Double pipe heat exchanger, long tube vertical evaporator and forced circulation evaporator.

UNIT IV MASS TRANSFER EQUIPMENTS (9)

Design of Bollmann extractor, fractionating column, packed tower and spray tray absorber

UNIT V SEPERATION EQUIPMENTS

(9) Design of plate and frame filter press, leaf filter, rotary drum filter, disc bowl centrifuge, rotart drum drier and Swenson –walker crystallizer.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	James Edwin Bailey, David F. Ollis	Biochemical Engineering Fundamentals	McGraw-Hill	2007
2	Don W. Green, Robert H. Perry	Chemical Engineer Hand book	The McGraw- Hill	2008
			Companies, Inc.	

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Pauline. M. Doran	Bioprocess Engineering Principles	Academic Press	2013

Course Objectives

- To learn the scope and importance of food processing.
- To impart basic knowledge in different food processing methods carried out in the food tech companies.
- To extend the brief knowledge in food conservation operations.
- To study the methods of food preservation by cooling.
- To familiarize the students on the concepts of preservation methods for fruits.
- To create deeper understanding on preservation methods for vegetables.

Course Outcomes

- Describe the scope and importance of food processing.
- Outline the various processing methods for foods.
- Extend the knowledge in food conservation operations.
- Describe the methods of food preservation by cooling.
- Summarize the preservation methods for fruits.
- Demonstrate the preservation methods for vegetables.

UNIT I SCOPE AND IMPORTANCE OF FOOD PROCESSING (9)

Properties of food- Physical, thermal, mechanical, sensory. Raw material Preparation - Cleaning, sorting, grading, peeling.

UNIT II PROCESSING METHODS (9)

Heating- Blanching and Pasteurization. Freezing- Dehydration- canning- additives- fermentation- extrusion cooking- hydrostatic pressure cooking- dielectric heating- micro wave processing and aseptic processing – Infra red radiation processing- Concepts and equipment used.

UNIT III FOOD CONVERSION OPERATIONS (9)

Size reduction- Fibrous foods, dry foods and liquid foods- Theory and equipments- membrane separation- filtration- equipment and application.

UNIT IV FOOD PRESERVATION BY COOLING (9)

Refrigeration, Freezing-Theory, freezing time calculation, methods of freezing, freezing equipments, freeze drying, freeze concentration, thawing, effect of low temperature on food. Water activity, methods to control water activity.

UNIT V PRESERVATION METHODS FOR FRUITS AND VEGETABLES (9)

Pre processing operations - preservation by reduction of water content: drying / dehydration and concentration – chemical preservation – preservation of vegetables by acidification, preservation with sugar - Heat preservation– Food irradiation- Combined preservation techniques.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	R. Paul Singh, Dennis R. Heldman	Introduction to food engineering.	Academic Press	2001
2	P.Fellows.	Food Processing Technology, Principles and practice.	Wood head Publishing Ltd	2000
3	Mircea Enachescu Dauthy	Fruit and Vegetable Processing	FAO agricultural services bulletin	1995

REFERENCE BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta	Engineering properties of foods	CRC Press	2005
2	B. Sivasankar	Food processing and preservation	PHI Learning Pvt. Ltd	2002

Course Objectives

- To learn the scope and importance of Molecular modeling.
- To impart basic knowledge in quantum mechanics.
- To familiarize the students on the concepts of molecular mechanics.
- To extend the brief knowledge in molecular dynamics simulation.
- To study the drug design by using modeling tools.
- To understand molecular docking and ligand based drug design methods

Course Outcomes

- Summarize the importance of Molecular modeling.
- Extend the knowledge in quantum mechanics
- Analyze the general features of molecular mechanics.
- Illustrate the molecular dynamics by using simple models.
- Outline the drug design by using modeling tools.
- Describe the molecular docking and ligand based drug design methods

UNIT-I MOLECULAR MODELLING**(9)**

Introduction to concept of molecular modeling, molecular structure and internal energy, applications of molecular graphics, coordinate systems, potential energy surfaces, discussion of local and global energy minima

UNIT-II QUANTUM MECHANICS**(9)**

Introduction to the computational quantum mechanics; one electron atom, many electronic atoms and molecules, Hartree Fock equations; calculating molecular properties using ab initio and semi empirical methods.

UNIT-III MOLECULAR MECHANICS**(9)**

Molecular mechanics; general features of molecular mechanics force field, bond stretching, angle bending, torsional terms, non – bonded interactions; force field parameterization and transferability; energy minimization; derivative and non – derivative methods, applications of energy minimization.

UNIT-IV MOLECULAR DYNAMICS**(9)**

Molecular dynamics simulation methods; molecular dynamics using simple models, molecular dynamics with continuous potential, setting up and running a molecular dynamic simulation, constraint dynamics; Monte Carlo simulation; Monte Carlo simulation of molecules.

UNIT-V MODELLING AND DRUG DESIGN

(9)

Macromolecular modeling, design of ligands for known macro molecular target sites, Drug- receptor interaction, classical SAR /QSAR studies and their implications to the 3 D modeler, 2-D and 3-D database searching, pharmacophore identification and novel drug design, molecular docking, Structure-based drug design for all classes of targets.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Andrew Leach	Molecular Modelling: Principles and Applications	Prentice Hall	2001
2	N. Claude Cohen	Guidebook on Molecular Modeling in Drug Design	Academic Press	1996

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Yvonne C. Martin, editor, Peter Willett	Designing bioactive molecules : three- dimension techniques and applications	Washington, DC : American Chemical Society	1998
2	Matthew F. Schlecht	Molecular Modeling on the PC	Wiley- Blackwell; H	1998

Course Objectives

- To impart basic knowledge in Bioremediation.
- To study the different bio filters and bio film processes.
- To understand the concept of bioremediation for soil environment.
- To extend the knowledge in filtration processes of bioremediation.
- To learn about the bioremediation of metals.
- To apply the concept of bioremediation to reduce pollution.

Course Outcomes:

- Summarize the basic concepts in Bioremediation.
- Design the bio filters and bio film processes.
- Elaborate the concept of bioremediation for soil environment.
- Construct the filtration processes of bioremediation.
- Describe the bioremediation of metals.
- Outline the concept of bioremediation to reduce pollution.

UNIT-I OVERVIEW OF BIOREMEDIATION (9)

Pollution: Types and its consequences, History of bioremediation, Sources of contamination, Bioremediation processes, Environments where bioremediation is used, Microbiology of bioremediation.

UNIT-II BIOFILM PROCESSES (9)

Trickling Filters and Biological Towers, Rotating Biological Contactors, Granular Media Filters, Fluidized-bed Reactors, Hybrid Biofilm Processes

UNIT-III BIOREMEDIATION FOR SOIL ENVIRONMENT (9)

Environment of Soil Microorganisms, Soil Organic Matter and Characteristics, Soil Microorganisms Association with Plants, Pesticides and Microorganisms, Petroleum Hydrocarbons and Microorganisms, Industrial solvents and Microorganism, Biotechnologies for Ex-Situ Remediation & in-Situ Remediation of Soil Phytoremediation Technology for Soil Decontamination

UNIT-IV BIOREMEDIATION FOR AIR AND WATER ENVIRONMEN (9)

Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream- Biofiltration, Biotrickling Filtration, Bioscrubbers, Contaminants in Groundwater, Landfill Leachate Biotreatment Technologies, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters

UNIT-V BIOREMEDIATION OF METALS

(9)

Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioleaching and Biobenificiation, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Rittmann, B.E., and McCarty, P.L.,	Environmental Biotechnology : Principles and Applications.	McGraw Hill,	2001
2	John Cookson	Bioremediation Engineering: Design and Applications	McGraw- Hill Education	1995

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Prescott, L. M., Harley, and Klein, D. A	Microbiology	McGraw- Hill Higher Education	2008

Course Objectives

- To learn the molecular structure of biological systems.
- To impart basic knowledge in conformation of nucleic acids.
- To familiarize the students on the concepts of conformation of proteins.
- To extend the brief knowledge in kinetics of ligand interactions.
- To understand the techniques for the study of biological structure & function.
- To study the transport and dynamics properties of biological systems.

Course Outcomes

- Summarize the importance of molecular structure of biological systems.
- Extend the knowledge in conformation of nucleic acids.
- Analyze the concepts of conformation of proteins.
- Illustrate the kinetics of ligand interactions.
- Outline the techniques for the study of biological structure & function.
- Describe the transport and dynamics properties of biological systems.

UNIT I MOLECULAR STRUCTURE OF BIOLOGICAL SYSTEMS (9)

Intramolecular bonds – covalent – ionic and hydrogen bonds – biological structures -general features – water structure – hydration – interfacial phenomena and membranes – self assembly and molecular structure of membranes.

UNIT II CONFORMATION OF NUCLEIC ACIDS (9)

Primary structure – the bases – sugars and the phosphodiester bonds- double helical structure – A, B and Z forms – properties of circular DNA – topology – polymorphism and flexibility of DNA – structure of ribonucleic acids – hydration of nucleic acids.

UNIT III CONFORMATION OF PROTEINS (9)

Conformation of the peptide bond – secondary structures – ramachandran plots – use of potential functions – tertiary structure – folding – hydration of proteins – hydropathy index.

UNIT IV ENERGETICS & DYNAMICS OF BIOLOGICAL SYSTEMS (9)

Kinetics of ligand interactions; Biochemical kinetics studies, uni-molecular reactions, simple bi molecular multiple intermediates, steady state kinetics, catalytic efficiency, relaxation spectrometry, ribonuclease as an example.

UNIT V APPLIED TECHNIQUES (9)

Techniques for the study of biological structure & function: Size and shape of macromolecules – methods of direct visualization macromolecules as hydrodynamic particles – macromolecules diffusion – ultra centrifugation – viscometry x-ray crystallography determination of molecular structures, X-ray fibre diffraction electron microscopy neutron scattering – light scattering.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Roland Glaser	Biophysics	Springer Science & Business Media	2001
2	Michel Daune	Molecular Biophysics: Structures in Motion	Oxford University Press	1999
3	Charles R. Cantor	Biophysical Chemistry, Part 2: Techniques for the Study of Biological Structure and Function	W. H. Freeman and Company	1980

Course Objectives

- To understand the available tools and databases for performing research in bioinformatics.
- To expose students to sequence alignment tool in bioinformatics.
- To construct the phylogenetic trees for evolution.
- To get familiar with the 3D structure of protein and classification.
- To acquire basic knowledge in protein secondary structure prediction.
- To extend the brief knowledge in Micro array data analysis.

Course Outcomes

- Summarize the basic concepts and importance of Bioinformatics in various sectors.
- Demonstrate the sequence alignment tool in bioinformatics.
- Construct the phylogenetic trees for evolution.
- Analyze the three dimensional protein structure and classification using various tools.
- Illustrate the protein secondary structure prediction by comparative modeling.
- Extend the knowledge in micro array technology and applications of bioinformatics in various sectors.

UNIT I OVERVIEW OF BIOINFORMATICS**(9)**

The scope of bioinformatics; bioinformatics & the internet; useful bioinformatics sites. Data acquisition: sequencing DNA, RNA & proteins; determination of protein structure; gene & protein expression data; protein interaction data. Databases – contents, structure & annotation: file formats; annotated sequence databases; miscellaneous databases.

UNIT II RETRIEVAL OF BIOLOGICAL DATA**(9)**

Data retrieval with Entrez & DBGET/ LinkDB; data retrieval with SRS (sequence retrieval system). Searching sequence databases by sequence similarity criteria: sequence similarity searches; amino acid substitution matrices; database searches, FASTA & BLAST; sequence filters; iterative database searches & PSI-BLAST. Multiple-sequence alignment, gene & protein families: multiple-sequence alignment & family relationships; protein families & pattern databases; protein domain families.

UNIT III PHYLOGENETICS**(9)** Phylogenetics,

cladistics & ontology; building phylogenetic trees; evolution of macromolecular sequences. Sequence annotation: principles of genome annotation; annotation tools & resources.

UNIT IV STRUCTURAL BIOINFORMATICS**(9)** Conceptual

models of protein structure; the relationship of protein three-dimensional structure to protein function; the evolution of protein structure & function; obtaining, viewing & analyzing structural data; structural alignment; classification of proteins of known three-dimensional structure: CATH & SCOP; introduction to protein structure prediction; structure prediction by comparative modeling; secondary structure prediction; advanced protein structure prediction & prediction strategies.

UNIT V MICROARRAY DATA ANALYSIS**(9)**

Microarray data, analysis methods; microarray data, tools & resources; sequence sampling & SAGE. Bioinformatics in pharmaceutical industry: informatics & drug discovery; pharmainformatics resources. Basic principles of computing in bioinformatics: running computer software; computer operating systems; software downloading & installation; database management.

TEXTBOOK

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Dan E. Krane, Michael L. Rayne	Fundamental Concepts of Bioinformatics	Pearson education	2004
2	Andreas D. Baxevanis, B. F. Francis Ouellette	Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins	Wiley-Interscience	2004
3	David W. Mount	Sequence and Genome Analysis	Cold Spring Harbor Laboratory	2004
4	Jonathan Pevsner	Bioinformatics and Functional Genomics	Wiley-Liss	2003

REFERENCE BOOKS

S. No.	Author (s) Name	Title of the book	Publisher	Year of Publication
1	Michael J. Korenberg	Microarray Data Analysis: Methods and Applications	Springer Science & Business Media	2007

Course Objectives

- To impart the skills in the field of nano biotechnology and its applications.
- To acquire knowledge in the nano particles and its significance in various fields.
- To extend the knowledge in types and application of nano particles in sensors.
- To equip students with clinical applications of nano devices.
- To understand the ethical issues in nanotechnology.
- To describe deeper understanding of the socio-economic issues in nanobiotechnology.

Course Outcomes

- Develop skills in the field of nano biotechnology and its applications.
- Summarize the nanoparticles and its significance in various fields.
- Extend the knowledge in types and application of nano particles in sensors.
- Summarize the ethical issues in nanotechnology.
- Outline the clinical applications of nano devices.
- Describe the socio-economic issues in nanobiotechnology.

UNIT I INTRODUCTION**(9)**

Introduction, Scope and Overview, Length scales , Importance of Nanoscale and Technology, History of Nanotechnology, Future of Nanotechnology: Nano Technology Revolution, Silicon based Technology, Benefits and challenges in Molecular manufacturing: The Molecular assembler concept, Controversies and confusions, Understanding advanced capabilities, Nanotechnology in Different, Fields: Nanobiotechnology, Materials, Medicine, Dental care.

UNIT II NANO PARTICLES**(9)**

Introduction, Types of Nanoparticles, Techniques to Synthesize Nanoparticles, Characterization of Nanoparticles, Applications, Toxic effects of Nanomaterials, Significance of Nanoparticles Nanofabrications- MEMS/NEMS, Atomic Force Microscopy, Self assembled monolayers/ Dip- pen Nanolithography, Soft Lithography, PDMS Molding, Nano Particles, Nano wires and Nanotubes.

UNIT III APPLICATIONS**(9)**

Nanomedicine, Nanobiocensor and Nanofluidics. Nanocrystals in biological detection, Electrochemical DNA sensors and Integrated Nanoliter systems. Nano-Biodevices and Systems. Fabrication of Novel Biomaterials through molecular self assembly- Small scale systems for in vivo drug delivery- Future nanomachine.

UNIT IV NANOBIOTECHNOLOGY**(9)**

Clinical applications of nanodevices. Artificial neurons. Real-time nanosensors- Applications in cancer biology. Nanomedicine. Synthetic retinyl chips based on bacteriorhodopsins. High throughput DNA sequencing with nanocarbon tubules. Nanosurgical devices.

UNIT V ETHICAL ISSUES IN NANOTECHNOLOGY**(9)**

Introduction, Socioeconomic Challenges, Ethical Issues in Nanotechnology: With Especial Reference to Nanomedicine, Nanomedicine Applied in Nonmedical Contexts, Social Issues Relating to Nanomedicine. Social and Ethical Issues, Economic Impacts, Other Issues, Nanotechnology and Future Socio-economic challenges.

TEXT BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Niemeyer, C.M. and Mirkin, C.A	Nanobiotechnology: Concepts, Applications and Perspectives	Wiley- VCH	2004
2	Goodsell, D.S.	Bionanotechnology	John Wiley and Sons, Inc	2004

REFERENCE BOOKS

S.No.	Author(s) Name	Title of the book	Publisher	Year of Publications
1	Shoseyov, O. and Levy, I	Nanobiotechnology: Bioinspired Devices and Materials of the Future	Humana Press	2007
2	Bhushan, B.	Springer Handbook of Nanotechnology	Springer- Verlag Berli Heidelberg	2004
3	Freitas Jr R.A	Nanomedicine	Landes Biosciences	2004
4	Kohler, M. and Fritzsche, W.	Nanotechnology – An Introduction to Nanostructuring Techniques	Wiley- VCH	2004

**OPEN ELECTIVES OFFERED BY SCIENCE &
HUMANITIES**

OBJECTIVES:

- To develop analytical skills for solving engineering problems
- To teach the students the basic concepts of LPP,
- To learn the techniques to solve transportation and Assignment problems
- To make the students to study about the Integer Programming and Network Analysis
- To Analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To acquaint the student to solve problems in different environments and develop critical thinking

INTENDED OUTCOMES:

- To define and formulate linear programming problems and appreciate their limitations.
- To solve linear programming problems using appropriate techniques and optimization solvers, interpret the results obtained and translate solutions into directives for action.
- To be able to build and solve Transportation Models, Assignment Models,
- To construct linear integer programming models and discuss the solution techniques.
- To formulate and solve problems as networks and graphs.
- To be able to solve problems in different environments and develop critical thinking

UNIT I LINEAR PROGRAMMING PROBLEM

Formulation of LPP - Graphical Method - Simplex Method - Artificial variable technique and two phase simplex method. Duality - Dual and simplex method - Dual Simplex Method .

UNIT II TRANSPORTATION PROBLEM

Transportation Model, finding initial basic feasible solutions, moving towards optimality, Degeneracy.

UNIT III ASSIGNMENT PROBLEM

Solution of an Assignment problem, Multiple Solution, Hungarian Algorithm, Maximization in Assignment Model, Impossible Assignment.

UNIT IV INTEGER PROGRAMMING

Integer Programming Problem – Gomory's fractional cut Method – Branch Bound Method

UNIT V NETWORK ANALYSIS

PERT & CPM- network diagram-probability of achieving completion date- crash time- cost analysis.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2008

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P.,	Operations Research	Pearson Education,	2003
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research,	Cengage Learning	2004

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.mit.edu

OBJECTIVES:

- To kindle analytical skills for solving engineering problems
- To impact the knowledge about inventory models
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making.
- To analyse the results and propose recommendations to the decision-making processes in Management Engineering
- To enhance the students to solve problems using non integer programming.

INTENDED OUTCOMES:

The students will

- To be able to solve simple models in Inventory problems and Replacement problems.
- To understand different queuing situations and find the optimal solutions using models for different situations.
- Simulate different real life probabilistic situations using Monte Carlo simulation technique.
- To be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and **solve** the practical situations into replacement models.
- To understand how to model and solve problems using non integer programming.

UNIT – I INVENTORY MODELS

Economic order quantity models-techniques in inventory management-ABC analysis.

UNIT – II NON LINEAR PROGRAMMING

Khun-tucker conditions with non-negative constraints- Quadratic programming- Wolf's modified simplex method.

UNIT – III SIMULATION MODELS

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M/M/1): (\infty/FIFO)$, $(M/M/c): (\infty/FIFO)$ Models.

UNIT -IV DECISION MODELS

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

UNIT -V REPLACEMENT MODELS

Models based on models that gradually deteriorate with time-whose maintenance cost increase with time-Replacement of items that fail suddenly and completely.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010
2	Kanti Swarup, Manmohan, Gupta	Operations Research	Sultan Chand & Sons	2008

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Natarajan A.M., Balasubramani P., Thamilarasi A	Operations Research	Pearson Education,	2003
2	Srinivasan G	Operations Research	Eastern Economy Edition	2007
3	Winston	Operations Research, Applications and Algorithms	Cengage Learning	2004

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.mit.edu

OBJECTIVES:

- To gain knowledge in measures of central tendency.
- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of correlation and spectral densities.
- To acquire the knowledge on random process in engineering disciplines.

OUTCOMES:

- Learners acquire skills in handling situations involving more than one random variable and functions of random variables.
- The students will have an exposure of various distribution functions, correlation and spectral densities.
- To understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- To understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
- To apply the concept random processes in engineering disciplines.
- To understand and apply the concept of correlation and spectral densities.

UNIT-I MEASURES OF CENTRAL TENDENCY AND PROBABILITY

Measures of central tendency – Mean, Median, Mode - Standard Deviation

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Uniform, Exponential,

Gamma(one Parameter only) and Normal distributions - Moment generating functions,

Characteristic function and their properties – Chebyshev's inequality.

UNIT -III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions - Probability mass function - Probability density functions – Covariance - Correlation and regression

UNIT- IV CLASSIFICATION OF RANDOM PROCESS

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT -V CORRELATION AND SPECTRAL DENSITIES

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Wiener-Khintchine relation – Relationship between cross power spectrum and cross correlation function - Linear time invariant system - System transfer function –Linear systems with random inputs – Auto correlation and cross correlation functions of input and output.

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peebles Jr, P.Z	Probability Random Variables and Random Signal Principles	Tata McGraw-Hill Publishers, New Delhi.	2002

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Henry Stark and John W. Woods	Probability and Random Processes with Applications to Signal Processing	Pearson Education, Third edition, Delhi	2002
2	Ochi, M.K	Applied Probability and Stochastic Process	John Wiley & Sons, New York	1990
3	Ross, S	A first Course in Probability	Pearson Education, New Delhi (Chap 2 to 8)	2002
4	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2007
5	Veerarajan, T.	Probability, Statistics and Random process	Tata McGraw-Hill Publications, Second Edition, New Delhi	2002

WEBSITES:

<ol style="list-style-type: none"> 1. www.cut-theknot.org/probability.shtml 2. www.mathcentre.ac.uk 3. www.mathworld. Wolfram.com
--

OBJECTIVES:

- To gain knowledge in measures of central tendency and probability.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems
- To introduce the basic concepts of classifications of design of experiments
- To sampling distributions and statistical techniques used in engineering and management problems.

OUTCOMES:

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Apply the concept of testing of hypothesis for small and large samples in real life problems.
- Apply the basic concepts of classifications of design of experiments and statistical quality control.
- Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

UNIT-I MEASURES OF CENTRAL TENDENCY AND PROBABILITY

Measures of central tendency – Mean, Median, Mode and Standard Deviation – SPSS Software Demonstration.

Probability - Random variable - Axioms of probability - Conditional probability - Total probability – Baye's theorem - Probability mass function - Probability density functions.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Uniform, Exponential, Gamma, and Normal distributions - Moment generating functions, Characteristic function and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and Regression - Transformation of random variables - Central limit theorem.

UNIT- IV TESTING OF HYPOTHESIS

Sampling distributions – Testing of hypothesis for mean, variance, proportions and differences using Normal, t, Chi-square and F distributions - Tests for independence of attributes and Goodness of fit.

UNIT- V DESIGN OF EXPERIMENTS

Analysis of variance – One way classification – CRD – Two way classification – RBD - Latin square.

Note: Use of approved statistical tables permitted in the examination.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Gupta, S.C. and Kapur, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2007
2	Athanasios Papoulis and S Pillai	Probability Random variables and Stochastic Processes	McGraw-Hill Publications, New Delhi.	2002

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Walpole, R.E., Myers, R.H., Myers, R.S.L and Ye, K	Probability and Statistics for Engineers and Scientists	Pearsons Education, Delhi.	2002
2	Lipschutz, S. and Schiller, J	Schaum's outlines - Introduction to Probability and Statistics	McGraw-Hill, New Delhi.	1998
3	Ross, S	A first Course in Probability	Pearson Education, Delhi (Chapters 2 to 8). New Delhi	2002
4	Johnson, R.A	Miller & Freund's Probability and Statistics for Engineers	Pearson Education, Delhi (Chapters 7, 8, 9, 12)	2000

WEBSITES:

1.	www.cut-theknot.org/probability.shtml
2.	www.mathcentre.ac.uk
3.	www.mathworld . Wolfram.com

OBJECTIVES:

- To understand the fundamental knowledge of probability theory.
- To introduce the concept of random variable and functions of random variables.
- To introduce the basic concepts of two dimensional random variables.
- To introduce the concepts of random processes and Markov chain
- To understand the different Queuing models and solve problems
- **To** understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

OUTCOMES:

- The student gain the knowledge in measures of central tendency and probability
- Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
- Understand the basic concepts of two dimensional random variables and apply in engineering applications.
- Understand the concepts of random process and markov chains
- They will be able to solve the Queuing models
- The students understand and characterize phenomena which evolve with respect to time in a probabilistic manner.

UNIT- I PROBABILITY AND RANDOM VARIABLE

Axioms of probability - Conditional probability - Total probability – Baye’s theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT- II STANDARD DISTRIBUTIONS

Functions of a random variable - Binomial, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties.

UNIT- III TWO DIMENSIONAL RANDOM VARIABLES

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT -IV RANDOM PROCESS AND MARKOV CHAINS

Classification - Stationary process - Markov process - Poisson process - Birth and death process - Markov chains - Transition probabilities - Limiting distributions.

UNIT-V QUEUEING THEORY

Markovian models - M/M/1, M/M/C, finite and infinite capacity - M/M/ ∞ queues - Finite source model - M/G/1 queue (steady state solutions only) - Pollaczek - Khintchine formula - Special cases.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ross,S	A first course in probability	Pearson Education, Delhi	2002
2	Medhi,J	Stochastic Process	New Age Publishers ,New Delhi	2009

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Veerarajan,T	Statistics and Random Processes	Tata McGraw-Hill, 2 nd Edition, New Delhi.	2003
2	Allen,O	Probability, Statistics and Queuing Theory	Academic press, New Delhi.	1999
3	Gross,D. and Harris, C.M	Fundamentals of Queuing theory	John Wiley and Sons, New York.	1998
4	Taha,H.A	Operations Research - An Introduction	Pearson Education Edition Asia, Delhi.	2002

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.mit.edu

COURSE OBJECTIVES:

- Be able to understand basic knowledge of fuzzy sets and fuzzy logic
- Be able to apply basic knowledge of fuzzy operations.
- To know the basic definitions of fuzzy relations
- Be able to apply basic fuzzy inference and approximate reasoning
- To know the applications of fuzzy Technology.
- To acquire the knowledge on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology

COURSE OUTCOME:

- To gain the main subject of fuzzy sets.
- To understand the concept of fuzziness involved in various systems and fuzzy set theory.
- To gain the methods of fuzzy logic.
- To comprehend the concepts of fuzzy relations.
- To analyze the application of fuzzy logic control to real time systems.
- The Engineers will have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

UNIT I

Fuzzy Sets : Basics Classical sets vs Fuzzy Sets – Need for fuzzy sets – Definition and Mathematical representations – Level Sets – F u z z y functions - Zadeh's Extension Principle

UNIT II

Operations on Fuzzy Sets Operations on $[0,1]$ – Fuzzy negation, triangular norms, tconorms, fuzzy implications, Aggregation Operations, Fuzzy Functional Equations

UNIT III

Fuzzy Relations Fuzzy Binary and n-ary relations – composition of fuzzy relations – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations – Fuzzy Relational Equations

UNIT IV

Possibility Theory Fuzzy Measures – Evidence Theory – Necessity and Belief Measures – Probability Measures vs Possibility Measures

UNIT V

Approximate Reasoning Fuzzy Decision Making - Fuzzy Relational Inference – Compositional rule of Inference - Efficiency of Inference - Hierarchical

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J Klir and Bo Yuan	Fuzzy Sets and Fuzzy Logic : Theory and Applications	Prentice Hall NJ	1995

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.J. Zimmermann	Fuzzy Set Theory and its Applications	Allied Publishers New Delhi	1991
2	Kevin M Passino and Stephen Yurkovich	Fuzzy Control	Addison Wesley Longman	1998
3	Michal Baczynski and Balasubramaniam Jayaram	Fuzzy Implications	Springer Verlag, Heidelberg	2008

WEBSITES:

1. www.mathcentre.ac.uk
2. www.mathworld . Wolfram.com
3. www.doc.ic.ac.uk
4. www.calvin.edu/~pribeiro/othrlnks/Fuzzy/fuzzysets.htm

COURSE OBJECTIVES:

- To understand the proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- To Learn about special type of matrices that are relevant in physics and then learn about tensors.
- To introduce the Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
- To introduce the concepts of fuzzy relations.
- To make the students to analyse the application of fuzzy logic control to real time systems.
- To acquaint the students to have an exposure on various topics such as fuzzy algebra, fuzzy theory and fuzzy technology.

COURSE OUTCOME:

- Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- Learn about special type of matrices that are relevant in physics and then learn about tensors.
- Get introduced to Special functions like Bessel, Legendre , Hermite and Laguerre functions and their recurrence relations
- Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method.
- Students will master in calculus of variations and linear integral equations.
- The students will have the knowledge on Mathematical Physics and that knowledge will be used by them in different engineering and technology applications.

UNIT I TENSORS

Definition of tensor - rank, symmetric tensors, contraction, quotient rule - tensors with zero components, tensor equations, metric tensors and their determinants - pseudo tensors

UNIT II DIFFERENTIAL EQUATIONS-SERIES SOLUTIONS

Series Solution : Classification of singularities of an ordinary differential equation
- Series solution-Method of Frobenius - indicial equation - examples

UNIT III SPECIAL FUNCTIONS

Basic properties (Recurrence and Orthogonality relations, series expansion) of Bessel, Legendre , Hermite and Laguerre functions – Generating Function

UNIT IV CALCULUS OF VARIATIONS

Concept of variation and its properties – Euler’s equation – Functional dependant on first and higher order derivatives – Functional dependant on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric Problems – Direct methods – Ritz and Kantorovich methods.

UNIT V LINEAR INTEGRAL EQUATIONS

Introduction – conversion of a linear differential equation to an integral equations and vice versa – conversion of boundary value problem to integral equations using Green’s function – solution of a integral equation – integral equations of the convolution type – Abel’s integral equations – integro–differential equations – integral equations with separable kernels – solution of Fredholm equations with separable kernels.

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr. Grewal B.S.	Higher Engineering Mathematics	40 th edition, , Khanna Publishers	2011
2	Stephenson, G, Radmore, P.M	Advanced Mathematical Methods for Engineering and Science students	Cambridge University Press	1999
3	Andrews, Larry C.	Special Function for Engineers and Applied Mathematicians	Macmillan, New York	1985
4	Murray R Spiegel, Seymour Lipschutz, Dennis Spellman	Vector Analysis	Tata Mc Graw Hill Education Pvt. Ltd., New Delhi	2010

WEBSITES:

1. <http://www.doitpoms.ac.uk/>
2. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
3. <http://www.math.umn.edu/~olver/pdn.html>
4. <http://tutorial.math.lamar.edu/classes/DE.aspx>

OBJECTIVES:

- To introduce the concepts of special functions.
- To find the solutions to partial differential equations and their applications
- To study about mathematical physics and perturbation techniques
- To learn replacement models and simulation models
- To provide techniques for effective methods to solve nonlinear programming and decision making
- To understand how to model and solve problems using non integer programming.

OUTCOMES:

- Students know the concepts of improper integrals, Beta and Gamma functions.
- The students acquire sound knowledge of techniques in solving PDE that model engineering problems.
- Identify the situations where singular perturbations are needed. They will be able to use various modifications of matched asymptotic expansions techniques to derive asymptotic solutions.
- Able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
- **Convert** and **solve** the practical situations into replacement models.
- Understand how to model and solve problems using non integer programming.

UNIT I INTRODUCTION TO SOME SPECIAL FUNCTIONS

Gamma function, Beta function, Bessel function, Error function and complementary Error function, Heaviside's function, pulse unit height and duration function, Sinusoidal Pulse function, Rectangle function, Gate function, Dirac's Delta function, Signum function, Saw tooth wave function, Triangular wave function, Half wave rectified sinusoidal function, Full rectified sine wave, Square wave function.

UNIT II PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS

Formation PDEs, Solution of Partial Differential equations $f(x,y,z,p,q) = 0$, Nonlinear PDEs first order, Some standard forms of nonlinear PDE, Linear PDEs with constant coefficients, Equations reducible to Homogeneous linear form, Classification of second order linear PDEs. Separation of variables use of Fourier series, D'Alembert's solution of the wave equation, Heat equation: Solution by Fourier series and Fourier integral

UNIT – III PERTURBATION TECHNIQUES

Singular perturbations (algebraic example). Notion of the boundary layer. Inner and outer solutions. Overlap region. Matching of the asymptotic expansions. Ordinary differential equations with singular perturbations. Methods to determine location of the boundary layer.

UNIT -IV SIMULATION MODELS

Elements of simulation model -Monte Carlo technique – applications. Queuing model: problems involving $(M|M|1):(\infty\backslash\text{FIFO})$, $(M|M|c):(\infty\backslash\text{FIFO})$ Models.

UNIT V DECISION MODELS

Decision Analysis – Decision Making environment – Decisions under uncertainty – Decision under risk – Decision – Tree Analysis.

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2007
2	Gupta, A.S.	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi	1997
3	Sankara Rao, K.	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi	1997
4	Ali H Nayfeh	Perturbation Methods	John Wiley & Sons, New Delhi.	2008
5	Hamdy Taha. A.	Operations Research	Prentice – Hall of India Private Limited, New Delhi .	2010

WEBSITES:

1. www.phys.uu.nl/~thoof/lectures/specialfct.pdf
2. www.maths.manchester.ac.uk/~bl/teaching/math34011/
3. pubsonline.informs.org/journal/opre

Course Objectives

- To introduce the basic concepts of vector space
- To know the fundamentals of linear Algebra
- To solve system of linear equations
- To study about the linear transformations
- To introduce the concepts of inner product spaces
- To give the knowledge on the importance of Linear Algebra.

COURSE OUTCOMES:

The student will be able to

- Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
- Apply the fundamental concepts in their respective engineering fields
- Solve the system of linear equations
- Visualize linear transformations as matrix form
- Recognize the underlying theory of vector spaces over a field and inner product spaces over real or complex numbers
- Articulate the importance of Linear Algebra and its applications in branches of Mathematics

UNIT I VECTOR SPACES

General vector spaces, real vector spaces, Euclidean n-space, subspaces, linear independence, basis and dimension, row space, column space and null space,

UNIT II EIGEN VALUES AND EIGEN VECTORS

Eigen values and Eigen vectors - diagonalization - Power method - QR decomposition

UNIT III SYSTEM OF LINEAR EQUATIONS

Direct methods, Gauss elimination method, Gauss Jordan method, Crout's method, iterative methods, Gauss-Jacobi method, Gauss-Seidel method, convergence criteria.

UNIT IV LINEAR TRANSFORMATIONS

Linear Transformations - The Null Space and Range - Isomorphisms - Matrix Representation of Linear Transformations – Similarity - Eigenvalues and Eigenvectors Eigen values and Eigen vectors - Diagonalization

UNIT V INNER PRODUCT SPACES

The Dot Product on \mathbb{R}^n and Inner Product Spaces - Orthonormal Bases - Orthogonal Complements - Application : Least Squares Approximation - Diagonalization of Symmetric M - Application: Quadratic Forms

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kreyszig,E	Advanced Engineering Mathematics	John Wiley & Sons, New Delhi.	2007
2	Anton and Rorres	Elementary Linear Algebra, Applications version	Wiley India Edition	2010
3	Jim Defranza, Daniel Gagliardi	Introduction to Linear Algebra with Application	Tata McGraw-Hill	2009

WEBSITES:

1. www.sosmath.com
2. www.linear.ups.edu
3. www.mathworld.wolfram.com
4. www.tutorial.math.lamar.edu

**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
(ONLY FOR BE CSE STUDENTS)****OBJECTIVES:**

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier series techniques in solving heat flow problems used in various situations.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the basic concepts of PDE for solving standard partial differential equations
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.
- To develop the use of effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

OUTCOMES:

- Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
- The learners can equip themselves in the transform techniques and solve partial differential equations
- Understand how to solve the given standard partial differential equations.
- Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
- Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
- Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

UNIT- I FOURIER SERIES

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT -II FOURIER TRANSFORM

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT- III PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT- IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT- V Z -TRANSFORM AND DIFFERENCE EQUATIONS

Z-transform - Elementary properties – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

TEXT BOOK:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Grewal, B.S.	Higher Engineering Mathematics	Khanna Publishers, Delhi.	2011
2	Kandasamy,P., Thilagavathy,K. and Gunavathy,K.	Engineering Mathematics Volume III.	S. Chand & Company Ltd., New Delhi.	1996

REFERENCES:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Venkateswarlu S	Engineering Mathematics, Vol I	Anuratha Agencies and Publishers, Kumbakonam.	2003
2	Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G	Advanced Mathematics for Engineering Students. Volumes II and III,	Viswanathan S Printers and Publishers Pvt. Ltd. Chennai.	2002
3	Bali N P.	A text book of Engineering Mathematics	Laxmi Publications Pvt. Ltd.	1986
4	Ramana B V	Higher Engineering Mathematics	Tata Mc Graw Hill Publishing Co. Ltd. New Delhi.	2007

WEBSITES:

1. www.sosmath.com
2. http://mathworld.wolfram.com/FourierSeries.html
3. http://www.math.umn.edu/~olver/pdn.html
4. http://tutorial.math.lamar.edu/classes/DE/IntroPDE.aspx

OBJECTIVES:

- To Develop abilities to write technically and expressively,
- To Recognize writing as a constructive, meaningful process,
- To Practise using reading strategies for effective writing.
- To equip them to write for academic as well as work place context.
- To enable students to be familiar with structure and style of formal written communication
- To Improve their writing skills and be ready with documents related ideas and notions.

OUTCOMES:

- Construct simple sentences, correct common grammatical errors in written English.
- Build confidence in English language by imbibing lexical and syntax rules.
- Enrich their reading ability for effective writing.
- Know the value of LSRW skills in document writing.
- Understand the structure, content and format of technical documents.
- Improve their writing skills and be ready with documents related ideas and notions.

UNIT – I BASICS OF WRITING

Introduction to Technical Writing – Importance of Writing – Characteristics of Writing– Audience Recognition/ Analysis – Appropriateness of language — Conciseness and Flow– Bias free and plain writing – Impersonal and Formal Language -Techniques of Technical Writing– Overcoming writer's block – Prioritizing for effective writing– Avoiding plagiarism.

UNIT – 2 PARAGRAPHS AND ESSAYS

Expressing Ideas – Paragraph construction – Cohesion and Coherence – Adequate development – Kinds of paragraphs – Writing drafts – Paragraph length and pattern – Types of Essays – Characteristics of Essays – Salient point of sentence constructions.

UNIT – 3 LETTERS, MEMOS AND EMAIL

Formal written correspondence – Types of messages – Business letters – Structure of letters – Language in letters – Tense in letters – Cover letters – Resumes – Curriculum vitae – Memos – Emails – Email Etiquette – Effectiveness and purpose.

UNIT – 4 THE ART OF CONDENSATION AND TECHNICAL PROPOSALS

Steps to Effective précis writing – Guidelines – Technical Proposals – Types of Proposals – Characteristics – Body of the Proposals – Style and appearance – Evaluation of proposals – Proof Reading – Book /Film Review – Travelogue – Dialogue Writing.

UNIT – 5 REPORTS AND RESEARCH ARTICLES

Discussion of newspaper articles -Objectives of Reports – Characteristics of Reports – Structure of Reports – Types of Reports – Writing an article – Writing research articles – Essential features of Dissertation – Organizing the structure of thesis and articles – Writing technical description.

TEXT BOOKS

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.N. Arora & Lakshmi Chandra	Improve Your Writing: Revised First Edition	OUP	2014

REFERENCES:

S.NO	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Crème, P. and M. Lea.	Writing at University: A guide for students.	OUP	2003
2	Graham King	Collins Improve Your Writing	Collins; First edition	2009
3	David Morley	The Cambridge Intro. To Creative Writing	Cambridge	2008

OBJECTIVES:

- To inculcate the basics of brief history of Earth sciences
- To divulge knowledge on the basics of structure of earth and earth's gravitational field.
- To disseminate the fundamentals of magnetic field and thermal distribution of earth.
- To introduce the concepts of seismology and seismic waves .
- To impart the basic knowledge of oceans
- To Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

OUTCOME:

- Gain knowledge on the basics of history of Earth sciences.
- Acquire knowledge on concepts of structure of earth and earth's gravitational field.
- Have adequate knowledge on the concepts of magnetic field and thermal distribution of earth
- Obtain knowledge on the basics of seismic waves.
- Understand the basics of oceans and properties of sea water.
- Apply the knowledge gained from this course to solve the relevant problems in engineering stream.

UNIT I ORIGIN OF EARTH

A brief history of the development of Earth Sciences and of Geophysics in particular, An overview of Geophysical methods and their essential features, Problems of inversion and non-uniqueness in Geophysics, Origin & evolution of Solar system, Earth and Moon structure,. Kepler's law of planetary motion, A review of the Earth's structure and composition

UNIT II STRUCTURE OF EARTH

Chemical composition of Earth, Rheological behavior of crust and upper mantle, viscoelasticity and rock failure criteria, Geochronology: Radiometric dating and their advantages, meaning of radiometric ages, Major features of the Earth's gravitational field and relationship with tectonic processes in the crust and upper mantle, concept of isostasy, mathematical concept of Airy and Pratt hypotheses of isostasy

UNIT III MAGNETIC FIELD AND THERMAL DISTRIBUTION OF EARTH

Origin of geomagnetic field, polar wandering, secular variations and westward drift, reversals of geomagnetic field, sun spot, solar flares, geomagnetic storms, sea-floor spreading, Paleomagnetism and its uses, Thermal history of the Earth, sources of heat generation and temperature distribution inside the earth, convection in the mantle

UNIT IV SEISMOLOGY

Earthquake seismology, Earthquakes and its classifications, Global seismicity and tectonics, Earth's internal structure derived from seismology, Earthquake mechanism and Anderson's theory of faulting, Continental drift and plate tectonics: its historical perspective and essential features, present day plate motions, Triple junctions, oceanic ridges, Benioff zones, trenches and island arcs, hot spots, Mantle Plume, Mountain building, origin of Himalaya, Geodynamics of Indian subcontinent.

UNIT V OCEANS

Physical properties of seawater and methods of determination, distribution of salinity in the oceans, factors affecting salinity, water masses and water type, TS Diagram, Circulation of currents in major ocean waves. Tides: Dynamical and equilibrium theory of tides. Marine pollution, steps to control marine pollution, Laws of seas, Coastal zone management

TEXT BOOK:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B.F. Howell	Introduction to Geophysics	McGraw-Hill	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	W. Lowrie	Fundamentals of Geophysics	Cambridge University Press,	2007
2	J.A. Jacobs, R.D. Russel	Physics and Geology	McGraw-Hill	2002

WEBSITES:

1. www.ocw.mit.edu 2. www.physicsclassroom.com 3. www.nptel.ac.in 4. www.physics.org
--

COURSE OBJECTIVES:

- To disseminate the fundamentals of acoustic waves. (K)
- To inculcate the characteristics of radiation and reception of acoustic waves. (K)
- To divulge knowledge on the basics of pipe resonators and filters.(S)
- To introduce the features of architectural acoustics.(S)
- To impart the basic knowledge of transducers and receivers.(K)
- To Apply the knowledge inputs of the course for engineering applications.

COURSE OUTCOME:

- Develop the idea of the fundamentals of acoustic waves.
- Apply the concepts of radiation and reception of acoustic waves.
- Explain the basic ideas of pipe resonators and filters.
- Illustrate the basics of architectural acoustics..
- Illustrate the transducers and receivers and its applications in various electronic devices.
- Apply the knowledge inputs of the course for engineering applications.

UNIT I INTRODUCTION

Acoustics waves – Linear wave equation – sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – spherical waves – Describer scales. Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence –method of images.

UNIT II RADIATION AND RECEPTION OF ACOUSTIC WAVES

Radiation from a pulsating sphere – Acoustic reciprocity – continuous line source radiation impedance - Fundamental properties of transducers. Absorption and attenuation of sound. Absorption from viscosity – complex sound speed and absorption – classical absorption coefficient

UNIT III PIPES RESONATORS AND FILTERS

Resonance in pipes - standing wave pattern absorption of sound in pipes – long wavelength limit – Helmholtz resonator - acoustic impedance - reflection and transmission of waves in pipe - acoustic filters – low pass, high pass and band pass. Noise, Signal detection, Hearing and speech. Noise, spectrum level and band level – combining band levels and tones – detecting signals in noise – detection threshold – the ear – fundamental properties of hearing – loudness level and loudness – pitch and frequency – voice.

UNIT IV ARCHITECTURAL ACOUSTICS

Sound in enclosure – A simple model for the growth of sound in a room – reverberation time - Sabine, sound absorption materials – measurement of the acoustic output of sound

sources in live rooms – acoustics factor in architectural design. Environmental Acoustics: Weighted sound levels speech interference – highway noise – noise induced hearing loss – noise and architectural design specification and measurement of some isolation design of portions.

UNIT V TRANSDUCTION

Transducer as an electrical network – canonical equation for the two simple transducers transmitters – moving coil loud speaker – loudspeaker cabinets – horn loud speaker, receivers – condenser – microphone – moving coil electrodynamic microphone piezoelectric microphone – calibration of receivers

TEXT BOOK:

	Author(s) Name	Title of the book	Publisher	Year of Publication
	Lawrence E.Kinsler, Austin R.Frey,	Fundamentals of Acoustics	4th edition, John Wiley & Sons	2013

REFERENCES:

	Author(s) Name	Title of the book	Publisher	Year of Publication
	L. Beranek	Acoustics	Academic Press	2012

WEBSITES:

1. www.acousticalsociety.org
2. www.acoustics-engineering.com
3. www.nptel.ac.in
4. www.ocw.mit.edu

OBJECTIVES:

- To understand about the fuel
- To study about the alcohols and its importance in engine
- To gain knowledge on the fuel gas and oils
- To get the information on fuel cell
- To understand electric, hybrid and solar cars
- To Develop their knowledge in studies of vegetable oils

OUTCOMES:

- Students will know about the basic concepts of alternate fuels
- Students will know about the basic concepts of alcohols.
- Students will understand about fuel gas and oils
- Students can enrich their knowledge about the alternate fuels and energy systems
- Develop their knowledge in studies of vegetable oils
- Students knows about the importance of electric, hybrid and solar cars

UNIT I INTRODUCTION

Need for alternate fuel, availability and properties of alternate fuels, general use of alcohols, LPG, hydrogen, ammonia, CNG and LNG, vegetable oils and biogas, merits and demerits of various alternate fuels, introduction to alternate energy sources and significance.

UNIT II ALCOHOLS

Properties as engine fuel, alcohols and gasoline blends, performance in SI engines, methanol and gasoline blends, combustion characteristics in CI engines, emission characteristics, DME, DEE properties performance analysis, performance in SI & CI Engines.

UNIT III NATURAL GAS, LPG, HYDROGEN AND BIOGAS

Availability of CNG, properties, modification required to use in engines, performance and emission characteristics of CNG & LPG in SI & CI engines, performance and emission of LPG. Hydrogen storage and handling, performance and safety aspects. Production of Biogas and its applications

UNIT IV VEGETABLE OILS

Various vegetable oils for engines, esterification, performance in engines, performance and emission characteristics, biodiesel and its characteristics.

UNIT V ELECTRIC, HYBRID, FUEL CELL AND SOLAR CARS

Layout of an electric vehicle, advantage and limitations, specifications, system components, electronic control system, high energy and power density batteries, hybrid vehicle, fuel cell vehicles, solar powered vehicles.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Richard.L.Bechfold	Alternative Fuels Guide Book	SAE International Warren dale	1997
2.	Jain, P.C. and Monika Jain	Engineering Chemistry.	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2009

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Nagpal	Power Plant Engineering	Khanna Publishers	1991
2.	Saeid Mokhatab William A Poe	Hand book of Natural Gas Transmission and Processing, 2 nd edition.	Gulf Professional Publisher, USA	2012

WEBSITES:

1. www.fao.org/docrep/t4470e/t4470e08.htm
2. <http://www.exergy.se/goran/hig/ses/06/alternative%20fuels>
3. <http://www.alternative-energy-news.info/technology/transportation/hybrid-cars/>

OBJECTIVES:

- To make the students conversant with basics of Solid wastes and its classification.
- To make the student acquire sound knowledge of different treatments of solid wastes.
- To acquaint the student with concepts of waste disposals.
- To develop an understanding of the basic concepts of Hazardous waste managements.
- To acquaint the students with the basics of energy generation from waste materials.
- To get the information on energy conservation.

OUTCOMES:

- Outline the basic principles of Solid waste and separation of wastes (K)
- Identify the concepts of treatment of solid wastes (S)
- Identify the methods of wastes disposals. (S)
- Examine the level of Hazardousness and its management. (S)
- Examine the possible of the energy production using waste materials. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I SOLID WASTE

Definitions – Sources, Types, Compositions, Properties of Solid Waste – Municipal Solid Waste – Physical, Chemical and Biological Property – Collection – Transfer Stations – Waste Minimization and Recycling of Municipal Waste

UNIT II WASTE TREATMENT

Size Reduction – Aerobic Composting – Incineration – batch type and continuous flow type, Medical/ Pharmaceutical Waste Incineration – Environmental Impacts – Measures of Mitigate Environmental Effects due to Incineration

UNIT III WASTE DISPOSAL

Sanitary Land Fill Method of Solid Waste Disposal – Land Fill Classification, Types, Methods & Siting Consideration – Layout & Preliminary Design of Land Fills – Composition, Characteristics generation, Movement and Control of Landfill Leachate & Gases – Environmental Monitoring System for Land Fill Gases, Waste landfill Remediation

UNIT IV HAZARDOUS WASTE MANAGEMENT

Definition & Identification of Hazardous Waste – Sources and Nature of Hazardous Waste – Impact on Environment – Hazardous Waste Control – Minimization and Recycling - Assessment of Hazardous Waste Sites – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure, Remediation, risk assessment.

UNIT V ENERGY GENERATION FROM WASTE

Thermal conversion Technologies – Pyrolysis systems, Combustion systems, Gasification systems, Environment control systems, energy recovery systems. Biological & chemical conversion technologies – Aerobic composting, low solids. Anaerobic digestion, high solids anaerobic digestion, Energy production from biological conversion products, other biological transformation processes. Chemical transformation processes.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Dara.S.S,Mishra.D.D	A Text book of Environmental chemistry and pollution control	S.Chand and company Ltd	2011

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Nagpal H.Theisen, S. Vigil	Integrated Solid Waste management- Engg. Principles and management issues	George Tchobanoglous, McGraw Hill	1993
2.	Parker, Colin, & Roberts	Energy from Waste – An Evaluation of Conversion Technologies	Elsevier Applied Science, London	1985
3.	Shah, L Kanti	Basics of Solid & Hazardous Waste Management Technology	Prentice Hall	1999

WEBSITES:

- 1.www.iitk.ac.in/3inetwork/html/reports/IIR2006/Solid_Waste.
- 2.<http://www.unep.or.jp/ietc/ESTdir/Pub/MSW/>
- 3.www.alternative-energy-news.info/technology/garbage-energy/
- 4.nzic.org.nz/ChemProcesses/environment/

OBJECTIVES:

- To make the students conversant about the green chemistry
- To make the student acquire sound knowledge of the atom efficient process and synthesis elaborately.
- To acquaint the student with concepts of green technology.
- To develop an understanding of the basic concepts of renewable energy resources.
- To acquaint the students with the basic information on catalysis.
- To inculcate the chemical principles in the field of engineering and technology

OUTCOMES:

- Outline the basic principles of green chemistry (K)
- Examine the different atom efficient process and synthesis elaborately (S)
- Apply the concepts combustion of green technology (S)
- Identify and apply the concepts of renewable energy (S)
- Apply the concepts of green catalysts in the synthesis (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I INTRODUCTION TO GREEN CHEMICAL PRINCIPLES Definition, tools, and twelve principles of green chemistry, solvent-less reactions and reactions in water, microwaves and fluorous solvents, green resolution of racemic mixtures, materials for a sustainable economy, chemistry of longer wear, agrochemicals: problems and green alternate solutions.

UNIT II ATOM EFFICIENT PROCESSES

Atom efficient processes, evaluating chemical reagents according to their yield and atom efficiency, examples of efficient stoichiometric and catalytic processes, atom economy and homogeneous catalysis, halide-free synthesis and alternatives to Strecker synthesis

UNIT III BIOTECHNOLOGY AND GREEN CHEMISTRY

Bio technology and its applications in environmental protection-Bio informatics-Bio remediation, biological purification of contaminated air. Green chemistry for clean technology-Significance of green chemistry-Basic components of green chemistry, Industrial applications of green chemistry, green fuels-e-green propellants and bio catalysts.

UNIT IV RENEWABLE RESOURCES

Use of renewable materials, evaluating feedstock and starting materials and their origins, toxicity, sustainability and the downstream implications of the choice of feedstock, commodity chemicals from glucose and biomass conversion

UNIT V CATALYSIS IN GREEN CHEMISTRY

Catalysis, energy requirements and usage, optimization of the reaction by minimizing the energy requirements, examples of efficient catalytic reactions including the use of heterogeneous catalysis, zeolites, oxidation using molecular oxygen.

OBJECTIVES:

- To make the students conversant with **the information on electrochemical material.**
- To make the student acquire sound knowledge of **conducting polymers.**
- To acquaint the student with concepts of Energy storage devices.
- To develop energy storage devices.
- To impart knowledge on basic principals of solar cells and its applications
- To inculcate the chemical principles in the field of engineering and technology

OUTCOMES:

- Outline the basic principles of chemistry in electrochemical material (K)
- Examine the properties of conducting polymers (S)
- Apply the concepts of electrochemistry in storage devices. (S)
- Identify the concepts of storage devices and its applications. (S)
- Apply the suitable materials for the manufacturing of storage devices. (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I METAL FINISHING

Fundamental principles, surface preparation-Electroplating of copper, nickel, chromium, zinc and precious metals (gold & silver)- Electroplating for electronic industry- Alloy plating, brass plating- Electro less plating of nickel- anodizing – Electroforming – Electro winning

UNIT II CONDUCTING POLYMERS AND ELECTROCHEMICALS

Electropolymerisation- anodic and cathodic polymerization-effect of reaction parameters on the course of the reaction- Electrochemical preparation of conducting polymers- poly acetylene- Electrolytic production of perchlorates and manganese dioxide- Electro organic chemicals- constant current electrolysis.

UNIT III BATTERIES AND POWER SOURCES-I

Principles of energy conservation- electrochemical energy conservation- thermodynamic reversibility, Gibbs equation. EMF- battery terminology, energy and power density- Properties of anodes, cathodes, electrolytes and separators- Types of electrolytes.

UNIT IV BATTERIES AND POWER SOURCES-II

Primary batteries- Dry Leclanche cells, alkaline primary batteries, Lithium batteries- construction, characteristics, problems associated with system- Secondary batteries- Lead acid, nickel cadmium- Fuel cells- Introduction, types of fuel cells, advantages.

UNIT V ELECTROCHEMICAL MATERIAL SCIENCE

Solar cells- Preparation of CdS/Cu₂S solar cells by screen printing techniques and their characteristics - Amorphous silicon solar cells - Photo electrochemical cells(PEC) for conversion of light energy to electrical energy - PEC cells based on Cd/Se and Ga/As characteristics.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990
2.	A.T.Khun	Industrial Electrochemistry	Elsevier Publishers	1972

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	M.M.Baizer	Organic electrochemistry	Dekker Inc. New York	1983
2.	M. Barak	Electrochemical power sources	IEEE series, Peter Peregrinius Ltd, Steverage, U.K.	1997
3.	K.L. Chopra and I. Kaur	Thin film devices and their application	Plenum Press, New York.	1983
4.	Bruno Scrosati	Applications of Electroactive polymers	Chapman & Hall, London	1993

WEBSITES:

1. <http://www.anoplate.com/finishes/>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/electric/battery.html>
3. http://inventors.about.com/od/sstartinventions/a/solar_cell.htm

OBJECTIVES:

- To make the students conversant with **cement and lime** and its uses.
- To make the student acquire sound knowledge of abrasives and refractories.
- To acquaint the student with concepts of inorganic chemicals.
- To develop an understanding of the basic concepts explosives.
- To acquaint the students with the basics of agriculture chemicals.
- To inculcate the chemical principles in the field of engineering and technology

OUTCOMES:

- Outline the basic chemistry of **cement and lime** (K)
- Examine the uses of abrasives and refractories (S)
- Identify the usage of the inorganic chemicals. (S)
- Identify the concepts of explosives and smoke screens (S)
- Identify the usage of the **agriculture** chemicals (S)
- Integrate the chemical principles in the projects undertaken in field of engineering and technology (A)

UNIT I CEMENT AND LIME

Manufacture of Portland cement – setting and hardening of Portland cement – regauging cement – effect of fineness on setting and hardening – freezing – high early strength cement – high alumina cement Lime – raw materials- manufacture – slaking – lime mortar – types of lime – high – calcium or fat lime – calcium lime or lean lime – magnesian lime – dolomitic lime – hydraulic lime.

UNIT II ABRASIVES AND REFRACTORIES

Abrasives – hard abrasives – siliceous abrasives – soft abrasives – artificial abrasives – uses. Refractories – definition – classification – acid refractories – basic refractories – neutral refractories – properties – uses.

UNIT III INORGANIC CHEMICALS

Common salt and soda ash – Manufacture – Different grades – products – alkalis – Na_2CO_3 , Caustic soda and chlor-alkali industry – manufacture principles of electrolytic process – chlorine – storage. Hydrochloric acid – manufacture – absorption – uses, Sulphur and sulphuric acid – extraction of sulphur – manufacture of H_2SO_4 – chamber – contact processes – industrial uses.

UNIT IV EXPLOSIVES

Explosives – uses – properties and tests – explosives for war – nitrocellulose – picric acid and T.N.T. – industrial explosives – nitroglycerin and dynamites – black powder – smoke screens – incendiaries – gas mask.

UNIT V AGRICULTURE CHEMICALS

Fertilizers – organic and inorganic – ammoniated superphosphates, sodium nitrate, solid pellets – potassium salts – pesticides – fungicides – herbicides – their preparations and characteristics – environmental impacts.

TEXT BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	B.K. Sharma	Industrial Chemistry	Goel Publishing House, Meerut	2000
2.	D.Pletcher and F.C.Walsh	Industrial electrochemistry	Chapman and Hall, London	1990

REFERENCE BOOKS:

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	B.N.Chakrabarty	Industrial Chemistry	Oxford and IBH Publishing CO. New Delhi.	1998
1.	R.N. Sherve	Chemical process industries	McGraw-Hill, Kugakuisha Ltd., Tokyo.	1984
2.	James A. Kent	Hand Book of Industrial Chemistry, 9th edition	New York, Van Nostrand Reinhold.	1992
3.	S.D. Shukla and G.N. Pandy	A text book of chemical technology	Vikas publishing house pvt. Ltd, New Delhi.	1979

WEBSITES:

1. <http://en.wikipedia.org/wiki/Cement>
2. <http://www.hon.ch/HONselect/Selection/D01.html>
3. <http://fas.org/man/dod-101/navy/docs/fun/part12.htm>
4. <http://toxics.usgs.gov/topics/agchemicals.html>

**OPEN ELECTIVES OFFERED BY COMPUTER
SCIENCE ENGINEERING**

COURSE OBJECTIVES:

- To learn how to use and manipulate several core data structures: Lists, Dictionaries, Tuples, and Strings
- To study decision structures and loops
- To understand the process and skills necessary to effectively deal with problem solving in relation to writing programs
- To understand the process and skills necessary to effectively deal with problem solving
- To discuss in relation to writing programs
- To study various program object and graphics based on python

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Develop algorithmic solutions to simple computational problems Read, write, execute by hand simple Python programs
- Structure simple Python programs for solving problems
- Decompose a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python Programs
- Understand various program object and graphics based on python

UNIT I Fundamentals**9**

The Universal Machine-Program power- What is Computer Science?-Hardware Basics- Programming Languages-Python-Inside Python program-Software Development Process- Example program- Elements of programs- Output statements- Assignment Statements- Data types-Type conversions

UNIT II Decision Structures and Loops**9**

Simple Decisions-Two-way decisions-Multi-way decisions-Exception handling-for loops-indefinite loops-common loop patterns-Booleans

UNIT III Functions**9**

Function of functions-Functions and Parameters-Function that returns values-Function that modifies parameters-Functions and program structures

UNIT IV Sequences**9**

String data type- String Processing-List as sequences-String Representation-String Methods-I/O as String manipulation-File Processing

UNIT V Objects and Graphics**9**

Overview-Object of Objects-Simple Graphics Programming-Using Graphical Objects-Choosing Coordinates- Interactive Graphics-Graphics module reference

Total Hours: 45

References:

1. John Zelle, “ Python Programming: An Introduction to Computer Science”, 2nd Edition, Franklin & Associates, 2009
2. Mark Lutz, “Learning Python”, OReily, 2013
3. David Beazly & Brian K. Jones, “Python Cookbook”, OReily, 2013

15BEC SOE02

Internet Programming

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To study concepts of Internet, IP addresses and protocols
- To explain the concept of web page development through HTML
- To introduce the PERL and explore its current strengths and Weaknesses
- To write working Java code to demonstrate the use of applets for client-side programming
- To study Internet telephony and various multimedia applications
- To Elaborate on the principles of web page development

COURSE OUTCOMES:

Upon completion of this course, the student will be able to:

- Learn the advanced concepts & techniques of Internet and Java.
- Analyze the requirements for and create and implement the principles of web page development
- Understand the concepts of PERL
- Implement client-side programming using java applets
- Generate internet telephony based upon advanced concepts
- Develop applications on internet programming based on java applets and scripts

UNIT I Introduction

9

Introduction - Network of Networks, Intranet, Extranet and Internet. World Wide Web- Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. TCP/IP- Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control, IP Datagram, IPv4 and IPv6. IP Subnetting and addressing- Classful and Classless Addressing, Subnetting

UNIT II HTML

9

Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps- map, area, attributes of image area- Extensible Markup Language (XML)- Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts- Introduction- Environment Variable, GET and POST Methods.

UNIT III PERL

9

Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling- JavaScript- Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object – string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies- Definition of cookies, Create and Store a cookie with example. Java Applets- Container Class, Components, Applet Life Cycle, Update method, Applications.

UNIT IV Client-Server programming

9

Client-Server programming In Java - Java Socket, Java RMI. Threats - Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks- Network security techniques- Password and Authentication- VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall- Introduction, Packet filtering, Stateful, Application layer, Proxy.

UNIT V Internet Telephony

9

Introduction, VoIP- Multimedia Applications- Multimedia over IP: RSVP, RTP, RTCP and RTSP- Streaming media, Codec and Plugins, IPTV- Search Engine and Web Crawler- Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

Total Hours: 45

References:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

COURSE OBJECTIVES:

- To impart the fundamental concepts of Computer Animation and Multimedia
- To study the graphic techniques and algorithms using flash
- Explain various concepts available in 3D animation
- Explain various devices available for animation
- To study the multimedia concepts and various I/O technologies for concept development
- To understand the three-dimensional graphics and their transformations

COURSE OUTCOMES

Upon completion of this course, the student will be able to:

- Develop their creativity using animation and multimedia
- Understand the concepts of Flash and able to develop animation using it
- Understand about various latest interactive 3D animation concepts
- Know the various devices and software available in motion capture
- Understand the concept development process
- Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.

UNIT I Introduction 9

What is mean by Animation – Why we need Animation – History of Animation– Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects -Creating Animation.

UNIT II **Creating Animation in Flash** **9**

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers - Action script.

UNIT III	3D Animation & its Concepts	9
-----------------	--	----------

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation
– 3D Camera Tracking – Applications & Software of 3D Animation.

UNIT IV Motion Caption 9

Formats – Methods – Usages – Expression – Motion Capture Software's – Script Animation Usage – Different Language of Script Animation Among the Software.

UNIT V **Concept Development** **9**

Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets- 3D Animated Movies.

Total Hours: 45

References:

1. Principles of Multimedia – Ranjan Parekh, 2007, TMH. (Unit I, Unit V)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication.
3. Computer Graphics, Multimedia and Animation-Malay K. Pakhira, PHI Learning Pvt Ltd, 2010
4. Encyclopedia of Multimedia and Animations-Pankaj Dhaka, Anmol Publications-2011

COURSE OBJECTIVES:

- To study the basic parts of computer in detail
- Introduce various peripheral devices available for computer and its detailed working concepts
- Overview of various interfaces and other hardware overview
- Assemble/setup and upgrade personal computer systems and discuss about power supplies and the skills to trouble-shoot various power-related problems.
- To study basic concepts and methods in troubleshooting
- To study the installation/connection and maintenance of computer and its associated peripherals.

COURSE OUTCOME:

Upon completion of this course, the student will be able to:

- Identify the main components for the PC, familiarize themselves with PC memories such as RAM and ROM devices and so on.
- Identify various peripheral devices available and its working
- Understand various concepts of hardware and its interface and control
- Perform basic installation of PC. Importance of maintenance is understood
- Understand Various faults and failures are identified and troubleshooting in detail
- Understand overall PC hardware, interfacing, maintenance and troubleshooting

UNIT I Introduction**9**

Introduction - Computer Organization – Number Systems and Codes – Memory – ALU – CU – Instruction prefetch – Interrupts – I/O Techniques – Device Controllers – Error Detection Techniques – Microprocessor – Personal Computer Concepts – Advanced System Concepts – Microcomputer Concepts – OS – Multitasking and Multiprogramming – Virtual Memory – Cache Memory – Modern PC and User.

UNIT II Peripheral Devices**9**

Introduction – Keyboard – CRT Display Monitor – Printer – Magnetic Storage Devices – FDD – HDD – Special Types of Disk Drives – Mouse and Trackball – Modem – Fax-Modem – CD ROM Drive – Scanner – Digital Camera – DVD – Special Peripherals.

UNIT III PC Hardware Overview**9**

Introduction – Hardware BIOS DOS Interaction – The PC family – PC hardware – Inside the System Box – Motherboard Logic – Memory Space – Peripheral Interfaces and Controllers – Keyboard Interface – CRT Display interface – FDC – HDC.

UNIT IV Installation and Preventive Maintenance**9**

Introduction – system configuration – pre installation planning – Installation practice – routine checks – PC Assembling and integration – BIOS setup – Engineering versions and compatibility – preventive maintenance – DOS – Virus – Data Recovery.

UNIT V Troubleshooting

9

Introduction – computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and Firmware – Programmable LSI's – Bus Faults – Faults Elimination process – Systematic Troubleshooting – Symptoms observation and analysis – fault diagnosis – fault rectification – Troubleshooting levels – FDD, HDD, CD ROM Problems.

Total Hours: 45

References:

1. B. Govindarajalu, "IBM PC Clones Hardware, Troubleshooting and Maintenance", 2/E, TMH, 2002.
2. Peter Abel, Niyaz Nizamuddin, "IMB PC Assembly Language and Programming", Pearson Education, 2007
3. Scott Mueller, "Repairing PC's", PHI, 1992

COURSE OBJECTIVES:

- To understand the basic requirements, installation and structure of gaming using Java
- Discuss various aspects of safe cracker projects
- Discuss various aspects of match game projects
- Discuss various aspects of pizza delivery projects
- Discuss various aspects of moon landing projects
- Discuss the process of development of gaming using Java

COURSE OUTCOMES:

Upon completion of the course, students will be able to:

- Interpret various concepts of gaming based on Java
- Design the frame and code to develop safe cracker project
- Design the frame and code to develop match game project
- Design the frame and code to develop pizza delivery project
- Design the frame and code to develop moon landing project
- Design and develop various games using Java

UNIT I Introduction**9**

Introducing Games with Java- Requirements-Installing Netbeans IDE-Structure of Java Program-Structure of Java GUI-Swing controls-Stopwatch Project-Creating Frames-Adding Controls-Adding Event methods-Writing Code

UNIT II Safecracker Project**9**

Frame design-Grid Bag Layout Manager-Code Design-Adding Sounds-Tic Tac Toe Project-Frame Design-Code Design-Adding Events-Adding Sounds

UNIT III Match Game Project**9**

Preview-Frame Design-Photo Selection-Code Design-Timer Objects- Adding Delays-one player Solitaire game-Computer Moves

UNIT IV Pizza Delivery Project**9**

Preview- Frame Design-Adding Clock-Game Design-Multiple Frames GUI- Leap Frog Project-Preview-Frame Design-Code Design- Introduction to OOP-Sprite Class-Collision detection between objects- Updating Scores

UNIT V Moon Landing Project**9**

Preview-Frame Design- Code Design- Graphics Methods- Graphics 2D Objects-Stroke and Paint Objects-Shapes and Drawing Methods-Line, Rectangle and Ellipse-Scrolling Background-Sprite Animation

Total Hours:
45

References:

1. Philip Conrod, Lou Tylee, "Programming Games with Java",2013
2. Timothy M.Right, "Fundamental 2D Game Programming with Java",Cengage Learning PTR,2015
3. Wayne Holder,Doug Bell, "Java Game Programming for Dummies",

**OPEN ELECTIVES OFFERED BY ELECTRICAL AND
ELECTRONICS ENGINEERING**

Course Objectives

- To understand the basic concepts of electric hybrid vehicle.
- To gain the knowledge about electric propulsion unit.
- To gain the concept of Hybrid Electric Drive-Trains.
- To gain the different Energy Management Strategies.
- To study about the efficiency manipulation in drives
- To understand and gain the knowledge about various energy storage devices

Course Outcomes:

- Summarize the basic concepts in bioprocess Engineering.
- Explain the concept of Hybrid Electric Vehicles.
- Understand the concept of Hybrid Electric Drive-Trains.
- Identify the different Energy Management Strategies.
- Understand the concept of different Energy Storage devices.
- Analyze the different motor drives used in Hybrid Electric Vehicles.

UNIT I INTRODUCTION

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT II HYBRID ELECTRIC DRIVE-TRAINS

Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT III ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT IV ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices.

UNIT V ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOK

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Iqbal Hussein	Electric and Hybrid Vehicles: Design Fundamentals	CRC Press	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi	Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design	CRC Press	2004
2	James Larminie, John Lowry	Electric Vehicle Technology Explained	Wiley	2003

Course Objectives:

- To gain the knowledge about energy management.
- To understand the basic concepts in economic analysis in energy management.
- To understand the basic principles of energy audit.
- To gain the knowledge about the basic concept of types of Energy Audit
- To gain and Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- To study about the behavior changes of PF requirement in motor currents

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- Understand the concept of Energy Management.
- Analyze the different methods for economic analysis
- Knowledge about the basic concept of Energy Audit and types.
- Evaluate the different energy efficient motors
- Understand the concept of Energy conservation.
- Investigate the different methods to improve power factor.

UNIT I ENERGY MANAGEMENT

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting –Energy Auditor and Energy Manager – Eligibility, Qualification and functions - Questionnaire and check list for top management.

UNIT II ECONOMIC ASPECTS AND ANALYSIS

Economics analysis – Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, life cycle costing analysis - Calculation of simple payback method, net present worth method.

UNIT III BASIC PRINCIPLES OF ENERGY AUDIT

Energy audit – definition, concept, type of audit, energy index, cost index, pie charts, Sankey diagrams, load profiles, Energy conservation schemes – Energy audit of industries – energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT IV ENERGY EFFICIENT MOTORS

Electric Motors: Factors affecting efficiency - Energy efficient motors - constructional details, characteristics - voltage variation –over motoring – motor energy audit-

Energy conservation: Importance-energy saving measures in DG set-fans and blowers pumps- air conditioning system- energy efficient transformers.

UNIT V POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS

Power factor - methods of improvement, location of capacitors, p.f with non linear loads, effect of

harmonics on p.f,- p.f motor controllers –Energy efficient lighting system design and practice-lighting control– Measuring Instruments – wattmeter, data loggers, thermocouples, pyrometers, lux meters, tong testers, application of PLCs.

Text Book

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Murphy W.R. and G.Mckay Butter worth	<i>Energy Management</i>	<i>Heinemann Publications</i>	2007

Reference Books

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John.C.Andreas	Energy Efficient Electric Motors	Marcel Dekker Inc Ltd – 3rd edition	2005
2	W.C.Turner Steve Doty	Energy Management Handbook	John Wiley and Sons, 7th Edition	2009
3	Paul o' Callaghan	Energy Management	Mc-Graw Hill Book Company – 1st edition	1998

Course Objectives

- It deals with various types of Sensors & Transducers and their working principle
- It deals with resistive transducers
- It deals with capacitive transducers
- It deals with inductive transducers
- It deals with some of the miscellaneous transducers
- It deals with characteristics of transducers

Course Outcomes (COs)

At the end of the course the student will be able to

1. understand all types of sensors and transducers.
2. Justify the concept and working principle of different transducers and sensors
3. Justify the transducers that will be utilised in the electrical industries
4. Identify recent developments in transducer domain
5. Discover the knowledge for small technology up gradations in it
6. Analysis the real time application.

UNIT I INTRODUCTION OF TRANSDUCERS

Transducer – Classification of transducers – Basic requirement of transducers.

UNIT II CHARACTERISTICS OF TRANSDUCERS

Static characteristics – Dynamic characteristics – Mathematical model of transducer – Zero, first order and second order transducers – Response to impulse, step, ramp and sinusoidal inputs.

UNIT III RESISTIVE TRANSDUCERS

Potentiometer –Loading effect – Strain gauge – Theory, types, temperature compensation – Applications – Torque measurement – Proving Ring – Load Cell – Resistance thermometer – Thermistors materials – Constructions, Characteristics – Hot wire anemometer.

UNIT IV INDUCTIVE AND CAPACITIVE TRANSDUCER

Self inductive transducer – Mutual inductive transducers– LVDT Accelerometer – RVDT – Synchros – Microsyn – Capacitive transducer – Variable Area Type – Variable Air Gap type – Variable Permittivity type – Capacitor microphone.

UNIT V MISCELLENEOUS TRANSDUCERS

Piezoelectric transducer – Hall Effect transducers – Smart sensors – Fiber optic sensors – Film sensors – MEMS – Nano sensors, Digital transducers.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Sawhney A.K	A Course in Electrical and Electronics Measurements and Instrumentation	18th Edition, Dhanpat Rai & Company Private Limited	2007
2	Renganathan. S	Transducer Engineering	Allied Publishers, Chennai	2003

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Doebelin. E.A	Measurement Systems – Applications and Design	Tata McGraw Hill, New York	2000
2	Patranabis. D	Sensors and Transducers	Prentice Hall of India	1999
3	John. P, Bentley	Principles of Measurement Systems	III Edition, Pearson Education	2000
4	Murthy.D.V.S	Transducers and Instrumentation	Prentice Hall of India	2001

Course Objectives

- To understand the basic principles of PLC systems.
- To gain the knowledge about data handling functions.
- To gain the knowledge of storage techniques in PLC
- To acquire the knowledge about how to handle the data and functions
- To study about flow charts of ladder and spray process system
- To understand the principles of PID.

Course Outcome

- At the end of the course the student will be able to understand the registers and functions in PLC and they are able to do the program.
- To acquire the knowledge of storage techniques in PLC
- Students know how to handle the data and functions
- Students know about advanced controller in PLC applications
- Students gather real time industrial application of PLC
- Students gathered and evaluate the flow charts of ladder and spray process system

UNIT I INTRODUCTION

PLC Basics PLC system, I/O modules and interfacing CPU processor programming equipment
Programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

UNIT II PLC PROGRAMMING

PLC Programming input instructions, outputs, operational procedures, programming examples using contacts and coils. Drill-press operation. Digital logic gates programming in the Boolean algebra system, conversion examples Ladder diagrams for process control Ladder diagrams and sequence listings, ladder diagram construction and flow chart for spray process system.

UNIT III REGISTERS AND PLC FUNCTIONS

PLC Registers: Characteristics of Registers module addressing holding registers input registers, output registers. PLC Functions Timer functions and industrial applications counters counter function industrial applications, Architecture functions, Number comparison functions, number conversion functions.

UNIT IV DATA HANDLING FUNCTIONS

Data handling functions: SKIP, Master control Relay Jump Move FIFO, FAL, ONS, CLR and Sweep functions and their applications. Bit Pattern and changing a bit shift register, sequence functions and applications, controlling of two axes and three axis Robots with PLC, Matrix functions.

UNIT V PID PRINCIPLES

Analog PLC operation: Analog modules and systems Analog signal processing multi bit data processing , analog output application examples, PID principles position indicator with PID control, PID modules, PID tuning, PID functions

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	JR Hackworth and F.D Hackworth – Jr	Programmable Logic Controllers – Programming Method and Applications	Pearson	2006

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	John Webb and Ronald A Reiss	Programmable Logic Controllers – Principle and Applications	Fifth edition, PHI	
2	W.Bolton	Programmable Logic controller	Elsevier Newnes Publications, Fourth Edition	2006

WEBSITE

<http://www.mikroe.com/old/books/plcbook/chapter1/chapter1.htm>, - Introduction to programmable Logic controller

Course Objectives

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of wind energy conversion, solar cells, photovoltaic conversion.
- To study about solar energy collectors and its storages
- To study about the inter connected system in wind power
- To understand the basic principles fuel cell, Geo thermal power plants.
- To gain the knowledge about hydro energy.

Course Outcomes

At the end of this course, students will demonstrate the ability to

- Analyze the Energy Scenario in india
- Understand the concept of Solar Energy
- Understand the concept of Wind Energy
- Understand the concept of Hydro Energy
- Analyze the different energy sources
- Students gathered the real time inter connected system modelling in wind power

UNIT I INTRODUCTION

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization - Energy Conservation and Energy Efficiency - Needs and Advantages, Energy Conservation Act 2003.

UNIT II SOLAR ENERGY

Introduction to solar energy: solar radiation, availability, measurement and estimation– Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Applications of PV Systems – solar energy collectors and storage.

UNIT III WIND ENERGY

Introduction – Basic principles of wind energy conversion- components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy – Inter connected systems.

UNIT IV HYDRO ENERGY

Hydropower, classification of hydro power, Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V OTHER SOURCES

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic (MHD) energy conversion.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rai.G.D	Non-conventional resources of energy	Khanna publishers ,Fourth edition	2010
2	Khan.B.H	Non-Conventional Energy Resources	The McGraw Hills, Second edition	2009

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rao.S. & Parulekar	Energy Technology	Khanna publishers, Fourth edition	2005
2	Godfrey Boyl	Renewable Energy: Power sustainable future	Oxford University Press, Third edition	2012
3	John W Twidell and Anthony D Weir	Renewable Energy Resources	Taylor and Francis	2006
4	Mittal K.M	Non-Conventional Energy Systems	Wheeler Publishing Co. Ltd	1997

WEBSITES

1. www.energycentral.com
2. www.catelectricpowerinfo.com

Course Objectives

- To study the state variable analysis
- To provide adequate knowledge in the phase plane analysis and also describing function analysis.
- To study the analysis discrete time systems using conventional techniques.
- To analyze the stability of the systems using different techniques.
- To study the design of optimal controller.
- To study the types of compensators

Course Outcomes

At the end of the course the student will be able to

- understand the state variable analysis, Z- transform, state equation
- Construct the frequency response of the system using various plots
- Correlate the time and frequency domain specifications and effect of compensation
- Design the different types of compensators using frequency response plots to stabilize the control system
- Explain the state variable representation of physical systems with the effects of state feedback its assessment for linear-time invariant systems.

UNIT 1 STATE VARIABLE ANALYSIS

Concept of state – State Variable and State Model – State models for linear and continuous time

systems – Solution of state and output equation – controllability and observability - Pole Placement

– State observer Design of Control Systems with observers

UNIT II PHASE PLANE AND DESCRIBING FUNCTION ANALYSIS

Features of linear and non-linear systems - Common physical non-linearities – Methods of linearising

non-linear systems - Construction of phase portraits – Singular points – Limit cycles Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

UNIT III Z-TRANSFORM AND DIGITAL CONTROL SYSTEM

Z transfer function – Block diagram – Signal flow graph – Discrete root locus – Bode plot.

UNIT 1V STATE-SPACE DESIGN OF DIGITAL CONTROL SYSTEM

State equation – Solutions – Realization – Controllability – Observability – Stability
– Jury's test.

UNIT V OPTIMAL CONTROL

Introduction -Decoupling - Time varying optimal control – LQR steady state optimal control
–
Optimal estimation – Multivariable control design.

TEXT BOOKS

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.J. Nagrath and M. Gopal	Control Systems Engineering	New Age International Publishers	2003
2	Ashish Tewari	Modern control Design with Matlab and Simulink	John Wiley, New Delhi	2002
3	Benjamin C. Kuo	Digital Control Systems	Oxford University Press	1992
4	George J. Thaler	Automatic Control Systems'	Jaico Publishers	1993

REFERENCES

S. No.	Author(s) Name	Title of the book	Publisher	Year of Publication
1	George J. Thaler	Automatic Control Systems	Jaico Publishers	1993
2	M.Gopal	Modern control system theory	New Age International Publishers	2002
3	Gene F. Franklin, J. David Powell and Abbasemami-Naeini	Feedback Control of Dynamic Systems	Fourth edition, Pearson Education, Low price edition	2002
4	Raymond T. Stefani & Co	Design of feedback Control systems	Oxford University	2002

**OPEN ELECTIVES OFFERED BY ELECTRONICS AND
COMMUNICATION ENGINEERING**

Course Objectives

- To introduce students to the embedded systems, its hardware and software.
- To introduce devices and buses used for embedded networking.
- To study about task management
- To learn about semaphore management and message passing
- To study about memory management
- To imparts knowledge on

Course Outcomes

At the end of the course the students will be able to

- Understand overview of embedded systems architecture
- Acquire knowledge on embedded system, its hardware and software.
- Gain knowledge on overview of Operating system
- Discuss about task Management
- Gain knowledge about semaphore management and message passing.
- Gain knowledge about memory management.

UNIT - I INTRODUCTION TO EMBEDDED SYSTEM

Introduction - Embedded systems description, definition, design considerations & requirements - Overview of Embedded system Architecture (CISC and RISC) - Categories of Embedded Systems - embedded processor selection & tradeoffs - Embedded design life cycle - Product specifications - hardware/software partitioning - iterations and implementation - hardware software integration - product testing techniques – ARM 7

UNIT - II OPERATING SYSTEM OVERVIEW

Introduction – Advantage and Disadvantage of Using RTOS – Multitasking – Tasks - Real Time Kernels – Scheduler - Non-preemptive Kernels - Preemptive Kernels – Reentrancy- Reentrant Functions – Round Robin Scheduling - Task Priorities - Static Priorities – Mutual Exclusion – Deadlock – Intertask Communication – Message Mailboxes – Message Queues - Interrupts - Task Management – Memory Management - Time Management – Clock Ticks.

UNIT - III TASK MANAGEMENT

Introduction - μ C/OS-II Features - Goals of μ C/OS-II - Hardware and Software Architecture – Kernel Structures: Tasks – Task States – Task Scheduling – Idle Task – Statistics Task – Interrupts Under μ C/OS-II – Clock Tick - μ C/OS-II Initialization. Task Management: Creating Tasks – Task Stacks – Stack Checking – Task's Priority – Suspending Task – Resuming Task. Time Management: Delaying a Task – Resuming a Delayed Task – System Time. Event Control Blocks- Placing a Task in the ECB Wait List – Removing a Task from an ECB wait List .

UNIT - IV SEMAPHORE MANAGEMENT AND MESSAGE PASSING

Semaphore Management: Semaphore Management Overview – Signaling a Semaphore. Message Mailbox Management: Creating a Mailbox – Deleting Mailbox – Waiting for a Message box – Sending Message to a Mailbox- Status of Mailbox. Message Queue Management: Creating Message Queue – Deleting a Message Queue – Waiting for a Message at a Queue – Sending Message to a Queue – Flushing a Queue.

UNIT - V MEMORY MANAGEMENT

Memory Management: Memory Control Blocks – Creating Partition- Obtaining a Memory Block – Returning a Memory Block .Getting Started with μ C/OS-II – Installing μ C/OS-II – Porting μ C/OS-II: Development Tools – Directories and Files – Testing a Port - IAR Workbench with μ C/OS-II - μ C/OS-II Porting on a 8051 CPU – Implementation of Multitasking - Implementation of Scheduling and Rescheduling – Analyze the Multichannel ADC with help of μ C/OS-II.

REFERENCES

S.NO	Author(s) Name	Title of the book	Publisher	Year of publication
1	Jean J. Labrosse	MicroC/OS – II The Real Time Kernel	CMP BOOKS	2009
2	David Seal	ARM Architecture Reference Manual.	Addison-Wesley	2008
3	Steve Furbe,	ARM System-on-Chip Architecture,	Addison-Wesley Professional, California	2000

Course Objectives

- To study about various speakers and microphone
- To learn the fundamental of television systems and standards
- To learn the process of audio recording and reproduction
- To study various telephone networks
- To discuss about the working of home appliances
- To familiarize with TV services like ISDN.

Course Outcomes

At the end of the course the students will be able to

- Understand working of various type of loud speakers
- Acquire knowledge on various types of picture tubes
- Demonstrate the working of various optical recording systems
- Distinguish various standards for color TV system
- Acquire knowledge on various telecommunication networks
- Demonstrate the working of various home appliances

UNIT I LOUDSPEAKERS AND MICROPHONES

Dynamic Loudspeaker, Electrostatic loudspeaker, Permanent Magnet Loudspeaker, Woofers and Tweeters - Microphone Characteristics, Carbon Microphones, Dynamic Microphones and Wireless Microphones.

UNIT – II TELEVISION STANDARDS AND SYSTEMS

Components of a TV system – interlacing – composite video signal. Colour TV – Luminance and Chrominance signal; Monochrome and Colour Picture Tubes - Colour TV systems – NTSC, PAL, SECAM - Components of a Remote Control.

UNIT – III OPTICAL RECORDING AND REPRODUCTION

Audio Disc – Processing of the Audio signal – read out from the Disc – Reconstruction of the audio signal – Video Disc – Video disc formats- recording systems – Playback Systems.

UNIT – IV TELECOMMUNICATION SYSTEMS

Telephone services - telephone networks – switching system principles – PAPX switching – Circuit, packet and message switching, LAN, MAN and WAN, Integrated Services Digital Network. Wireless Local Loop. VHF/UHF radio systems, Limited range Cordless Phones; cellular modems

UNIT – V HOME APPLIANCES

Basic principle and block diagram of microwave oven; washing machine hardware and software; components of air conditioning and refrigeration systems.

Text Book:

1. S.P.Bali, “Consumer Electronics”, Pearson Education, 2005.

Course Objectives

- To familiar with the important concepts applicable to small electronic devices, their fabrication, characterization and application
- To have a solid understanding of Nanotechnology concepts.
- To introduce the basic concepts of Nanotechnology and its applications in various domain
- To understand the molecular structure of carbon nano tube
- To educate how to use Nanotechnology to solve real-world problems
- To familiar with the structure and application of carbon nano tube

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of Nanotechnology and its applications in various domain
- Ability to develop how to use Nanotechnology to solve real- world problems
- Understand solid understanding of Nanotechnology concepts
- Understand the important concepts applicable to small electronic devices, their fabrication, characterization and application
- Understand the molecular structure of carbon nano tube
- Familiar with the structure and application of carbon nano tube

UNIT I-LIMITATIONS OF CMOS

Fundamentals of MOSFET devices - Scaling of CMOS – Limitations – Alternative concepts in materials – **Structures of MOS devices:** SOI MOSFET, FINFETS, Dual Gate MOSFET, Ferro electric FETs.

UNIT II-MICRO AND NANO FABRICATION

Optical Lithography – Electron beam Lithography – Atomic Lithography – Molecular beam epitaxy - Nano lithography.

UNIT III-CHARACTERIZATION EQUIPMENTS

Principles of Electron Microscopes – Scanning Electron Microscope – Transmission Electron Microscope - Atomic Force Microscope – Scanning Tunneling Microscope.

UNIT IV-NANO DEVICES – I

Resonant tunneling diodes – Single electron devices – Josephson junction – Single Flux Quantum logic – Molecular electronics.

UNIT V-NANO DEVICES – II

Quantum computing: principles – Qbits – Carbon nanotubes (CNT): Characteristics, CNTFET, Application of CNT - Spintronics: Principle, Spin valves, Magnetic Tunnel Junctions, SpinFETs, MRAM

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Rainer Waser (Ed)	Nano electronics and information technology	Wiley- VCH. 3 rd Edition	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Thomas Heinzl	A Microscopic Electronics in Solid State Nanostructure	Wiley- VCH	2008
2	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Nanotechnology – (Basic Science and Emerging Technologies	Overseas Press	2002
3	Mark Ratner, Daniel Ratner	Nanotechnology: A Gentle introduction to the Next Big idea	Pearson education	2003

Course Objectives

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study the image compression procedures.
- To study the image segmentation and representation techniques.
- To study the video processing fundamentals
- To know the concepts of motion estimation

INTENDED OUTCOMES:

- Understand the image fundamentals and mathematical transforms necessary for image processing.
- Understand the image enhancement techniques
- Understand the image compression procedures.
- Understand the image segmentation and representation techniques.
- Understand the video processing fundamentals
- Understand motion estimation concepts

UNIT I FUNDAMENTALS OF IMAGE PROCESSING AND IMAGE TRANSFORMS Basic steps of Image processing system sampling and quantization of an Image – Basic relationship between pixels Image Transforms: 2 – D Discrete Fourier Transform, Discrete Cosine Transform, Discrete Wavelet transforms.

UNIT II IMAGE PROCESSING TECHNIQUES

Image Enhancement: Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters, Frequency Domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering.

UNIT III IMAGE SEGMENTATION AND COMPRESSION

Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation Image Compression Image compression fundamentals – coding Redundancy, spatial and temporal redundancy. Compression models : Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

UNIT IV BASICS OF VIDEO PROCESSING

Analog video, Digital Video, Time varying Image Formation models : 3D motion models, Geometric Image formation , Photometric Image formation, sampling of video signals, filtering operations.

UNIT V 2-D MOTION ESTIMATION

Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

TEXTBOOKS

1. Gonzalez and Woods ,”Digital Image Processing “, 3rd edition Pearson
2. Yao wang, Joem Ostarmann and Ya – quin Zhang, ”Video processing and communication “,1st edition PHI

REFERENCE BOOKS

1. M. Tekalp ,”Digital video Processing”, Prentice ll International
2. Aner ozdemi R, "Inverse Synthetic Aperture Radar Imaging with MATLAB Algorithms", JohnWiley & Sons
3. Chris Solomon, Toby Breckon , "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", John Wiley & Sons,

Course Objectives

- To learn the processing steps in fabrication of VLSI devices.
- To learn the concepts of assembling and packaging for VLSI devices.
- To impart a good knowledge in reactive plasma etching techniques and equipment.
- To familiarize the students with the NMOS and CMOS IC technology.
- To make the student acquire reactive Plasma Etching techniques and Equipment.
- To acquaint the student with the VLSI assembly technology and package fabrication technology

Course outcomes

After completing this course, the students will be able to

- List out various fabrication techniques
- Understand the etching principle in IC fabrication
- Gain knowledge on deposition and diffusion methods
- Understand the process simulation and integration.
- Assembling and packing techniques
- various technologies used for fabricating VLSI devices

UNIT 1

Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends and Projections. Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds} - V_{ds} relationships, Threshold Voltage V_t , G_m , G_{ds} and ω_o , Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Z_{pu}/Z_{pd} , MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT II:

Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.

Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT III:

Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT IV:

Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT V:

Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A.Pucknell, 2005, PHI.
2. Modern VLSI Design - Wayne Wolf, 3rd ed., 1997, Pearson Education.

REFERENCES:

1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

Course Objectives

- To study materials used for MEMS and its working
- To study the fabrication process used for MEMS
- To study the packaging process used for MEMS
- To familiarize the students with various micro actuators and micro sensors.
- To learn the survey of materials central to micro engineering.
- To impart good knowledge in micro system packaging materials

Course Outcomes

At the end of the course the students will be able to

- Appreciate the underlying working principles of MEMS devices.
- Understand the working of Micro sensors and actuators
- Explain the IC fabrication processes
- Gain knowledge on bulk manufacturing
- Understand the Design of Micro systems.
- Design and model MEMS devices.

UNIT I-INTRODUCTION TO MEMS AND MICRO FABRICATION

History of MEMS Development, Characteristics of MEMS-Miniaturization - Micro electronics integration - Mass fabrication with precision. Sensors and Actuators- Energy domain. Sensors, actuators Micro fabrication - microelectronics fabrication process- Silicon based MEMS processes- New material and fabrication processing- Points of consideration for processing. Anisotropic wet etching, Isotropic wet etching, Dry etching of silicon, Deep reactive ion etching (DRIE), and Surface micromachining process- structural and sacrificial material.

UNIT II-ELECTRICAL AND MECHANICAL CONCEPTS OF MEMS

Conductivity of semiconductors, crystal plane and orientation, stress and strain - definition - Relationship between tensile stress and strain- mechanical properties of Silicon and thin films, Flexural beam bending analysis under single loading condition- Types of beam- longitudinal strain under pure bending -deflection of beam- Spring constant, torsional deflection, intrinsic stress, resonance and quality factor.

UNIT III-ELECTROSTATIC AND THERMAL PRINCIPLE SENSING AND ACTUATION

Electrostatic sensing and actuation-Parallel plate capacitor - Application- Inertial, pressure and tactile sensor parallel plate actuator- comb drive Thermal sensing and Actuators-Thermal sensors-Actuators- Applications Inertial, flow and infrared sensors.

UNIT IV-PIEZORESISTIVE, PIEZOELECTRIC AND MAGNETIC PRINCIPLE SENSORS AND ACTUATOR

Piezoresistive sensors- piezoresistive sensor material- stress in flexural cantilever and membrane- Application-Inertial, pressure, flow and tactile sensor. Piezoelectric sensing and actuation- piezoelectric material properties-quartz- PZT-PVDF -ZnO- Application-Inertial, Acoustic, tactile, flow-surface elastic waves Magnetic actuation- Micro magnetic actuation principle- Deposition of magnetic materials-Design and fabrication of magnetic coil.

UNIT V-POLYMER AND OPTICAL MEMS

Polymers in MEMS- polyimide-SU-8 Liquid crystal polymer(LCP)- PDMS – PMMA – Parylene - Fluorocarbon, Application-Acceleration, pressure, flow and tactile sensors. Optical MEMS-passive MEMS optical components-lenses-mirrors-Actuation for active optical MEMS.

TEXT BOOK:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Chang Liu	Foundations of MEMS	Pearson Indian Print, 1 st Edition	2012

REFERENCES:

S.NO.	Author(s) Name	Title of the book	Publisher	Year of publication
1	Gaberiel M. Rebiz	RF MEMS Theory, Design and Technology	John Wiley & Sons	2003
2	Charles P. Poole and Frank J. Owens	Introduction to Nanotechnology	John Wiley & Sons	2003
3	Julian W. Gardner and Vijay K. Varadhan	Microsensors, MEMS and Smart Devices	John Wiley & sons	2001

Course Objectives

- To introduce the basic concepts of neural networks and its applications in various domain
- To educate how to use Soft Computing to solve real-world problems
- To have a solid understanding of Basic Neural Network.
- To provide students with a sound and comprehensive understanding of artificial neural networks and machine learning.
- To gain exposure in the field of neural networks and relate the human neural system into the digital world
- To provide knowledge of computation and dynamical systems using neural networks

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of neural networks and its applications in various domains
- Gain knowledge about learning process in Neural Networks
- Apply perception concept in design
- Design using ART phenomena
- Gain knowledge on SOM concepts
- Ability to develop the use of Soft Computing to solve real-world problems

UNIT I: INTRODUCTION TO NEURAL NETWORKS

Introduction - biological neurons and their artificial models - learning, adaptation and neural network's learning rules - types of neural networks- single layer, multiple layer- feed forward, feedback networks

UNIT II LEARNING PROCESS

Error – correction learning – memory based learning - hebbian learning-competitive learning-Boltzmann learning- supervised and unsupervised learning-adaptation-statistical learning theory.

UNIT III PERCEPTION

Single layer perception-Adaptive filtering-unconstrained optimization-Least-mean square algorithm-Leaning curve-Annealing Technique-perception convergence theorem-Relationship between perception and Baye's classifier-Back propagation algorithm

UNIT IV ATTRACTOR NEURAL NETWORK AND ART

Hopfield model-BAM model-BAM stability-Adaptive BAM -Lyapunov function-effect of gain-Hopfield design-Application to TSP problem-ART- layer 1-layer 2-orienting subsystem- ART algorithm-ARTMAP

UNIT V SELF ORGANIZATION

Self organizing map-SOM Algorithm-properties of the feature map-LVQ-Hierarchical vector Quantization. Applications of self-organizing maps: The Neural Phonetic Typewriter Learning Ballistic Arm Movements

REFERENCES:

1. Simon Haykin, "Neural Networks and Learning Machines" -3/E - Pearson/ Prentice Hall 2009
2. Satish Kumar- "Neural Networks : A Classroom Approach"-TMH-2008
3. Freeman J.A., Skapura D.M."Neural networks, algorithms, applications, and programming techniques" -Addison Wesley, 2005.
4. Laurene Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms, and Applications" - Pearson/ Prentice Hall
5. Robert J Schalkoff-"Artificial Neural Networks,McGraw Hill"-1997

Course Objectives

- To introduce the basic concepts of Fuzzy logic and its applications in various domain
- To educate how to use Fuzzy computation to solve real-world problems
- To have a solid understanding of Basic fuzzy models.
- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- To learn about applications on Fuzzy based systems
- To familiarize with fuzzy inference and defuzzy inference procedures

Course Outcomes

At the end of the course the students will be able to

- Understand the basic concepts of Fuzzy logic and its applications in various domain
- Gain knowledge on theory of Reasoning
- Develop fuzzy controllers
- Understand concepts of adaptive fuzzy control
- Ability to develop how to use Fuzzy computation to solve real- world problems
- Design fuzzy based model for any application

UNIT - I

Basics Of Fuzzy Logic: Fuzzy sets, Properties of fuzzy sets, operation in fuzzy sets, fuzzy relations, the extension principle

UNIT – II

Theory Of Approximate Reasoning: Linguistic variables, Fuzzy proportions, Fuzzy if- then statements, inference rules, compositional rule of inference-fuzzy models

UNIT - III

Fuzzy Knowledge Based Controllers (Fkbc): Basic concept structure of FKBC, choice of membership functions, scaling factors, rules, fuzzyfication and defuzzyfication procedures – Design of Fuzzy Logic Controller

UNIT - IV

Adaptive Fuzzy Control: Process performance monitoring, adaption mechanisms, membership functions, tuning using gradient descent and performance criteria. Self organizing controller model based controller.

UNIT V**FUZZY BASED SYSTEMS**

Simple applications of FKBC -washing machines- traffic regulations -lift control-fuzzy in medical applications-Introduction to ANFIS.

TEXT BOOKS:

1. An Introduction to Fuzzy Control- D. Diankar, H. Hellendoom and M. Reinfrank- Narosa Publishers India, 1996.
2. Fuzzy Sets Uncertainty and Information- G. J. Klir and T. A. Folger- PHI IEEE, 1995.

OPEN ELECTIVES OFFERED BY MECHANICAL ENGINEERING

Course Objective

1. To explain to the students about MEMS Technology, Present, Future and Challenges.
2. To gain a knowledge of basic approaches for microsystem design.
3. To gain a knowledge of state-of-the-art lithography techniques for microsystems.
4. To learn new materials, science and technology for microsystem applications.
5. To understand materials science for microsystem applications.
6. To understand state-of-the-art micromachining and packaging technologies.

Course Outcome

1. Students will explain MEMS Technology, Present, Future and Challenges.
2. Gain a knowledge of basic approaches for microsystem design
3. Gain a knowledge of state-of-the-art lithography techniques for microsystems
4. Learn new materials, science and technology for microsystem applications
5. Understand materials science for microsystem applications
6. Understand state-of-the-art micromachining and packaging technologies

UNIT I INTRODUCTION

Intrinsic Characteristics of MEMS – Energy Domains and Transducers- Sensors and Actuators – Introduction to Micro fabrication - Silicon based MEMS processes – New Materials – Review of Electrical and Mechanical concepts in MEMS – Semiconductor devices – Stress and strain analysis – Flexural beam bending- Torsional deflection.

UNIT II SENSORS AND ACTUATORS-I

Electrostatic sensors – Parallel plate capacitors – Applications – Interdigitated Finger capacitor – Comb drive devices – Micro Grippers – Micro Motors - Thermal Sensing and Actuation – Thermal expansion – Thermal couples – Thermal resistors – Thermal Bimorph - Applications – Magnetic Actuators – Micromagnetic components – Case studies of MEMS in magnetic actuators- Actuation using Shape Memory Alloys

UNIT III SENSORS AND ACTUATORS-II

Piezoresistive sensors – Piezoresistive sensor materials - Stress analysis of mechanical elements – Applications to Inertia, Pressure, Tactile and Flow sensors – Piezoelectric sensors and actuators – piezoelectric effects – piezoelectric materials – Applications to Inertia , Acoustic, Tactile and Flow sensors.

UNIT IV MICROMACHINING

Silicon Anisotropic Etching – Anisotropic Wet Etching – Dry Etching of Silicon – Plasma Etching – Deep Reaction Ion Etching (DRIE) – Isotropic Wet Etching – Gas Phase Etchants – Case studies - Basic surface micro machining processes – Structural and Sacrificial Materials – Acceleration of sacrificial Etch – Striction and Antistriction methods – LIGA Process - Assembly of 3D MEMS – Foundry process.

UNIT V POLYMER AND OPTICAL MEMS

Polymers in MEMS– Polimide - SU-8 - Liquid Crystal Polymer (LCP) – PDMS – PMMA – Parylene – Fluorocarbon - Application to Acceleration, Pressure, Flow and Tactile sensors- Optical MEMS – Lenses and Mirrors – Actuators for Active Optical MEMS.

TEXT BOOKS

1. Chang Liu, "Foundations of MEMS", Pearson Education Inc., 2006.
2. Stephen D Senturia, "Microsystem Design", Springer Publication, 2000.
3. Tai Ran Hsu, "MEMS & Micro systems Design and Manufacture" Tata McGraw Hill, New Delhi, 2002.

REFERENCES

1. Nadim Maluf, "An Introduction to Micro Electro Mechanical System Design", Artech House, 2000.
2. Mohamed Gad-el-Hak, editor, "The MEMS Handbook", CRC press Boca Raton, 2000
3. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim, "Micro Sensors MEMS and Smart Devices", John Wiley & Son LTD, 2002
4. James J. Allen, "Micro Electro Mechanical System Design", CRC Press Publisher, 2010
5. Thomas M. Adams and Richard A. Layton, "Introduction MEMS, Fabrication and Application," Springer 2012.

Course Objective

1. To develop the student's knowledge in various robot structures and their workspace.
2. To develop student's skills in performing spatial transformations associated with rigid body motions.
3. To develop student's skills in perform kinematics analysis of robot systems.
4. To provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. To provide the student with some knowledge and analysis skills associated with trajectory planning.
6. To provide the student with some knowledge and skills associated with robot control.

Course Outcome

1. Develop the student's knowledge in various robot structures and their workspace.
2. Develop student's skills in performing spatial transformations associated with rigid body motions.
3. Develop student's skills in perform kinematics analysis of robot systems.
4. Provide the student with knowledge of the singularity issues associated with the operation of robotic systems.
5. Provide the student with some knowledge and analysis skills associated with trajectory planning.
6. Provide the student with some knowledge and skills associated with robot control.

UNIT I FUNDAMENTALS OF ROBOT

Robot – Definition, Need for Robots, Robot Anatomy, Co-ordinate systems, Work Envelope, types and classification – specifications – Pitch, yaw, Roll, Joint Notations, Speed of Motion, Pay Load – Robot Parts and their functions, grippers types. Forward kinematics, inverse kinematics- Manipulators with two, three degrees of freedom in 2D - Derivations and problems.

UNIT II DRIVES AND SENSORS

Drives- hydraulic, pneumatic and electrical. Force sensing, touch and tactile sensors, proximity sensors, non contact sensors and Machine vision sensors. Safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance mechanism.

UNIT III PROGRAMMING AND APPLICATIONS

Robot programming languages – VAL programming – Motion Commands, Sensorscommands. Role of robots in inspection, assembly, material handling, underwater, space, nuclear, defence and medical fields.

UNIT IV MACHINE VISION

Machine Vision - Sensing - Low and higher level vision - Image acquisition and digitization - Cameras, CCD,CID, CPD, etc., - Illumination and types - Image processing and analysis - Feature extraction - Applications.

UNIT V IMPLEMENTATION AND ROBOT ECONOMICS

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TEXT BOOKS

1. Klafter R.D., Chmielewski T.A and Negin M., “Robotic Engineering - An Integrated Approach”, Prentice Hall, 2003.
2. Groover M.P., “Industrial Robotics -Technology Programming and Applications”, McGraw Hill, 2001.

REFERENCES

1. Craig J.J., “Introduction to Robotics Mechanics and Control”, Pearson Education, 2008.
2. Deb S.R., “Robotics Technology and Flexible Automation” Tata McGraw Hill Book Co., 1994.
3. Koren Y., “Robotics for Engineers”, Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, McGraw Hill Book Co., 1987.
5. Janakiraman P.A., “Robotics and Image Processing”, Tata McGraw Hill, 1995.
6. Rajput R.K., “Robotics and Industrial Automation”, S.Chand and Company, 2008.
7. Surender Kumar, “Industrial Robots and Computer Integrated Manufacturing”, Oxford and IBH Publishing Co. Pvt. Ltd., 1991.

Course Objective

1. To recognize and evaluate occupational safety and health hazards in the workplace.
2. To determine appropriate hazard controls following the hierarchy of controls.
3. To analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. To prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. To teach student the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. To prevent or mitigate harm or damage to people, property, or the environment.

Course Outcome

1. Recognize and evaluate occupational safety and health hazards in the workplace.
2. Determine appropriate hazard controls following the hierarchy of controls.
3. Analyse the effects of workplace exposures, injuries and illnesses, fatalities.
4. Prevent incidents using the hierarchy of controls, effective safety and health management systems and task-oriented training.
5. Understand the concept of Industrial Safety & provide useful practical knowledge for workplace safety.
6. Prevent or mitigate harm or damage to people, property, or the environment.

UNIT I INTRODUCTION TO LOGISTICS

Logistics - concepts, definitions and approaches, factors influencing logistics - Supply chain: basic tasks, definitions and approaches, influencing supply chain - a new corporate model.

UNIT II PHASES OF SUPPLY CHAIN

The new paradigm shift - The modular company - The network relations - Supply processes - Procurement processes - Distribution management.

UNIT III EVOLUTION OF SUPPLY CHAIN MODELS

Strategy and structure - Factors of supply chain - Manufacturing strategy stages - Supply chain progress - Model for competing through supply chain management - PLC grid, supply chain redesign - Linking supply chain with customer.

UNIT IV SUPPLY CHAIN ACTIVITIES

Structuring the SC, SC and new products, functional roles in SC - SC design framework - Collaborative product commerce (CPC).

UNIT V SCM ORGANISATION AND INFORMATION SYSTEM

The management task - Logistics organization - The logistics information systems - Topology of SC application - Product Data Management - Warehouse management system MRP- I, MRP - II, ERP,. - Case study, ERP Software's

TEXT BOOKS

1. Shari.P.B and Lassen.T.S, "Managing the global supply chain", Viva books, New Delhi, 2000.
2. Ayers.J.B, "Hand book of supply chain management", The St. Lencie press, 2000.

REFERENCES

1. Nicolas.J.N, "Competitive manufacturing management - continuous improvement", Lean production, customer focused quality, McGrawHill, New York, 1998.
2. Steudel.H.J and Desruelle.P, "Manufacturing in the nineteen - How to become a mean, lean and world class competitor", Van No strand Reinhold, New York, 1992.

Course Objective

1. To generalized equations for mass, momentum and heat.
2. To understand the concepts of Reynolds and Gauss theorems.
3. To learn combined diffusive and convective transport.
4. To apply Film- and penetration models for mass and heat transfer.
5. To apply Stefan-Maxwells equations for multi-component diffusion.
6. To Solve the given set of equations either analytically or numerically.

Course Outcome

1. Generalized equations for mass, momentum and heat.
2. Understand the concepts of Reynolds and Gauss theorems.
3. Learn combined diffusive and convective transport.
4. Apply Film- and penetration models for mass and heat transfer.
5. Apply Stefan-Maxwells equations for multi-component diffusion.
6. Solve the given set of equations either analytically or numerically.

UNIT I INTRODUCTION AND BASIC CONCEPTS

General overview of transport phenomena including various applications, Transport of momentum, heat and mass , Transport mechanism, Level of transport, Driving forces, Molecular transport (diffusion), convective transport (microscopic)

UNIT II PROPERTIES, UNITS AND OTHER PHYSICAL PARAMETERS

Unit systems, temperature, mole, concentration, pressure, Gas laws, laws of conservation, energy and heat units

UNIT III MOMENTUM TRANSPORT

Basic concepts in fluid mechanics, Force, unit and dimensions, pressure in fluid, head of fluid, Molecular transport for momentum, heat and mass transfer, Viscosity of fluids, Newton's law, Momentum transfer, Newtonian and non- Newtonian fluids, Fluid flow and Reynolds number, Overall mass balance, Control volume and Continuity equation, Overall energy balance, Bernoulli's equation, Overall momentum balance, Drag coefficient, Stokes law, Flow in packed beds, Flow in fluidized bed

UNIT IV ENERGY TRANSPORT

Basic concepts in heat transfer, Heat transfer mechanisms, Fourier's law of heat conduction, thermal conductivity, convective heat transfer coefficient, Conduction heat transfer - through flat slab/wall and through hollow cylinder, Conduction through solids in series, Forced convection heat transfer inside pipes, Heat transfer outside various geometrics in forced convection, General discussion on natural convection heat transfer, Heat exchangers, General discussion on radiation heat transfer

UNIT V MASS TRANSPORT

Basic concepts in mass transport, Some application examples, Modes of mass transfer, Molecular diffusion-Fick's law, Analogy between mass, heat and momentum transfer, Dispersion, Hydraulic or Darcy's flow in porous media, Chemical kinetics and activation energy, Film theory, Convective mass transfer, Liquid-solid mass transfer, Liquid-liquid mass transport, Gas-liquid mass transfer, Aeration and oxygen transport, Air stripping

REFERENCES

1. Geankoplis, C. J. 2003. Transport Processes and Separation Processes Principles. 4th Edition. Prentice Hall.
2. <https://laulima.hawaii.edu/portal>

Course Objective

1. To describe the principles of the study of human movement.
2. To describe the range of factors that influence the initiation, production and control of human movement.
3. To identify the body's lever systems and their relationship to basic joint movement and classification.
4. To distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. To explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. To relate the different body systems necessary for human movement to occur.

Course Outcome

1. Describe the principles of the study of human movement.
2. Describe the range of factors that influence the initiation, production and control of human movement.
3. Identify the body's lever systems and their relationship to basic joint movement and classification.
4. Distinguish between biomechanical principles of kinetics and kinematics when applied to the analysis of human movement.
5. Explain joint and muscle function and the forces acting upon the human body during various sporting activities.
6. Relate the different body systems necessary for human movement to occur.

UNIT I INTRODUCTION

Biomechanics - Improving Performance – Applications - Preventing And Treating Injury - Qualitative And Quantitative Analysis - Scholarly Societies - Computer Searches – Biomechanical Knowledge versus Information - Kinds of Sources - Evaluating Sources

UNIT II KEY MECHANICAL CONCEPTS

Mechanics - Basic Units - Nine Fundamentals of Biomechanics - Principles and Laws - Nine Principles for Application of Biomechanics

UNIT III HUMAN ANATOMY AND SOME BASIC TERMINOLOGY

Gross (Whole-Body) Modeling - Position and Direction Terminology - Terminology for Common Movements - Skeletal Anatomy - Major Joints - Major Muscle Groups - Anthropometric Data

UNIT IV ANATOMICAL DESCRIPTION

Key Anatomical Concepts - Directional Terms - Joint Motions - Muscle Actions - Active and Passive Tension of Muscle - Limitations of Functional Anatomical Analysis - Mechanical Method of Muscle Action Analysis - The Need for Biomechanics to Understand Muscle Actions - Sports Medicine and Rehabilitation Applications

UNIT V MECHANICS OF THE MUSCULOSKELETAL SYSTEM

Tissue Loads - Response of Tissues To Forces - Biomechanics of The Passive Muscle–Tendon Unit - Biomechanics of Bone - Biomechanics of Ligaments - Three Mechanical Characteristics of Muscle - Stretch-Shortening Cycle (SSC) - Force–Time Principle - Neuromuscular Control

REFERENCES

1. Duane Knudson, “Fundamentals of Biomechanics”, Springer Science+ Business Media, LLC, 2007
2. C. Ross Ethier Craig A. Simmons, “Introductory Biomechanics”, Cambridge University Press, 2007

**OPEN ELECTIVES OFFERED BY AUTOMOBILE
ENGINEERING**

Course Objectives:

- To impart knowledge on the constructional details and principle of operation of various automobile components.
- To learn the function and working of various components in transmission and drive lines.
- To study the concept and working of steering and suspension systems in an automobile.
- To give knowledge on the wheels, tyres and brakes of automobiles.
- To provide information on the current and future trends in automobiles.
- Identify and explain the types of steering system.

Course Outcomes:**Upon successful completion of the course, the students should be able to:**

- Demonstrate the operating principles and constructional details of various automobile components.
- Explain the function and working of components in transmission and drive lines.
- Identify and explain the types of steering system.
- Identify and explain the types of suspension system.
- Classify and describe the types of wheels, tyres and brakes of automobiles.
- Discuss the current and future trends in the automobiles.

UNIT-I ENGINE AND FUEL FEED SYSTEMS

Classification of Engine , construction and working of four stroke petrol and diesel engine, firing order and its significance. Carburettor working principle, requirements of an automotive carburettor, Petrol injection Systems (MPFI, TBI), Diesel fuel injection systems (CRDI)

UNIT –II TRANSMISSION SYSTEMS

Requirements of transmission system. Flywheel. Different types of clutches, principle, Construction, torque capacity and design aspects. Objective of the gearbox - Determination of gear ratios for vehicles. Performance characteristics at different speeds. Different types of gearboxes - operation. Function of Propeller Shaft Construction details of multi drive axle vehicles. Different types of final drive. Differential principles. Constructional details of differential unit. Non-slip differential. Differential lock

UNIT -III SUSPENSION SYSTEM

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension – Pneumatic suspension – Hydro Elastic suspension - Shock absorbers. Vibration and driving comfort.

UNIT-IV BRAKES

Necessity of brake, stopping distance and time, brake efficiency, weight transfer, shoe brake and disc brake theory Brake actuating systems - Mechanical, Hydraulic and Pneumatic. Parking and engine exhaust brakes. Power and power assisted brakes. Antilock Braking System (ABS).

UNIT -V ELECTRICAL SYSTEM

Principle and construction of lead acid battery. Lighting system: details of head light and side light, LED lighting system, head light dazzling and preventive methods – Horn, wiper system and trafficator. Starting System and charging system.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Young U.P and Griffiths L	Automotive Electrical Equipment	ELBS & New Press	1999
2.	Ganesan.V	Internal Combustion Engines	Tata McGraw-Hill Publishing Co., New Delhi	2003
3.	Dr.Kirpal Singh	Automobile Engineering	Standard Publishes	2011

REFERENCES

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Heldt .P.M	The Automotive Chassis	Literary Licensing,LLC	2012
2.	Crouse.W.H	Automobile Electrical Equipment”, 3 rd Edition	McGraw-Hill Book Co., Inc., New York.	1986
3.	N.Newton, W. Steeds and T.K.Garrett	The Motor vehicle, 13th edition	SAE Inc	2001

Course Objectives

- The objective of this course is to make the students to know and understand the constructional details, operating characteristics and design aspects of Two and Three wheelers.
- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Construct the frames of two and three wheelers of different layouts.
- Demonstrate the constructional details and principle of operation of various engine components.
- Identify and explain the types of transmission systems.
- Identify and explain the types of steering and suspension systems.
- Classify and describe the types of wheels, tyres and brakes for two and three wheelers.
- Explain the servicing of two and three wheelers.

UNIT I INTRODUCTION

Classifications- design considerations –weight and dimension limitations – requirements stability problems, gyroscopic effect- pendulum effect of two and three wheelers.

UNIT II POWER UNITS, IGNITION SYSTEMS AND OTHER ELECTRICAL SYSTEMS

2 stoke and 4 stoke SI engines and CI engines design criteria– design of cylinders, cylinder head, cooling fins, crank case, connecting rod and crank shaft. Carburettor types and design. Battery coil ignition, magneto ignition and electronic ignition. Lighting and other electrical system.

UNIT III CLUTCHES AND TRANSMISSION

Types of clutches for 2 and 3 wheelers. Design of clutch system. Gears for two and three wheelers. Design of gear box and gear change mechanism. Belt, chain and shaft drive. Freewheeling devices, starting systems.

UNIT IV FRAMES, SUSPENSION, WHEELS AND TYRES

Types of frames used for two wheelers and three wheelers. Wheel frames- construction design of frames for fatigue strength torsional stiffness and lateral stability. Front and rear forks. Springs for suspension, Dampers, constructional details of wheel and tyres.

UNIT V THREE WHEELERS

Auto rickshaws, different types, Pick-Ups and delivery type vehicle, frames and transmission for 3 wheelers wheel types, wheel attachment tyre types. Brakes and their operating mechanism.

TEXT BOOKS:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Irving P.E.	Motor Cycle Engineering.	Temple Press Book, London.	1992.
2.	Srinivasan.S.	Motor cycle, Scooter, Mobeds.	New century book house.	1988.

REFERENCES:

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	M.M.Griffin.	Motor cycles from inside and outside.	Prentice Hall Inc, New Jersey.	1978.
2.	Bruce A. Johns, David D.Edmundson and Robert Scharff	Motorcycles: Fundamentals, Service, Repair	Goodheart-Willcox	1999

Course Objectives

- The objective of this course is to make the students to know and understand the maintenance and fault diagnosis of basic systems inAutomobile.
- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.

Course Outcomes

Upon successful completion of the course, the students should be able to:

- Describe and differentiate the types of maintenance.
- List the procedure for dismantling, servicing and assembling of engine components.
- Demonstrate the servicing of transmission and driveline components.
- Discuss the procedure for steering and suspension
- Discuss the procedure for wheel and brake maintenance.
- Explain the fault diagnosis in the electrical and air conditioner systems.

UNIT I MAINTENANCE OF RECORDS AND SCHEDULES

Importance of maintenance, preventive (scheduled) and breakdown (unscheduled) maintenance, requirements of maintenance, preparation of check lists, Inspection schedule, maintenance of records, log sheets and other forms, safety precautions in maintenance.

UNIT II ENGINE MAINTENANCE

Dismantling of engine components and cleaning, cleaning methods, visual anddimensional inspections, minor and major reconditioning of various components, reconditioning methods, engine assembly, special tools used for maintenance overhauling, engine tune up.

UNIT III CHASSIS MAINTENANCE

Mechanical and automobile clutch and gear box, servicing and maintenance, maintenance servicing of propeller shaft and differential system, Maintenance servicing of suspension systems. Brake systems, types and servicing techniques, Steering systems, overhauling and maintenance. Wheel alignment, computerized alignment and wheel balancing.

UNIT IV ELECTRICAL SYSTEM MAINTENANCE

Testing methods for checking electrical components, checking battery, starter motor, charging systems, DC generator and alternator, ignitions system, lighting systems, Fault diagnosis and maintenance of modern electronic controls, checking and servicing of dash board instruments.

UNIT V MAINTENANCE OF FUEL SYSTEM, COOLING SYSTEMS, LUBRICATION SYSTEM AND VEHICLE BODY

Servicing and maintenance of fuel system of different types of vehicles, calibration and tuning of engine for optimum fuel supply, Cooling systems, water pump, radiator, thermostat, anticorrosion and antifreeze additives, Lubrication maintenance, lubricating oil changing, greasing of parts, Vehicle body maintenance, minor and major repairs. Door locks and window glass actuating system maintenance.

TEXT BOOKS

SL.NO.	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	John Doke	Fleet Manag ement	McGraw Hill Co	1984
2.	James D Halderman	Advanced Engine Performance Diagnosis	Prentice Hall Publications	2011
3.	Service Manuals from Different Vehicle Manufacturers			

Course Objectives:

- To impart knowledge on trends in the vehicle power plants.
- To learn the various advanced driver assistance systems.
- To study the working of advanced suspension and braking systems in an automobile.
- To give information about motor vehicle emission and noise pollution control.
- To provide knowledge of the vehicle telematics.
- To give information about the noise control techniques

Course Outcomes:

Upon successful completion of the course, the students should be able to:

- Distinguish and describe the various modern vehicle power plant systems.
- List and explain the various driver assistant mechanisms.
- Identify and describe the working of advanced suspension and braking systems.
- Apply the knowledge of motor vehicle emission and noise pollution control.
- Describe the noise control techniques
- Describe the vehicle telematics and its applications.

UNIT I TRENDS IN POWER PLANTS

Hybrid vehicles - Stratified charged / lean burn engines - Hydrogen engines - battery vehicles – Electric propulsion with cables - Magnetic track vehicles.

UNIT II DRIVER ASSISTANCE SYSTEMS

Collision Avoidance Systems, Adaptive cruise control, adaptive noise control, anti spin regulation, traction control systems, cylinder cut- off technology, ABS, Driver Drowsiness Detection system

UNIT III SUSPENSION BRAKES AND SAFETY

Air suspension - Closed loop suspension - antiskid braking system, Retarders, Regenerative braking safety cage - air bags - crash resistance - passenger comfort.

UNIT IV NOISE & POLLUTION

Reduction of noise - Internal & external pollution control through alternate fuels/power plants – Catalytic converters and filters for particulate emission.

UNIT V TELEMATICS

Global positioning systems, geographical information systems, navigation systems, automotive vision system, road recognition

TEXT BOOKS

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	Ljubo Vlacic, Michael Saren and Fumio Harashima	Intelligent Vehicle Technologies	Butterworth-Heinemann publications, Oxford	2001
2.	Ronald K.Jurgen	Navigation and Intelligent Transportation Systems	Automotive Electronics Series,SAE, USA.	1998
		–Progress in Technology		

REFERENCES

SL. NO	AUTHOR(S)	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1.	William B Riddens	“Understanding Automotive Electronics”, 5 th Edition	Butterworth Heinemann Woburn.	1998
2.	Bechhold,	“Understanding Automotive Electronics”	SAE	1998
3.	Robert Bosch,	“Automotive HandBook”, 5 th Edition	SAE	2000

OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING

COURSE OBJECTIVES

1. To examine the role and tasks of basic housing policies and building bye laws
2. Understand the process of integrated service delivery in the context of economic, social, environmental and institutional factors
3. Analyze the Innovative construction methods and Materials
4. Analyze city management strategies and strengthen the urban governance through a problem solving approach
5. To know the Importance of basic housing policies and building bye laws
6. To use Housing Programmes and Schemes

COURSE OUTCOME

The students will be able to

1. Know the Importance of basic housing policies and building bye laws
2. Use Housing Programmes and Schemes
3. Plan and Design of Housing projects
4. Examine Innovative construction methods and Materials
5. Know Housing finance and loan approval procedures
6. Understand Construction as well as managing techniques

UNIT I INTRODUCTION TO HOUSING 9

Definition of Basic Terms – House, Home, Household, Apartments, Multi storeyed Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels

UNIT II HOUSING PROGRAMMES 9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems)

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS 9

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL HRS : 45

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 2002.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 2001.

REFERENCES

1. Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 2002.
2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 2000.

COURSE OBJECTIVES

1. Defining and identifying of eng. services systems in buildings.
2. The role of eng. services systems in providing comfort and facilitating life of users of the building.
3. The basic principles of asset management in a building & facilities maintenance environment
4. Importance of Fire safety and its installation techniques
5. To Know the principle of Refrigeration and application
6. To Understand Electrical system and its selection criteria

COURSE OUTCOME

The students will be able to

1. Machineries involved in building construction
2. Understand Electrical system and its selection criteria
3. Use the Principles of illumination & design
4. Know the principle of Refrigeration and application
5. Importance of Fire safety and its installation techniques
6. Know the principle behind the installation of building services and to ensure safety in buildings

UNIT I MACHINERIES**9**

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II ELECTRICAL SYSTEMS IN BUILDINGS**9**

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III PRINCIPLES OF ILLUMINATION & DESIGN**9**

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Laws of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS

9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Subcooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION

9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers

TOTAL HRS : 45

TEXT BOOKS

1. E.R.Ambrose, “Heat Pumps and Electric Heating”, John and Wiley and Sons, Inc., New York, 2002.
2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 2005.

REFERENCES

1. Philips Lighting in Architectural Design, McGraw-Hill, New York, 2000.
2. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London, 2005.
3. National Building Code.

OBJECTIVES:

1. To understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. To describe the Coastal zone regulations, coastal processes and wave dynamics.
3. To forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

OUTCOMES:

1. Understand the coastal processes, coastal dynamics, impacts of structures like docks, harbours and quays leading to simple management perspectives along the coastal zone.
2. The Coastal zone regulations, coastal processes and wave dynamics.
3. Forecast waves and tides and plan coastal structures including harbours.
4. To explain which scientific background values that are necessary for a successful planning,
5. To apply knowledge about ecosystem values and management in the planning process,
6. To plan and carry out a simplified consultation process for activities in the coastal zone

UNIT I. COASTAL ZONE 9

Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources – Non living resources.

UNIT II . WAVE DYNAMICS 9

Wave classification – Airy's Linear Wave theory – Deep water waves – Shallow water waves – Wave pressure – Wave energy – Wave Decay – Reflection, Refraction and Diffraction of waves – Breaking of waves – Wave force on structures – Vertical – Sloping and stepped barriers – Force on piles.

UNIT III. WAVE FORECASTING AND TIDES 9

Need for forecasting - SMB and PNJ methods of wave forecasting – Classification of tides – Darwin's equilibrium theory of tides – Effects on structures – seiches, Surges and Tsunamis.

UNIT IV. COASTAL PROCESSES 9

Erosion and depositional shore features – Methods of protection – Littoral currents – Coastal aquifers – Sea water intrusion – Impact of sewage disposal in seas.

UNIT V. HARBOURS 9

Types of classification of harbours – Requirements of a modern port – Selection of site – Types and selection of break waters – Need and mode of dredging – Selection of dredgers.

TEXT BOOKS

TOTAL HRS :

45

1. Richard Sylvester, "Coastal Engineering, Volume I and II", Elseiner Scientific Publishing Co., 2006
2. Quinn, A.D., "Design & Construction of Ports and Marine Structures", McGraw-Hill Book Co., 2007

REFERENCES

1. Ed. A.T. Ippen, "Coastline Hydrodynamics", McGraw-Hill Inc., New York, 2002
2. Dwivedi, S.N., Natarajan, R and Ramachandran, S., "Coastal Zone Management in Tamilnadu"

15BECEOE04 EXPERIMENTAL METHODS AND MODEL ANALYSIS 3 0 0 3 100

OBJECTIVE:

1. To Describe some of the factors affecting reproducibility and external validity.
2. To List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. To explain the concept of variability, its causes and methods of reducing it
4. To describe possible causes of bias and ways of alleviating it
5. To identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. To describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

OUTCOMES:

1. Describe some of the factors affecting reproducibility and external validity.
2. List the different types of formal experimental designs (e.g. completely randomised, randomised block, repeated measures, Latin square and factorial experimental designs).
3. Explain the concept of variability, its causes and methods of reducing it
4. Describe possible causes of bias and ways of alleviating it
5. Identify the experimental unit and recognise issues of non-independence (pseudo-replication).
6. Describe the six factors affecting significance, including the meaning of statistical power and “p-values”.

UNIT I MEASUREMENTS 9

Basic Concept in Measurements, Measurement of displacement, strain pressure, force, torque etc, Type of strain gauges (Mechanical, Electrical resistance, Acoustical etc..).

UNIT II GAUGING 9

Strain gauge circuits – The potentiometer and Wheatstone bridge – use of lead wires switches etc. Use of electrical resistance strain gauges in transducer applications.

UNIT III RECORDING DEVICES 9

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems. Strain analysis methods – Rosette analysis. Static and dynamic testing techniques. Equipment for loading-Moire’s techniques.

UNIT IV NON DESTRUCTIVE TESTING TECHNIQUES 9

Non destructive testing techniques. Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT V LAWS OF SIMILITUDE

9

Laws of similitude - model materials – model testing – testing large scale structures – holographic techniques

TOTAL HRS : 45

TEXT BOOKS

1. Dally J W and Riley W.F, Experimental stress Analysis, McGraw-Hill, Inc. New York, 2005.
2. Srinath L S et al, Experimental Stress Analysis, Tata McGraw-Hill Publishing co., Ltd., New Delhi, 2006.

REFERENCE BOOKS

1. Rangan C S et al., Instrumentation – Devices and Systems, Tata McGraw-Hill Publishing Co., Ltd., New Delhi, 2002.
2. Sadhu Singh, Experimental Stress Analysis, Khanna Publishers, New Delhi, 2006.

OBJECTIVES

1. To enable the students for a successful career as water management professionals.
2. To create a potential among students in the area of irrigation management with specific enrichment to synthesis of data and their analysis.
3. To expose the students the need for an interdisciplinary approach in irrigation water management
4. To providing a platform to work in an interdisciplinary team.
5. To provide students an ability to understand the applications of mathematical and scientific concepts to analyse intricate technical, social and environmental problems in irrigation water management and finding solutions for them.
6. To promote student awareness for a life-long learning process and inculcate professional ethics and codes of professional practice in water management.

OUTCOME

At the end of this the students will be in a capacity to

1. Understand the concepts of soil-water-plant relationship as well as to expose them to the principles and practices of crop production.
2. Exposure to ground water, hydraulics of ground water related to drainage, drainage concepts, planning, design and management of drainage related irrigation system management
3. Understand the various principles of irrigation management and to analyse the different types of irrigation systems and their performances based on service oriented approach.
4. Gain insight on local and global perceptions and approaches to participatory water resource management
5. Learn from successes and failures in the context of both rural and urban communities of water management.
6. Exposure on the use of economic concepts in irrigation development and to impart knowledge on economic planning so as to enable viable allocation of resources in the irrigation sector.

UNIT I. IRRIGATION SYSTEM REQUIREMENTS**9**

Irrigation systems – Supply and demand of water – Cropping pattern – Crop rotation – Crop diversification – Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies.

UNIT II. IRRIGATION SCHEDULING**9**

Time of irrigation – Critical stages of water need of crops – Criteria for scheduling irrigation – Frequency and interval of irrigation

UNIT III. MANAGEMENT 9

Structural and non-structural strategies in water use and management – Conjunctive use of surface and ground waters – Quality of irrigation water.

UNIT IV. OPERATION 9

Operational plans – Main canals, laterals and field channels – Water control and regulating structures – Performance indicators – Case study

UNIT V. INVOLVEMENT OF STAKE HOLDERS 9

Farmer's participation in System operation – Water user's associations – Farmer councils – Changing paradigms on irrigation management – Participatory irrigation management

TOTAL HRS : 45

TEXT BOOKS

1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 2000
2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 2000

COURSE OBJECTIVES

1. Develop Parametric design and the conventions of formal engineering drawing
2. Produce and interpret 2D & 3D drawings
3. Communicate a design idea/concept graphically/visually
4. Examine a design critically and with understanding of CAD - The student learn to interpret drawings
5. to produce designs using a combination of 2D and 3D software.
6. Get a Detailed study of an engineering artifact

COURSE OUTCOME

The students will be able to

1. Develop Parametric design and the conventions of formal engineering drawing
2. Produce and interpret 2D & 3D drawings
3. Communicate a design idea/concept graphically/visually
4. Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5. Get a Detailed study of an engineering artifact
6. Planning and designing of structures

UNIT I INTRODUCTION 9

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

UNIT III STRUCTURAL ANALYSIS 9

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

UNIT IV DESIGN AND OPTIMISATION 9

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

UNIT V EXPERT SYSTEMS 9

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

TOTAL HRS : 45

TEXT BOOKS

1. Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer Aided Design and Manufacturing”, Prentice Hall of India Ltd, New Delhi, 2005.
2. Krishnamoorthy C.S.Rajeev S., “Computer Aided Design”, Narosa Publishing House, New Delhi, 2000

REFERENCES

1. Harrison H.B., “Structural Analysis and Design”, Part I and II Pergamon Press, Oxford, 2002.
2. Rao S.S., “Optimisation Theory and Applications”, Wiley Eastern Limited, New Delhi, 2002.
3. Richard Forsyth (Ed), “Expert System Principles and Case Studies”, Chapman and Hall, London, 2000.

OBJECTIVES:

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design
6. To design flexible and rigid pavements as per IRC.

COURSE OUTCOMES

On completion of the course, the students will be able to:

1. Carry out surveys involved in planning and highway alignment.
2. Design cross section elements, sight distance, horizontal and vertical alignment.
3. Implement traffic studies, traffic regulations and control, and intersection design.
4. Determine the characteristics of pavement materials.
5. Design flexible and rigid pavements as per IRC.
6. Will gain the knowledge of horizontal and vertical curves.

UNIT I. TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM**9**

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and deflections in pavements under repeated loading

UNIT II. DESIGN OF FLEXIBLE PAVEMENTS**9**

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III. DESIGN OF RIGID PAVEMENTS**9**

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV. PERFORMANCE EVALUATION AND MAINTENANCE**9**

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index] Pavement maintenance. [IRC Recommendations Only]

UNIT V. STABILISATION OF PAVEMENTS**9**

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geosynthetics (geotextiles & geogrids) in roads.

TOTAL HRS : 45

TEXT BOOKS

1. Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna tech. Publications, New Delhi, 2007.
2. Croney, D., Design and Performance of Road Pavements, HMO Stationary Office, 2005.
3. Wright, P.H., “Highway Engineers”, John Wiley & Sons, Inc., New York, 2001
4. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES

1. Yoder R.J and Witczak M.W., “Principles of Pavement Design”, John Wiley, 2003.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-2001, The Indian Roads Congress, New Delhi.

OBJECTIVES:

1. To understand the role of geology in the design and construction process of underground openings in rock.
2. To apply geologic concepts and approaches on rock engineering projects
3. To identify and classify rock using basic geologic classification systems.
4. To use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. To sequential design process used in geotechnical engineering practice.
6. To Require civil engineering students to read and summarize geologic literature for site specific projects.

OUTCOMES:

1. Understand the role of geology in the design and construction process of underground openings in rock.
2. Geologic concepts and approaches on rock engineering projects
3. Identify and classify rock using basic geologic classification systems.
4. Use the geologic literature to establish the geotechnical framework needed to properly design and construct heavy civil works rock projects.
5. Sequential design process used in geotechnical engineering practice.
6. Require civil engineering students to read and summarize geologic literature for site specific projects.

UNIT I. CLASSIFICATION AND INDEX PROPERTIES OF ROCKS 9

Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II. ROCK STRENGTH AND FAILURE CRITERIA 9

Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III. INITIAL STRESSES AND THEIR MEASUREMENTS 9

Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.

UNIT IV. APPLICATION OF ROCK MECHANICS IN ENGINEERING 9

Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.

UNIT V. ROCK BOLTING 9

Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.

TOTAL HRS : 45

TEXT BOOKS

1. Goodman P.E., “Introduction to Rock Mechanics”, John Wiley and Sons, 2005.
2. Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 2006.

REFERENCES

1. Brow E.T., “Rock Characterisation Testing and Monitoring”, Pergaman Press, 2002.
2. Arogyaswamy R.N.P., “Geotechnical Application in Civil Engineering”, Oxford and IBH, 2000.
3. Hock E. and Bray J., “Rock Slope Engineering, Institute of Mining and Metallurgy”, 1991.

OBJECTIVE:

1. To learnt the design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and prestressed concrete water tanks
2. To design the storage structures.
3. To gain knowledge of steel water tanks and their design.
4. To get a brief idea about concrete water tanks.
5. To design steel bunkers and silos
6. To design prestressed concrete water tanks

OUTCOMES:

1. The design of various steel water tanks, concrete water tanks, steel bunkers and silos, concrete bunkers and silos and prestressed concrete water tanks
2. Design the storage structures.
3. Gain knowledge of steel water tanks and their design.
4. Get a brief idea about concrete water tanks.
5. Design steel bunkers and silos
6. Design prestressed concrete water tanks

UNIT I. STEEL WATER TANKS**9**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation

UNIT II. CONCRETE WATER TANKS**9**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

UNIT III. STEEL BUNKERS AND SILOS**9**

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

UNIT IV. CONCRETE BUNKERS AND SILOS**9**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

UNIT V. PRESTRESSED CONCRETE WATER TANKS**9**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

TOTAL HRS : 45

TEXT BOOKS

1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 2002.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 2000

REFERENCES

- 1.R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 2000
- 2.William H.Seaverns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 2000.

OBJECTIVES:

1. To understand the need of energy conversion and the various methods of energy storage
2. To explain the field applications of solar energy
3. To identify Winds energy as alternate form of energy and to know how it can be tapped
4. To explain bio gas generation and its impact on environment
5. To understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. To illustrate the concepts of Direct Energy Conversion systems & their applications.

OUTCOMES:

1. Understand the need of energy conversion and the various methods of energy storage
2. Explain the field applications of solar energy
3. Identify Winds energy as alternate form of energy and to know how it can be tapped
4. Explain bio gas generation and its impact on environment
5. Understand the Geothermal & Tidal energy, its mechanism of production and its applications
6. Illustrate the concepts of Direct Energy Conversion systems & their applications.

UNIT I. INTRODUCTION 9

Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height – Shape factor – Aspect ratio – Drag and lift.

UNIT II. EFFECT OF WIND ON STRUCTURES 9

Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).

UNIT III. EFFECT ON TYPICAL STRUCTURES 9

Tall buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.

UNIT IV. APPLICATION TO DESIGN 9

Design forces on multistorey building, towers and roof trusses.

UNIT V. INTRODUCTION TO WIND TUNNEL 9

Types of models (Principles only) – Basic considerations – Examples of tests and their use.

TOTAL HRS : 45

TEXT BOOKS

1. Peter Sachs, “Wind Forces in Engineering, Pergamon Press, New York, 2002.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 2005

REFERENCES

1. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottawa, 2003
2. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 2002.

OBJECTIVE:

1. To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
2. To study different methods of construction to successfully achieve the structural design with recommended specifications.
3. To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. To study of construction equipment's, and temporary works required to facilitate the construction process
5. To provide a coherent development to the students for the courses in sector of Advanced construction technology.
6. To present the new technology of civil Engineering and concepts related Advanced construction technology.

OUTCOMES:

1. Implementation of new technology concepts which are applied in field of Advanced construction.
2. Different methods of construction to successfully achieve the structural design with recommended specifications.
3. Application of scientific and technological principles of planning, analysis, design and management to construction technology.
4. Will gain the Knowledge of construction equipment's, and temporary works required to facilitate the construction process
5. Development to the students for the courses in sector of Advanced construction technology.
6. The new technology of civil Engineering and concepts related Advanced construction technology.
- 7.

UNIT - I MODERN CONSTRUCTION METHODS 9

Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II CONSTRUCTION METHODS FOR SPECIAL STRUCTURES 9

Construction Methods For Bridges, Construction Methods for Roads, Construction Methods For Special Structures for Railways, Construction Methods for Dams, Construction Methods for Harbour, Construction Methods for River Works Pipelines

UNIT - III MODERN CONSTRUCTION EQUIPEMENTS -I 9

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and Hoisting

UNIT - IV MODERN CONSTRUCTION EQUIPEMENTS -II**9**

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT - V PRINCIPLES AND PRACTICES OF TEMPORARY STRUCTURES**9**

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipments

TOTAL HRS : 45**TEXT BOOKS**

1. Peurifoyu , R. L., , Ledbette, W.B., Construction Planning , Equipment and Methods, Mc Graw Hill Co., 2000.
2. Antill J.M., PWD, Civil Engineering Construction, Mc Graw Hill Book Co., 2005

REFERENCE

- 1.Varma, M Construction Equipment and its Planning & Applications, Metropoltian Book Co., 2000
- 2.Nunnaly, S.W., Construction Methods and Management , Prentice – Hall, 2000
- 3.Ataev, S.S., Construction Technology, MIR , Pub. 2000

FACULTY OF ARCHITECTURE

B.ARCH

BACHELOR OF ARCHITECTURE

[5 YEAR FULL TIME UNDER GRADUATE DEGREE PROGRAM]

RECOGNISED BY THE COUNCIL OF ARCHITECTURE, NEW DELHI

REGULATIONS, CURRICULUM AND SYLLABUS

2015 -2016 Batch (New Syllabus)

CHOICE BASED CREDIT SYSTEM

(CBCS)

FACULTY OF ARCHITECTURE



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University Established Under Section 3 of UGC Act 1956)

Pollachi Main Road, Eachanari Post, Coimbatore – 641 021. INDIA

15ART101	COMMUNICATIVE ENGLISH									SEMESTER-I	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	2	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To Gain knowledge in communicative English
- To gain knowledge of the basic English grammar
- To gain knowledge of the technical vocabulary and formation of Sentences
- To gain the skill reading & listening to English
- To gain the skill of speaking & reading
- To make the student confident in communication skills by means of discussions & interactions

COURSE OUTCOME:

1. An understanding about the communication in English Language for the purpose of Professional practice
2. Student will understand the Basics of the grammar
3. Student will understand the technical vocabulary & will be able to Fluently speak
4. Student will be able to read the technical books quickly by understanding
5. Student will gain the Skill of Reading, Listening & Speaking effectively in a group
6. Student will become confident of his capabilities and the communication of the English & Design Vocabulary

UNIT- I LANGUAGE FOCUS

Technical vocabulary – formal phrases and idioms – homophones, homonyms, often mis-spelt words – conjunctions – formation of new words – irregular verbs – plurals, gender sounds, words ending with phobia, logy etc. Grammar: Finite and infinite verbs – transformation of sentences – simple, complex and compound – phrases and clauses – question forms – question tags – expression of cause and effect, purpose and function.

UNIT—2 READING & LISTENING

Extensive and Intensive reading – active and passive reading – eye reading and visual perception – reading for a purpose – speed reading – reading with expression – story telling – critical and analytical reading – Listening to debates and discussions for making suitable responses.

UNIT- III WRITING & SPEAKING

Cohesion and coherence in sentences and paragraphs – business letters of different kinds – report writing – writing strategies – writing comments, procedures, inferences, instructions and recommendations – writing articles.

Applied English Communication – Welcome address, vote of thanks, compeering, debates, role plays, demonstration of advertisements – group discussions – mock interviews and dialogues – checklist of making oral presentations – vocal communication techniques – voice, quality, volume, pitch, rate of delivery.

UNIT- IV HARD AND SOFT SKILLS

Personal attributes – verbal and non verbal communication – interpersonal abilities/ skills – empathy, leadership, good manners and sociability – problem solving – reasoning and flexibility – intrapersonal abilities – self communication – self control and self esteem.

UNIT- V SOCIAL SKILLS

Facilitating interactions, understanding social roles – making a team – leading a team – dealing with different kinds of people and situations – emotional quotient and intelligent quotient – personality development – communication and body language, social etiquette –goal setting – determination, discipline and direction.

SUGGESTED READINGS :

1. Sasikumar.V. and P.V.Damija, “ Spoken English”, Tata Mc Graw Hill Publishing Corporation Ltd, New Delhi, 1997
2. Ashraf Rizvi M, Effective Technical Communication, Tata McGraw Hill, Delhi 2008
3. Stanton Nicky, “ Mastering Communication”, Mc Millan Master Series, London,1996
4. Robert M Sherfield “Developing softskills”, Dorling Kindersley (India)

15ART102	HISTORY OF ARCHITECTURE									SEMESTER-I
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture from the prehistoric age
- To gain knowledge of the ancient civilization of the World
- To gain knowledge of the ancient civilization of the Mayan, Egyptian
- To gain Knowledge in Chinese & Greek civilization
- To gain knowledge of the Light of its Social fabric, Relevance design principles
- To gain knowledge of the construction materials and methods.

COURSE OUTCOME:

1. An understanding about the spatial and stylistic qualities associated with architecture.
2. An understanding of the diversity of Architecture of the Mayan & Egyptian
3. An understanding to appreciate particular culture, symbolic, spatial and material qualities
4. An understanding about architecture and cities as givers of meaning and continuity.
5. An Understanding about the Dravidian Style by case studies
6. An Understanding about the West Asian Architecture by case studies

UNIT- I INTRODUCTION AND WEST ASIAN ARCHITECTURE

Relevance of History - Old Stone Age - the Middle Stone age – The New Stone Age - Development of Shelter. – catalhuyuk, Indus Civilization (Harappa and mohenjadaro)

West Asia: Evolution of Sumerian and Persian cultures - Outline of architectural character –

Ziggurat at Urnammu - Palace of Sargon, Khorsabad- Palace at Persepolis.

UNIT- II

EGYPT

Egypt: Factors influencing Architecture - Outline of Architectural Character, Evolution of Pyramids – Great Pyramid of Cheops, Giza, ,Architecture characteristics of Egyptian temples - Great temple of Ammon, Karnak, Temple of ramses, Abu Simbel.

UNIT- III

MAYAN

Mayan: Outline of Architectural Character – City of Chichen Itza- El Castillo, Temple of Warriors, The Great Ballcourt – Tikal and Teotihuacan - Pyramid of the Sun, Pyramid of the Moon.

UNIT- IV

CHINA

China: Outline of Architectural Character - Great Wall of China, Fogong Temple, Temple of Heaven, Forbidden City (Palace Museum)

UNIT- V

GREEK

Outline of architectural character - Orders in architecture - Doric Ionic, Corinthian, Acropolis, Athens ; Parthenon, Erechthion, , Theatre Epidauros – Agora – Athens – Character theater – temples – Greek Architectural features.

SUGGESTED READINGS::

1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone Press, 1986.
2. S.Lloyd and H.W.Muller, History of World Architecture - Series, Faber and Faber Ltd., London, 1986.
3. Francis D.K. Ching, A Global History of Architecture, John Wiley & Sons Publishers, New Jersey,2007.
4. Provide Educational movies for each topic.

15ART103	MATHEMATICS IN ARCHITECTURE									SEMESTER-I	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To develop analytical skills needed for problem solving a
- To develop creative thinking as well as an understanding of Geometry
- To develop the application of mathematical concepts in architecture.
- To develop the skill of Parametric architecture
- To develop the skill of statistical approach
- To develop the Skill of programming by Mathematical Approach

COURSE OUTCOME:

1. Student will be trained on the basis of the topics of Mathematics necessary for effective understanding of architecture subjects.
2. Students will understand the advanced level applications by using coordinate geometry
3. Students will understand the Statistical charts and variance for applications in architecture
4. Students will develop the skill and understating of Area & volume calculations for Applications in Architectural design
5. Students will understand the historical applications of mathematics and use of it in current context
6. Student would have an understanding of the basics of parametric design concept in architecture

UNIT- I

CO-ORDINATE GEOMETRY

Points, vectors and coordinate systems – Vector Algebra – Points vs Vectors – Rotation about an arbitrary axis – Parametric, Implicit and Explicit Equations – Lines – Parametric equations of lines – Implicit equation of lines – Distance from a point to a line – Conic sections – Parametric equation of conics.

UNIT- II

BASIC STATISTICS

Arithmetic Mean, Median, Mode, Standard Deviation and Variance – Graphical display of data in statistics through charts and graphs such as bar charts, histograms etc

UNIT- III

AREA AND VOLUME CALCULATIONS

Surface Area and Volume Calculations for simple 3D objects such as cube, cuboid, cylinder, cone, sphere, pyramid, prisms and their frustrums.

UNIT- IV

GEOMETRY IN ARCHITECTURE

Ratio and Systems of proportion – definition and derivation of golden ratio – Fibonacci series. Geometry of Muqarnas. – Making models for understanding the dimensions .

UNIT- V

PLATONIC SOLIDS

Geometry of Platonic Solids. (Concept and Application). Physical modeling of simple and complex geometric forms. - Making models for understanding the dimensions.

SUGGESTED READINGS::

1. T Veerarajan, Engineering Mathematics, Tata McGraw-Hill Publishing Company Ltd, NewDelhi, 2002.
2. B.S.Grewal, Engineering Mathematics, Khanna Publishers, Delhi 1998.
3. P.Kandaswamy, P.Thilakavathy and K.Gunavathy, Engineering Mathematics Vol I and II, S.Chandan Publishers, 1998.
4. Kappraff Jay, Connections: The Geometric bridge between art and science, McGraw Hill, USA,1991.
5. Geometry of Design: Studies in Proportion and Composition, Kimberly Elam.David Gibson
6. Computer aided geometric design by Thomas W.Sederberg 2014

15ARP111	ART, CRAFT AND MODEL MAKING									SEMESTER-I	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To introduce the vocabulary of art and the principles.
- To inform students about the various art forms through the ages within the cultural contexts.
- To develop presentation skills, visual expression and representation
- To Improve the imaginative thinking and creativity
- To develop the knowledge of Visualization by simple Two- & Three-dimensional exercises
- To develop the art skill by hands on working with various mediums and materials.

COURSE OUTCOME:

1. Student will understand the vocabulary of art and form principles
2. Student will understand to appreciate the art forms and analyse and apply the concept of architecture
3. Student will gain mastery in sketching, visualizing and expression through manual drawing, sensitized to culture, craft and context.
4. Student will gain Skill Development in Handling Materials and in Making Products and models.
5. Student will gain knowledge about various mediums of presentation
6. Student will gain deep understanding about the art Appreciation and essence of the Aesthetic value

UNIT I to UNIT V

Exploration in mixed media & collage to convey specific theme and meaning. Analytical Studies will be undertaken in two and three dimensions using various media.

Use of hand tools and materials: working with wood, metals, plaster, plastic, foam boards etc; techniques, safety & practice. Suggestive exercises are:

Type 1: Making mount board models employing cubes cuboids, pyramid, cylinder and cones.

Type 2: Space frame models using match sticks straw, steel wires, bamboo splits.

Type 3: Texture applicability to murals and interior decoration.

Making craft objects and sculpture using different materials such as clay, metal, etc.

SUGGESTED READINGS::

1. Design Methods (Architecture) (Paperback), by John Chris Jones (Author).
2. Basics Design Ideas (Paperback) by Bert Bielefeld (Author), Sebastian El khoul (Author).
3. Design Drawing, Francis D. K. Ching.
4. The Nature of Design, Peg Faimon & John Weigand.
5. Foundations of Art and Design (Paperback) by Alan Pipes (Author)
6. John W. Mills- The Technique of Sculpture, B.T. Batsford Limited, New York - Reinhold Publishing Corporation, London, 1966.
7. C. Lawrence Bunchy - Acrylic for Sculpture and Design, 450, West 33rd Street, New York, N.Y. 10001, 1972.
8. The Elements of Graphic Design: Space, Unity, Page Architecture, and Type (Paperback) by Alexander W. White (Author)
9. Geometry of Design: Studies in Proportion and Composition, Kimberly Elam. David Gibson

15ARS121	ARCHITECTURAL DESIGN I - BASIC DESIGN									SEMESTER-I	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- To provide a comprehensive introduction to the discipline of Architectural Design Fundamentals
- To develop the skill in Visual Arts.
- To encourage creative thinking and design analysis by various Exercises
- To develop the dialogue & Communication visually & Verbally
- To develop the graphic thinking ability and provide a platform for graphical representation.
- To develop an understanding of the design process and develop aesthetic judgment.

COURSE OUTCOME:

1. Student will understand the qualities of different elements as well as their composite fusions.
2. Student will be able to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects.
3. Student will develop these required skills – observation / analysis / abstractions / interpretation / representations / expressions through models and drawings
4. Student will be able to develop the confidence to communicate effectively by explaining their own design product
5. Student will develop the art of Design Communication through his expression
6. Student will understand with whole design process from the concept to the final product.

UNIT- I

DESIGN DEFINITION:

Design Thinking: What is Design? Changing Role of the Designer; Route map of the Design Process; Components of Design Problems; Measurement, Criteria & Judgment in Design; Types and Styles of Thinking – Creative thinking, Guiding Principles.

UNIT- II

BASIC ELEMENTS & PRINCIPLES OF DESIGN:

Introduction to Elements of design. Properties, qualities, and characteristics of principles of design Focus on Composition and Character of the elements of design addressed visually and conceptually (Exploration in any 2- Dimensional media). Exploration in mixed media & collage to convey a specific theme and meaning. Analytical Studies to be undertaken in two and three dimensions using various materials and tools.

UNIT- III

BASIC ELEMENTS & PRINCIPLES OF DESIGN:

The principles of design relationships/ Composition.- The analysis of design elements - Exercises involving the same. - Focus on Composition and Character of Basic elements of design addressed visually, and conceptually (Exploration in any 2- Dimensional media). - Exploration in mixed media & collage to convey specific theme and meaning. - Analytical Studies will be undertaken in two and three dimensions using various media.

UNIT- IV

DESIGN MODELLING:

Use of hand tools and materials: working with wood, metals, plaster, plastic, foam boards etc; techniques, safety & practice. Suggestive exercises are:

Type 1: Making mount board models employing cubes cuboids, pyramid, cylinder and cones.

Type 2: Space frame models using match sticks straw, steel wires, bamboo splits.

Type 3: Texture applicability to murals and interior decoration.

UNIT- V

INTRODUCTION TO ARCHITECTURAL DESIGN:

Simple Exercise exploring multi dimensional elements by making models – Art work – composition – Graphical representation – fundamentals of design drawing.

SUGGESTED READINGS:

1. Design Methods (Architecture) (Paperback), by John Chris Jones (Author).
2. Basics Design Ideas (Paperback) by Bert Bielefeld (Author), Sebastian El khouli (Author).
3. Foundations of Art and Design (Paperback) by Alan Pipes (Author)
4. John W.Mills- The Technique of Sculpture, B.T.Batsford Limited, New York - Reinhold Publishing Corporation, London, 1966.
5. The Elements of Graphic Design: Space, Unity, Page Architecture, and Type (Paperback) by Alexander W. White
6. Geometry of Design: Studies in Proportion and Composition, Kimberly Elam.David Gibson
7. Ching, F.D.K., “Design Drawing”, Van Nostrand Reinhold, 1998
8. Neufert, P., “Architects” Data”, 3rd Ed., Blackwell Science, 2000
9. Agkathidis, A Hudert M. and Schilig, G. “ Form Defining Strategies : Experimenting Architectural Design”. Wasmuth, 2007.

15ARS122	BUILDING MATERIALS AND CONSTRUCTION-I									SEMESTER-I	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	5	Credits			4

COURSE OBJECTIVE:

- To provide an understanding of the construction materials and methods through construction detailing.
- To develop basic knowledge of the various components of a built structure.
- Ability to understand by field study on all Topics
- Ability to understand the Traditional materials
- Ability to understand the Rural materials
- Ability to gain Knowledge about the techniques of Rural Construction

COURSE OUTCOME:

1. Student will gain Knowledge of properties and construction methods of brick, clay products and timber products.
2. Student will be able to detail structural and nonstructural components of simple buildings using the above materials.
3. Student will understand to integrate knowledge of properties and construction methods of basic building materials in the design of simple projects.
4. Student will understand about the Bamboo construction techniques.
5. Student will be able to gain advanced knowledge about Timber Roof Constructions.
6. Student will understand the building construction techniques of the traditional / rural houses.

UNIT- I

SOIL AND STONE

Soils: Formation – grain size distribution – soil classification systems.

Stone: Classification of rocks - Building stones - their uses –physical properties - brief study of tests for stone – deterioration - preservation of stone - various stone finishes - cutting and polishing of granites.

UNIT- II

TRADITIONAL & RURAL MATERIALS

Mud as a building material - Soil stabilization, soil blocks - Cast- in-situ walls - flooring - roofing - plastering. Bamboo, Casuarina, Coconut, palm, Hay, Coir, Jute – properties and uses. Types of foundations - walls - simple roof trusses floors for rural structures Lime – types - properties and uses – Manufacturing process – Mortar: functions – requirements - mixes.

UNIT- III

BRICKS AND CLAY PRODUCTS – MATERIALS

Bricks - brief study on manufacture of bricks – properties and uses - suitability - types of bricks - uses in buildings, structural tiles, ceramics, terracotta – properties and uses.

UNIT- IV

BUILDING COMPONENTS

Functional requirements of a building and its components - Drawings of foundations, plinth, superstructure, roofing. Openings: Doors, Windows and Ventilators.

UNIT- V

BUILDING MATERIALS

Introduction to basic building materials- Observation of work at site – mixture ratio – material standards – material sample collections form market – Market study – local materials – imported materials – assignments – Introduction to bill of quantities – rates – small material volume and cost.

SUGGESTED READINGS:

1. J.S.Spencke and D.J.Cook, Building Materials in Developing Countries, John Wiley and Sons, 1983.
2. Kumar, S.K., “Building Construction”, 19th Ed., Standard Publishers Distributors, 2001
3. Allen, E. and Iano, J., “Fundamentals of Building Construction: Materials and Methods”, Wiley, 2004
4. Mehta, M., Scarborough, W. and Armpriest, Diane, “Building Construction: Principles, Materials and Systems”, Pearson Prentice Hall, 2008

15ARS123	ARCHITECTURAL GRAPHICS I									SEMESTER-I	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	5	Credits			3

COURSE OBJECTIVE:

- To make them understand the nature of geometrical forms in terms of drawing plane and solid projections.
- To make them understand the representation of 2 dimensional and 3 Dimensional forms
- To make them understand the plans, sections, isometric and axonometric drawings of forms
- To develop the skill of doing perspectives
- To develop the skill of manual presentation with various medium
- To develop the Skill of technical Architectural Representation

COURSE OUTCOME:

1. Student will be able to understand the 2 dimensional & the 3 dimensional perspective of the objects
2. Student will be able to construct the 3d views and perspective drawings of the buildings.
3. Student will be able to draw the perspective drawings with sciography
4. Student will be able to do Architectural Rendering
5. Student will be able to do architectural detailed drawing for a smaller scale project.
6. Student will be able to do read and Do a technical Architectural Drawing

UNIT - I

GEOMETRICAL DRAWING – PLANE GEOMETRY -REPRESENTATION

Introduction to fundamentals of drawing/ drafting – Construction of Lines, Planes, form – grade of pencils and usage-Understanding the scale with units and dimensions – Construction of plane, object – Hollow and solid geometry – Development of surfaces and multifaceted forms – Understanding the graphical representations of arrows, lettering techniques, composition etc – Lineweights, Line type etc

UNIT - II

GEOMETRICAL DRAWING – ORTHOGRAPHIC PROJECTION

Isometric, Axonometric, Oblique and multiview orthographic projections to scale of various forms- Simple and complex objects- straight, curvilinear etc – Sections, Elevations of solid geometry – hollow objects etc

UNIT - III

PERSPECTIVE AND SCIOGRAPHY – SIMPLE & COMPLEX OBJECTS – SCIENTIFIC METHOD

Introduction to perspective projections – One point perspective, Two point perspective, Three point perspective, Shade and shadow of the object- Light source- Cone of Vision – Sciography of plan, isometric, axonometric views.

UNIT - IV

PERSPECTIVE AND SCIOGRAPHY – SHORT CUT METHOD

Introduction to short cut perspective method-small buildings – exterior views-adding of figures, trees, elements etc and applying rendering techniques

UNIT - V

MEASURED DRAWING AND GRAPHICAL REPRESENTATION

Introduction to fundamentals of measured drawing- format for presentation- measured drawing of simple objects like furniture, ornamentation, door, window etc -Introduction to representations of materials- building materials – Stone, brick, glass, grass etc- usage of various mediums –watercolor, pastels, color pencils, pens etc-Sketching- composition of documents, title blocks, posters, logos etc

SUGGESTED READINGS:

1. Robert S. Oliver,, The Complete Sketch, Van Nostrand Reinhold, New York, 1989.
2. Tokyo Musashino Academy of Art - Introduction to Pencil Drawing, Graphic - Shaw Publishing Co. Ltd., Japan, 1991.
3. Freehand Drawing for Architects and Interior Designers (Paperback) by Magali Delgado Yanes (Author), Ernest Redondo Dominguez (Author)
4. Alwyn Cranshaw, Learn to paint with Water colours, Acrylic colours, Boats and Harbours, Sketch, Still life, landscapes, William Collins Sons and Co. Ltd., London, 1981.
5. Francis D. K. Ching, Architectural Graphics, Van Nostrand Rein Hold Company, New York, 1964.
6. Bhatt, N.D. and Panchal, V.M., “Engineering Drawing – Plane and Solid Geometry”, 48th Ed., Charotar Publishing House, 1996
7. Griffin, A.W. and Brunicardi, V.A., “Introduction to Architectural Presentation Graphics”, Prentice Hall, 1998
8. Ciriello, M., “Architectural Design Graphics”, McGraw-Hill, 2002
9. Carpo, M., “Perspective, Projections and Design: Technologies of Architectural Representation”, Routledge, 2008

SEMESTER – 2

15ART201	THEORY OF ARCHITECTURE I									SEMESTER-II	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE

- To introduce architecture as a discipline and to sensitize the students to the various functional aspects of architecture
- To make them understand the meaning of Architecture and its visual aesthetic sense
- To introduce the students to the ordering elements, principles of architecture
- To gain Knowledge about the organization principles of Form and Space
- To gain Knowledge about the theoretical aspects of Design
- To gain knowledge and understand the vocabulary of the architectural language through the analysis of selected buildings.

COURSE OUTCOME:

1. Student will understand on the definition of architecture; elements of architectures of form.
2. Student will be exposed to the principles of architecture and applications of the same in buildings and spaces.
3. Student will understand the meaning of character and style of buildings with examples.
4. Student will understand on ideologies and philosophies of architectures of contemporary
5. Student will understand about the theoretical aspects of Architectural Design
6. Student will gain Knowledge in the Vocabulary of the Architectural Terms and language

UNIT- I

Introduction to Design and Architecture

Definitions of Design, Architecture-context for architecture as satisfying human needs-functional, aesthetic and psychological – architecture as a discipline-introducing the various functional aspects of architecture: site, structure, skin, services, use, circulation etc. Introduction to the factors that lend meaning to architecture-architectural expression and symbolism-character and style-movements, philosophies, ideologies and theories-meaning and interpretation of architecture

UNIT- 2

Ordering Elements & Principals of Architecture

Point, line, plane, form, shape, motif, pattern, light, colour, texture – understanding the elements with respect to architecture-Detailed study of the visual and emotional effects of geometric forms and their derivatives: sphere, cube, pyramid, cylinder and cone – Transformation of forms, Articulation of forms – mass-space/solid-void effects, articulation of edges, corners, surfaces -Proportion, scale, balance, rhythm, axis, symmetry, hierarchy, datum, unity, harmony, dominance with respect to architecture

UNIT- 3

Organisation of Form and Space

Spatial relationships: space within space, interlocking spaces, adjacent spaces, space linked by a common space -spatial organization: centralized, linear, radial, clustered, grid -form-space relationships-

UNIT- 4

Circulation and Organisation

Circulation as organizing element: building approach, building entrance, configuration of the path, path space relationship, form of circulation space

UNIT -5

Experiencing Architecture

Understanding architecture in totality in terms of the various aspects through first hand

Experience, analysis and interpretation using the case of a building, architectural style, work(s)

Of the contemporary architects

SUGGESTED READINGS:

1. Francis D.K.Ching, Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, 1979.
2. Lorraine Farrelly. 2007 The Fundamental of Architecture. AVA Publishing SA 2007. Switzerland.
3. Ernest Burden - Elements of Architectural Design - A visual resource, Van Nostrand Reinhold, 1994.
4. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., New Nelhi, 1973
5. Edward D. Mills – Planning:The Architects Hand Book -Bitterworth, London, 1985
6. G.Muthu Shoba Mohan 2008 Principles of Architecture Oxford & IBH publishing co. pvt. ltd. New Delhi.
7. Francis D.K. Ching 1995 A Visual Dictionary of Architecture. John Wiley & Sons, INC. New Delhi.
8. Paul Alan Johnson - The Theory of Architecture - Concepts and themes, Van Nostrand Co., New York, 1994.
9. Pierre Von Meiss, Elements of Architecture, Spon Press, New York, 2007.

15ART202	HISTORY OF ARCHITECTURE II									SEMESTER-II	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture in the chronology
- To understand the social Fabric, Relevance, Design Principles& Construction materials and Methods.
- To understand about the Roman Architecture
- To Gain knowledge in Romanesque Architecture
- To gain knowledge about the Baroque architecture
- To understand about evolution of European Architecture

COURSE OUTCOME:

1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.
2. Student will understand about the spatial and stylistic qualities associated with Roman architecture.
3. Student will understand about the spatial and stylistic qualities associated with Romanesque architecture.
4. Student will understand about the spatial and stylistic qualities associated with Gothic architecture
5. Student will understand the Styles and Details of Gothic Architecture
6. Student will expertise in Spatial understanding of historical places by Sketching& reading.

UNIT- I

ROMAN

Outline of architectural character: roman orders (Doric, ionic, Corinthian, Tuscan and composite)

Building Systems - Use of arches, vaults and columns

Building Typology: Religious Buildings – Temple (Pantheon); Civic Buildings – Baths (Thermae of Caraculla), Theatres (Colloseum), Circus (Circus Maximus), Palace (Forum Romanum); Engineering works – Aqueducts, bridges

UNIT- II

ROMANESQUE

Factors influencing architecture - Building Systems - Use of arches, vaults, columns, piers, buttresses and roofs. Outline of architectural character of Italy, France and England - Examples: Pisa complex, Italy Abbay aux Hommes, Caen, Tower of London.

UNIT- III

GOTHIC

Outline of Architectural character - evolution of vaulting and development of structural systems - Examples: Notre Dame, Paris - Westminster Abbey, Hampton Court Palace, London, Doges Palace, Venice, Milan Cathedral.

UNIT- IV

ITALIAN RENAISSANCE

Renaissance – Introduction. Italian Renaissance - three phases – early Renaissance (Alberti - S. Andrea, Brunelleschi - Cathedral of Florence, Pazzi Chapel, Basilica San Lorenzo) , High Renaissance (Bramante - Santa Maria delle Grazie) , Late Renaissance (Michelangelo, Palladio -St. Peter's Basilica, Villa Capra La Rotonda)

UNIT- V

NORTHERN RENAISSANCE AND BAROQUE

Northern Renaissance – Introduction; Characteristics of English Renaissance – Works of Sir Christopher Wren, Inigo Jones.

Baroque – Features and Elements of Baroque - St Paul's Cathedral, Palace of Versailles., Winter Palace in Saint Petersburg.

SUGGESTED READINGS:

1. Sir Bannister Fletcher, A History of Architecture, University of London, The Antholone Press, 1986.
2. Robert Chitham, The Classical Orders of Architecture, Elsevier, London, 2005
3. Francis D.K. Ching, A Global History of Architecture, John Willey & Sons Publishers, New Jersey, 2007.
4. S.Lloyd/H.W.Muller, History of World Architecture - Series, Faber Ltd., London, 1986.
5. Spiro Kostof, A History of Architecture - Settings and Rituals, Oxford University Press, London, 1985.
6. Pierre Pichard, TanjavurBrhadisvara, Ecole Francaise D' Extreme Orient, New Delhi, 1995

15ART203	MECHANICS OF STRUCTURES I									SEMESTER-II	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

UNIT- I

INTRODUCTION TO STRUCTURES AND STRUCTURAL SYSTEMS

Overview of Structures - Concept of Structure in Architecture -Types of Structural Systems - Components of a Structure - Materials and their Structural Properties

UNIT- II

FORCES AND STRUCTURAL SYSTEMS

Types of force systems - Resultant of parallel forces - principle of moments - principle of equilibrium - simple problems

UNIT- III

ANALYSIS OF PLANE TRUSSES

Introduction to Determinate and Indeterminate plane trusses - Analysis of simply supported and cantilevered trusses by method of joints and method of sections

UNIT- IV

PROPERTIES OF SECTION

Centroid- Moment of Inertia - Section modules - Radius of gyration - Theorem of perpendicular axis - Theorem of parallel axis

UNIT- V

ELASTIC PROPERTIES OF SOLIDS

Stress strain diagram for mild steel, High tensile steel and concrete - Concept of axial and volumetric stresses and strains - Elastic constants - Relation between elastic constants - Application to problems.

SUGGESTED READINGS:

1. S.S.Bhavikatti, "Strength of Materials", VIKAS Publishing House Pvt. Ltd., Chennai, 1997.
2. S.Ramamrotham, Strength of materials - Dhanpatrai& Sons, Delhi, 1990.
3. W.A.Nash, Strength of Materials - Schaums Series - Mcgraw Hill Book Company, 1989.
4. Building Structures--From Concepts to Design. Second Edition, by Malcolm Millais. Spon Press, London 2005
5. Buildings from Caves to Skyscrapers, Mario G Salvadori, Holiday House, 1985

15ARP211	COMPUTER APPLICATIONS I									SEMESTER-II	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce computer operation principles and explore image editing through a graphical composition.
- To impart training in computer aided 2D drafting and 3D modelling through projects.
- To enable the use of computer applications to develop a design from the initial stages to the final outcome
- To enable the rendering of a building so as to create a photo realistic image.
- To develop the skill of digital rendering
- To develop the skill of Digital Applications and programming in Architecture

COURSE OUTCOME:

1. Student will be able to express using digital tools in the realm of visual composition, drafting, 3D visualization and rendering
2. Student will be able to draw measured drawings using the software
3. Student will be able to detail the building components using the software
4. Student will be able to produce accurate drawings faster using the software
5. Student will be able to give a rendered image of the Architectural Design by software
6. Student will be able to conceptualize, visualize and Produce digital drawings at ease

UNIT- I

SIMPLE APPLICATIONS

Creating technical documents and reports, Cost estimates with simple calculations, Presentations with graphics. Suggested Software – MS Word, Excel, Open Office,

UNIT- II

SKETCH UP TOOL AND APPLICATIONS

Introduction to Sketch up – Simple Buildings – Material Application– Vray rendering

UNIT- III

AUTOCAD AND ITS APPLICATION

Introduction to AutoCAD 2D, 3D, Render, Layer Applications – Plot Setup – View port – Scale Setup – Metric and imperial systems.

UNIT- IV

ADOBE PHOTOSHOP AND ITS APPLICATIONS

Introduction to Adobe Photoshop – layers – editing – filter – image – color – balance

UNIT- V

INTERNET APPLICATION

World Wide Web, Electronic Mail, Blogging, Ethical use of the Internet

SUGGESTED READINGS:

1. MS Office 2010 Product Guide by Microsoft
2. First Look Microsoft Office 2010, Katherine Murray, Microsoft
3. Sketchup 7 User Self help Tutorials and Video Tutorials
4. Cherly R. Shrock Beginning AUTOCAD. New Age International Publishers. New Delhi. 2006.
5. AutoCAD architectural users guide - Autodesk Inc., 1998.
6. AutoCAD 2011 User Manual, Autodesk 2011.

15ARS221	ARCHITECTURAL DESIGN II									SEMESTER-II	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- Understanding a Simple Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach
5. Student will be able to research, Analyse and Deliver a Architectural Design .
6. Student will be able to Communicate effectively through the design ideas

UNIT- I

Design Process: Basics: Drawing skills, Conventions, Abstraction and Expression; Application: Analysis, Exploration, Discovery and Verification; Communication: Process, Individual Design, Team Design, and Public Design. Evolution from Program and Conditions to Concept & Design - Graphical Representation of the Process.

UNIT- II

The study of space standards and anthropometrics related to each problem. Anthropometry as related to physically handicapped and elderly persons is required to be studied. Different Techniques shall be used for presentation.

UNIT- III

Design Strategies and Methods. Designing in Context; Design & Function; Constituents of Design; Working with materials and Structures; Arriving at Ideas. Methods: Nature & Geometry as generators; Music and Mathematics as models; Accident and the unconscious as sources; Rationalist Approaches; Precedent; Responses to Site; Generative Processes. Traditional Methods, New Methods, The Three Stage Process – Divergence, Transformation, Convergence; Choosing Design Strategies.

UNIT- IV

Horizontal movement - single bay - passive energy type spaces. Design Exercises shall be simple functional units with universal access compliance such as : Toilet for a physically handicapped person. Hostel room, bed room, kitchen, Shop, Workshop, pavilions, snack bar;

UNIT- V

The problems involve simple space organization. Design Exercises shall be multiple spaces and understanding their inter-relationships, such as : Residence, petrol bunk, fire station, police station, Cottage for an elderly couple.

The basics of building anatomy from parapet to foundation and an overview of the different building materials shall be explained at the beginning of the design studio.

SUGGESTED READINGS:

1. Paul Laseau, Graphic Thinking for Architects.
2. E and O.E. Planning, Liffé Books Ltd., London, 1973.
3. De. Chiara and Callender, Time-saver Standards for Building Types, McGraw Hill Co., New York, 1973.
4. Sid Del Mar Leach, Techniques of Interior Design Rendering and presentation, McGraw Hill Co., New York, 1973.
5. Mike K. Lin, Drawing and Designing with Confidence: A Step by Step Guide.
1. Rendow Yee, Architectural Drawing: A visual Compendium of types and Methods.
2. Francis D Ching, Design Drawing.
3. Francis D Ching, Drawing a Creative Process.
4. Mike. W. Lin, Architectural Rendering Techniques: A Colour Reference.
5. Richard M. Mc Garry, Marker Magic: The Rendering Problem Solver for Designers.
6. Michael. E. Doyle, Color Drawing: Design drawing Skills & Techniques for Architects, Landscape Architects & Interior Designers.

15ARS222	BUILDING MATERIALS AND CONSTRUCTIONS II									SEMESTER-II	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	5	Credits			4

COURSE OBJECTIVE:

- To give an introduction to cement and concrete as materials for building construction.
- To help understand the principles, types, methods of construction and applications of concrete
- To understand about structural and non-structural building components
- To understand and enable design and detail using concrete in buildings
- To develop the skill of detailed construction drawings
- To understand about concrete staircase.

COURSE OUTCOME:

1. Student will learn about the concrete as a versatile material in different contexts.
2. Student will understand the concepts of concrete as a building construction material.
3. Student will be able to design and detail specific components in concrete in Architectural Design
4. Student will understand about concrete Footing, column by doing detailed drawings
5. Student will understand about concrete Slab, beams by doing detailed drawings
6. Student will understand about concrete Plinth, lintel, Sill by doing detailed drawings
7. Student will understand about concrete Staircase by doing detailed drawings

OBJECTIVES:

To provide an understanding of the construction materials and methods through construction detailing.

To develop basic knowledge of the various components of a built structure.

UNIT- I

BRICKS PRODUCTS - CONSTRUCTION

Structural members in brickwork – Brick piers, footings, load bearing walls.

Reinforced brick masonry - Arches - Lintels – Corbels - copings.

UNIT- II

CLAY PRODUCTS CONSTRUCTION

Hollow clay blocks - for walls - partitions - roofs.

Roofing - Flat Roofs - Terrace roofs - Sloping roofs.

UNIT- III

TIMBER CONSTRUCTION – DOOR, WINDOWS AND PANELLING

Fundamentals of timber- manufacture – uses – current developments – physical properties - Drawings of timber joinery for Windows, doors, ventilators. Timber partitions, paneling, false ceiling, fixed partitions, sliding, folding, top hung bottom rested false ceiling - wall paneling

UNIT- IV

TIMBER CONSTRUCTION – STAIRCASE

Timber staircases - Designed staircase

UNIT- V

TIMBER CONSTRUCTION – TRUSS

Timber trusses - Lean to - close couple - Kingpost - Queen post - Trusses.

Exercise involving simple bill of quantities

SUGGESTED READINGS:

1. Don A.Watson, Construction Materials and Processes, McGraw Hill Co., 1972.
2. W.B.Mckay, 'Building Construction', Vol.1, 2, 3 Longmans, U.K. 1981.
3. Alanwerth, Materials, The Mitchell Pub. Co. Ltd., London, 1986.
4. R.Chudleu, 'Building Construction Handbook', British Library Cataloguing in Publication Data, London, 1990.
5. S.C.Rangwala, Engineering Materials, CharotarPub.House, Anand, 1997.

15ARS223	ARCHITECTURAL GRAPHICS – II									SEMESTER-II	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	5	Credits			3

COURSE OBJECTIVE:

- To involve students in a number of exercises that will help them develop the skill of representation in advanced drawing techniques
- To make them understand the measured drawing method
- To make them understand to document buildings of architectural interest
- To understand and Develop the skill of measured drawing of Sections & Elevations
- To understand and develop the set of Architectural working drawings
- To develop them in making the working drawings for the Site Execution

COURSE OUTCOME:

1. Student will be able to construct and draw detailed architectural working drawings
2. Student will understand the 3d views and perspective drawings of the buildings.
3. Student will understand the detailed specifications of a small construction drawing
4. Student will learn to Collect the building data and document accordingly
5. Student will develop the skill of making a Architectural Working Drawing
6. Student will develop the skill of reading a Interior working Drawing

UNIT- I

Architectural drawing & representation

Introduction to basic building components representation - Typical section of a building – simple specifications and - line weight, line type etc. Types of Drawings.

UNIT- II

Orthographic projection – Exterior and Interior spaces

Isometric, Axonometric, Oblique and orthographic projections to scale of Exterior and interior spaces-multi level spaces in buildings –interior furniture etc – shade and shadow

UNIT- III

Building perspective-Manual & Digital rendering

Perspective of large spaces and buildings – One point perspective, Two point perspective, Three point perspective – scientific method, short cut method -pencil ,pen rendering ,stippling-Shade and shadow- Sciography of plan ,elevation, isometric, axonometric views-rendering of the building silhouette by manual and digital techniques.

UNIT- 4

Measured Drawing – Historic building document Study

Introduction to fundamentals of measured drawing, line value, lettering, drawing representation, methods and technique of measuring objects by measuring tape –photographs – aesthetic components and details

UNIT- V

Measured Drawing – Detailed Documentation of a Public building

Documentation of a complete building of a special interest in terms of history, building Construction- architectural excellence or technology – examples like Post office, Police Station, Public School

SUGGESTED READINGS:

1. Francis Ching, Architectural Graphics, Van Nostrand and Reinhold Company, New York, 1975.
2. Edward J. Muller, James G. Fauselt, Philip A. Graw Architecture Drawing and Light Construction Prentice hall Publishers Columbus. 1999.
3. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986.
4. Bernard Alkins- 147, Architectural Rendering, Walter Foster Art Books, 1986.
5. Learn to paint with Water Colours, Acrylic colours, Boats and Harbours, Sketch, Still life, landscapes. Author: Alwyn Cranshaw, Publisher: William Collins Sons & Co. Ltd., London, 1981.
6. Architectural Rendering, A Technique of Contemporary Presentation, Author: Albert O. Halse, Publisher, Mc Graw Hill Book Company, New York, 1972.
7. Elisabetta Drudi, Figure Drawing for Fashion Design, The Pepin Press Singapore. 2001.
8. K. Venugopal, Engineering Drawing and Graphics + AutoCAD, New Age International Publishers, New Delhi, 2007.
9. Kendra Schank Smith, Architects' Drawings, Architectural Press- An imprint Elsevier Burlington 2006.

SEMESTER 3

15ART301	BUILDING SERVICES I								SEMESTER-III		
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To get a Brief understanding about the list of Services involved in Building
- To understand the sequence and importance of the services in a Building during the planning
- To develop basic technical knowledge in water supply & Applications in Architecture
- To develop the technical knowledge in Electric Supply & Applications in Architecture
- To develop and understand about the Illumination systems
- To develop sanitation, electrical, air conditioning, mechanical and firefighting systems.

COURSE OUTCOME:

1. Student will understand about Building services and its integration in a building
2. Student will learn about water supply, sewage, drainage and waste systems in buildings.
3. Student will learn about the various electrical systems and applications in building
4. Student will understand about Heating, ventilation and air-conditioning systems in a building.
5. Student will learn about the Fire safety & Services in a building
6. Student will understand the importance of application of services in a building.

UNIT- I

WATER CHARACTERISTICS AND QUALITY

Surface and ground water sources - quality/quantity - nature of impurities – need for treatment

UNIT- II

FUNDAMENTALS OF SEWAGE TREATMENT AND SEWERAGE SYSTEMS

Environmental sanitation -Sanitation in buildings. Arrangement of sewerage systems in Housing, large factories, towns and cities - sewage pumping station - Rainwater disposal and storm water drainage from buildings.

UNIT- III

ELECTRICAL SYSTEMS AND ILLUMINATION

- a) Basics of electricity - Single/Three phase supply - Protective devices in electrical installations - Earthing for safety - Types of earthing - ISI specifications.
- b) Principles of illumination: Modern theory of light - Synthesis of light - Additive and subtractive synthesis of colour - Luminous flux - Candela - Solid angle illumination - Utilization factor - depreciation factor - MSCP - MHCP - Laws of illumination.

UNIT- IV

MECHANICAL SYSTEMS

- a) Pumps – uses & types and their selection, installation and maintenance, Hot Water Boilers.
- b) Basic refrigeration principles: Thermodynamics - Heat - Temperature, measurement transfer - Change of state - Sensible heat - Latent heat of fusion, evaporation, sublimation - Saturation temperature -Super heated vapour- subcooled liquid - pressure temperature relationship for liquids – Refrigerants

UNIT- V

FUNDAMENTALS OF ACOUSTICS

Sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies.

Types of noises, transmission of noise, transmission loss, noise control and sound insulation and remedial measures, determination of density of a given building material, absorption co-efficients and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

SUGGESTED READINGS::

1. William H. Severns and Julian R. Fellows, Airconditioning and Refrigeration, John Wiley and Sons, London, 1988.
2. Robert D. Finch, Introduction to Acoustics, Prentice Hall of India Private Limited, New Dehli, 2008.
3. MARK J. HAMMER MARK J. HAMMER, JR, Water and Wastewater Technology, PHI Learning Private Limited, New Delhi. 2009.
4. M.N.Rao, A.K.Datta, Waste Water Treatment, Oxford & IBH PUBLISHING CO. PVT. LTD, New Delhi, 2007.
5. Section 11. Sanitary Appliances and Water Fittings. IS Code- SP: 21-1983.
6. Hand book on Water Supply and Drainage with Special emphasis on plumbing IS Code – SP : 35 – 1987.
7. Part of Section 1: Water Supply. IS CODE – SP : 7 – 1992.
8. IS Code of Basis Requirements for Water supply drainage and sanitation. IS Code – IS 1172: 1983.
9. Code of Practice for Water Supply in Buildings. IS Code – IS 2065: 1983.

15ART302	HISTORY OF ARCHITECTURE II									SEMESTER-III	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture in the chronology
- To understand the social Fabric, Relevance, Design Principles& Construction materials and Methods.
- To understand about the Buddhist Architecture
- To Gain knowledge in Dravidian Architecture
- To gain Knowledge about the Mughal Style
- To understand about evolution of Islamic architecture

COURSE OUTCOME:

1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.
2. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.
3. Student will understand about the spatial and stylistic qualities associated with Dravidian architecture.
4. Student will understand about the spatial and stylistic qualities associated with Islamic & provincial architecture
5. Student will understand the Styles and Details of Mughal Architecture
6. Student will expertise in Spatial understanding of historical places by Sketching& reading

UNIT- I

HINDU & INDO-ARYAN STYLES

Evolution of Hindu temple - Early shrines of the gupta and chalukyan periods -Tigawa temple, Ladh Khan and Durga temple, Aihol, Papanatha and Virupaksha temples, Pattadakal.

Indo-Aryan: Salient features of an Indo Aryan temple -Lingaraja Temple, Bhuvaneswar- Sun temple, Konarak. Kunds and Vavs – - Adalaj - Surya kund, Modhera.

UNIT- II

DRAVIDIAN STYLE

Dravidian culture - Rock cut productions of Pallavas –Shore temple, Mahabalipuram- Dravidian Order – Brihadeeswara Temple, Tanjore - Evolution and form of gopuram - Complexity in temple plan due to complexity in Ritual -Minakshi temple, Madurai.

UNIT- III

BUDDHIST STYLE

Hinayana and Mahayana Buddhism - Interaction of Hellenic & Indian Ideas in Northern India - Architectural Production during Ashoka's rule - Ashokan Pillar, Saranath, Rock cut caves at Barabar, Sanchi Stupa.

Salient features of a Chaitya hall and Vihara, Rock cut architecture in the Western and Eastern ghats- Karli, Viharas at Nasik, Rani gumpha, Udaigiri. Takti Bahai, Gandhara.

UNIT- IV

INTRODUCTION TO ISLAMIC ARCHITECTURE

History of Islam- Influences on Islamic Architecture - character of Islamic architecture with examples. sources of Islamic Architecture in India and influences on them - Brief history development of architectural style during the rule of the slave, Khilji, Tuqlaq Sayyid and Lodhi Dynasties - important examples for each period.

UNIT- V

PROVINCIAL & MUGHAL STYLES

Development of the provincial styles in different regions - Punjab, Jaunpur, Bengal, Gujarat, Malwa, the Deccan (Bijapur, Golconda, Bidar and Gulbarga) - important examples for each style.

Development of the Mughal style under the different rulers - Babur, Shershah, Humayun, Akbar, Jahangir, Shahjahan, Aurangzeb- important examples - development of the Mughal garden - important examples.

SUGGESTED READINGS:

1. Percy Brown, Indian Architecture (Buddhist and Hindu Period), Taraporevala and Sons, Bombay, 1983.
2. Satish Grover, The Architecture of India (Buddhist and Hindu Period), Vikas Publishing Housing Pvt. Ltd., New Delhi, 1981.
3. ChristoperTadgelli, The History of Architecture in India from the Dawn of civilization to the end of the Raj, Longmon Group U.K.Ltd., London, 1990.
4. Islamic Architecture, Form, Function and Meaning, Robert Hillenbrand, Edinburgh University Press, 1994.
5. Brown Percy, Indian Architecture (Islamic Period) Taraporevala and Sons, Bombay, 1983.
6. Satish Grover, The Architecture of India (Islamic) Vikas Publishing House Pvt. Ltd., New Delhi, 1981.
7. Christopher Tadgell- The History of Architecture in India - Penguin Books (India) Ltd., New Delhi 1990.
8. Francis D.K. Ching, A Global History of Architecture, John Willey & Sons Publishers, New Jersey,2007.

15ART303	MECHANICS OF STRUCTURES II									SEMESTER-III	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To gain understanding of structural concepts in architecture
- To gain understanding of structural details of various Forces and techniques
- To gain understanding about the theoretical aspects and the component aspects involved in a building
- To gain understanding about the R.C.C structural elements
- To gain understanding about the Indeterminate Structures
- To gain understanding about the forces acting on structural elements

COURSE OUTCOME:

1. Student will understand the concepts of action of forces like bending moment and shear force
2. Student will understand the basic geometric properties and the behavior of beams under effect of stress
3. Student will understand the various structural components of the building like columns
4. Student will understand about the Reinforced structures structural system and ability
5. Student will understand about Indeterminate Structures in Architectural Design
6. Student will be able to relate various building structural components and their behavior

UNIT- I

SHEAR FORCE AND BENDING MOMENT

Concept of shearing forces and Bending Moments - shear force and bending Moment diagrams for cantilever and simply supported beams subjected to point load, uniformly distributed loads and their combinations

UNIT- II

STRESSES IN BEAMS

Theory of simple bending - bending stresses in beams, shear stresses in beams - examples on simple sections. Stress distribution diagrams.

UNIT- III

DEFLECTION OF BEAMS

Slope and deflection at a section - Double Integration and Macaulay's method for simply supported and cantilever beams

UNIT- IV

THEORY OF COLUMNS

Short and long columns - Euler's method and its limitations - Derivations of Euler's formula (for different end conditions) - Rankine's formula for columns, examples, effect of eccentric loading

UNIT- V

INTRODUCTION TO INDETERMINATE STRUCTURES

Introduction – Determination of degree of statical indeterminacy for beams and frames – Concept of Analysis (No Problems)

Total 45 Hrs/Semester

SUGGESTED READINGS::

1. S.S.Bhavikatti, "Strength of Materials", VIKAS Publishing House Pvt. Ltd., Chennai, 1997.
 2. S.Ramamrotham, Strength of materials - Dhanpatrai & Sons, Delhi, 1990.
 3. W.A.Nash, Strength of Materials - Schaums Series - McGraw Hill Book Company, 1989.
 4. R.K.Bansal - Engineering Mechanics and Strength of Materials - Lakshmi Publications, Delhi, 1990.
- R.K. Rajput - Strength of Materials, S. Chand & Company Ltd., New Delhi 1996.

15ARP311	COMPUTER APPLICATIONS II									SEMESTER-III	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	5	Credits			2

COURSE OBJECTIVE:

- To develop the advanced Digital knowledge and skills
- To develop the skills of two-dimensional rendering
- To develop the skill and knowledge of the Building information Modelling
- To develop the Skill related to building visualization,
- To develop the skill of multimedia presentations, brochures,
- To develop the skill of video presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will be able to understand the use of digital tools in the realm of visual composition,
2. Student will understand the drafting & Details through Software
3. Student will develop the skill of 3D visualization and rendering
4. Student will understand the concept of BIM- building information modelling through the specific software
5. Student will gain the Skill of Multimedia & video making presentations required for Architectural practice
6. Student will gain knowledge about the latest developments of digital applications in Architecture

UNIT - I to 5:

INTRODUCTION TO BUILDING INTEGRATED MODELLING

New Features , Editing and Working with Families in a Project, Concepts, creating a sharedFamily, Project and System settings.
Suggested Software: REVIT, ARCHICAD.

BASIC MODELLING AND DOCUMENTATION

Creating the Basic Model, Adding Doors and Windows, Floors and Floor Openings, Roof and Ceiling, Staircases. Suggested Software: REVIT, ARCHICAD. Creating drawings, Creating detail from Building Model, Scheduling, Annotating and Dimensioning, Viewing the Mode

RENDERING

Applying Materials and textures, creating a perspective view, rendering an Exterior view, rendering an Interior view, Creating and Recording Walkthroughs, creating 3D cutaways with Section Boxes

Suggested Software: ArchiCAD, Revit

SUGGESTED READINGS:

1. AutoCAD 2011 User Manual, Autodesk 2011.
2. Revit reference manual - Autodesk UNC, 2010.
3. ArchiCAD architectural users guide -Graphisoft Inc., 2010.

15ARS321	ARCHITECTURAL DESIGN III									SEMESTER-III	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- To create understanding of human built environment as a holistic, living entity from macro to micro scales, and shaped by geographic and socio-cultural forces as well as by historic, political and economic factors, through study of and design within the context of rural settlements.
- Understanding the Design Programme and the Components of the Design Problem & Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media & Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings
- To enable a comprehensive study of rural settlement and architecture in order to understand them as exemplar of collective design that evolved through various parameters.

COURSE OUTCOME:

1. Student will be able collect data, assimilate and integrate knowledge in a holistic manner.
2. Student will learn about the Sensitivity towards the nature and values of unselfconscious and collective design the interconnectedness of human society and environment
3. Student will learn about traditional techniques and concepts of Architecture.
4. Student will learn about the evolution and transformation of the rural settlements according to the time and cultural context.
5. Student will understand the essence of rural planning
6. Student will develop the skill of design process for the Rural settlements

TOPICS

Introduction to site – inventory and Analysis – Graphical representation - time space activity analysis.

Single level planning in small scale, small span, horizontal movement and simple vertical movement, data collection, case studies, analysis and presentation of studies – Data collection with respect to design and detailing for physically handicapped persons - Concepts and presentation of design with scaled models - Examples: Residential buildings, Institutional buildings: banks, nursery or primary schools, primary health center, school for children with learning disabilities, neighborhood market, etc.

Design Process to be approached stage wise through Architectural Programming

SUGGESTED READINGS::

1. De Chiara and Callender, Time Saver Standards Building Types, McGraw Hill Co., 2nd Edition, 1980.
2. Edward D. Mills, Planning - The Architects Handbook - 10th Edition, British Library Cataloguing in Publication Data, 1985.
3. Wakita Linde, The Professional practice of Architectural working, drawing John Wiley & Sons, 1984.
4. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw Hill Book Co., 1982.
5. Julius Panero & Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design Publication, 1979.
6. Neufert Architect's Data, Rudolph Herg, Crosby Lockwood and Sons Ltd., 1970.

15ARS322	BUILDINGMATERIALS AND CONSTRUCTION III									SEMESTER-III	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits			4

COURSE OBJECTIVE:

- To give an introduction to metals as material for building construction.
- To give knowledge about the principles, methods of construction and applications of metals for structural components
- To understand about non-structural building components.
- To gain Knowledge about Steel floor & Steel Staircase
- To understand about Door, windows & partitions
- To provide familiarity with market forms of metals and finishes for them.

COURSE OUTCOME:

- Student will gain Knowledge of properties of ferrous and non-ferrous metals as materials for buildings.
- Student will understand about the possibilities of steel as an important building construction material.
- Student will be able to design and detail structural and non-structural components of simple buildings using metals.
- Student will gain Knowledge about Steel Floors & Staircase
- Student will understand about the details of Door, windows & Partitions by detailed Drawings.
- Student will be able to use metal innovatively in building projects.

UNIT - I

CONCRETE, ITS INGREDIENTS MANUFACTURE & PROPERTIES

Ingredients - suitability requirements for aggregates, grading of aggregates - role of water in concrete - reinforcement - admixtures - properties of concrete.

Manufacture of concrete and concreting - mix proportioning - batching, mixing, transporting, placing, compaction, curing formwork - quality control - outline of tests for concrete - joints in concrete - concrete finishes.

UNIT - II

SPECIAL CONCRETE AND CONCRETING METHODS

Lightweight, high density, fibre reinforced, polymer concrete - outline of manufacture properties and uses of the above - ready mixed concrete - gunning - cold weather and underwater concreting - current developments in concrete products and methods of concreting.

FOUNDATIONS

Pile foundation, different types of piles, precast and cast insitu with reinforcement details for different types of grids, details of pile capping, jointing of precast piles and columns.

UNIT - III

CONCRETE CONSTRUCTION

Introduction to framed structures. Concrete in foundations - types of footings - isolated, combined, continuous, strap.

Concrete floors, walls and partitions. Concrete lintels, arches, sunshades - Concrete slabs - types - concrete beams and columns.

UNIT - IV

CONCRETE STAIRCASES

Factors involving staircase design - types of staircases like straightflight, doglegged, quarterturn, bifurcated, spiral helical, etc. - different support conditions like inclined slab, cranked slab, continuous, cantilever - foundations finishes for staircases - detailing out of handrails and balusters. Designing and detailing for physically handicapped.

UNIT - V

D.P.C- WEATHERING COURSE – WATER PROOFING

Introduction to DPC – Damp Proof Course – Water Proofing – Details and techniques – types

Exercises involving simple bill of Quantities

SUGGESTED READINGS :

1. M.S.Shetty, Concrete Technology, S.Chand& Co. Ltd., New Delhi, 1986.
2. Dr.B.C.Punmia, Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 1993.
3. Arthur Lyons, Materials for Architects and Builders - An introduction, Arnold, London, 1997.
4. W.B.Mckay, Building Construction, Longmans, UK, 1981.
5. Francis D.K.Ching, Building Construction Illustrated VNR, 1975.

15ARS323	CLIMATE RESPONSIVE ARCHITECTURE I									SEMESTER-III	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	5	Credits			3

COURSE OBJECTIVE:

- To study about climatic factors and its influence
- To understand about the of external and internal factors of Climate for a certain location
- To understand deeply about the Microclimatic influences in a building
- To understand about the Solar geometry and it impacts in a building
- To understand the Air movement & its principles and Applications for human thermal comfort
- To understand about the Classification of climate and Design strategies recommendations for each climatic Zone

COURSE OUTCOME:

1. Student will understand the whole climatic scenario of the world
2. Student will learn about the Solar geometry, sun path its irradiation effects and control
3. Student will learn about heat transfer in buildings due to materials and design implications.
4. Student will understand about the Various ventilation principles and techniques for good ventilation
5. Student will understand hybrid design strategies and its design applications for different climatic zones
6. Student will develop the skill of doing a climatic design for any building with optimum recommendations.

UNIT - I

CLIMATE AND HUMAN COMFORT

Factors that determine climate of a place – Components of Climate – Climate classifications for building designers in tropics – Climate characteristics. Human body heat balance – Human body heat loss – Effects of climatic factors on human body heat loss – Effective temperature – Human thermal comfort – Use of C.Mahony's tables.

UNIT - II

DESIGN OF SOLAR SHADING DEVICES

Movement of sun – Locating the position of sun – Sun path diagram – Overhead period–Solar shading–Shadow angles – Design of appropriate shading devices

UNIT - III

HEAT FLOW THROUGH BUILDING ENVELOPE CONCEPTS

The transfer of heat through solids – Definitions – Conductivity, Resistivity, Specific heat, Conductance, Resistance and Thermal capacity – Surface resistance and air cavities– Air to air transmittance (U value) – Time lag and decrement

UNIT - IV

IMPACT OF AIR MOVEMENT DUE TO NATURAL AND BUILT FORMS

The wind – The effects of topography on wind patterns – Air currents around the building – Air movement through the buildings – The use of fans – Thermally induced air currents – Stack effect, Venturi effect – Use of court yard.

UNIT - V

CLIMATE AND DESIGN OF BUILDINGS

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates – Climate responsive design exercises

SUGGESTED READINGS::

1. O.H. Koenigsberger and others (1993), Manual of Tropical Housing and Building – Part I - Climate design, Orient Longman, Madras, India.
2. Bureau of Indian Standards IS 3792 (1987), Hand book on Functional requirements of buildings other than industrial buildings, (Part I – IV), Manakbhavan, 9, Bahadur Shah Zafar Marg, New Delhi – 110002 SUGGESTED READINGS :
3. Martin Evans (1980), Housing Climate and Comfort – Architectural Press, London
4. B. Givoni (1981), Man, Climate and Architecture, Architectural Sciences Series - Applied Science Publishers Ltd., London
5. B. Givoni (1994) Passive and Low Energy Cooling of building, VanNostrand Reinhold New York, USA..
6. Galloe, Salam and Sayigh A.M.M. (1998) “Architecture, Comfort and Energy”, Elsevier Science Ltd. , Oxford, U.K.
7. Arvind Krishan “ Climate responsive Architecture” .

SEMESTER 4

15ART40	BUILDING SERVICES II										SEMESTER-IV
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To inform about the principles and laws of Water supply and sewage systems in buildings.
- To inform about the principles and laws of Electrical lighting systems in buildings.
- To inform about the principles and laws of HVAC systems
- To inform about the principles of Mechanical and Integrated system
- To Inform About Integrated services
- To Inform about the integration of service with the Architectural Design

COURSE OUTCOME:

1. Student will gain Knowledge of design of water supply and sewage services
2. Student will learn and understand about the design of electrical and lighting systems in buildings.
3. Student will be able to design buildings satisfying the HVAC systems
4. Student will understand the applications of mechanical systems and its design applications as per standards.
5. Student will gain basic knowledge about the Integrated Building management Systems.
6. Student will understand the Applications of building Services in advanced level by detailed Drawings

UNIT- I

Water Distribution

Water supply systems – Domestic – Commercial – usages - Distribution systems in buildings - Types of pipes used - Laying, jointing, testing - prevention of water wastage and reuse of water - Internal water supply in buildings - Relevant byelaws and regulations.

UNIT- 2

Sewage Disposal

Arrangement of sewerage systems in buildings - sewage treatment plant b) Refuse Disposal: Collection, conveyance and disposal of town refuse systems

UNIT- 3

Plumbing Systems

Materials and construction details of sewers and connections – plumbing fixtures - testing for water tightness - plumbing system for building types. – Toilets kitchen etc., Relevant Plumbing Codes

UNIT- 4

Electrical Systems And Lighting Design

Study of electrical layout for residential Building - Types of wires, wiring systems and their choice - Main and distribution boards - Electrical load calculation – Details - Classification of lighting - Artificial light sources - spectral energy distribution - luminous efficiency - colour temperature - colour rendering – lighting fixtures.

UNIT- 5

Air-Conditioning System And Applications

Vapour compression cycle - compressors - evaporators - Refrigerant control devices - electric motors - Starters - Air handling units - Cooling towers.

Window type and packaged air-conditioners - chilled water plant - fan coil systems - water piping - cooling load - Airconditioning systems for different types of buildings - Protection against fire to be caused by A.C.systems.

SUGGESTED READINGS:

1. Robert D.Finch, Introduction to Acoustics, Prentice Hall of India Private Limited, New Dehli, 2008.
2. MARK J. HAMMER MARK J. HAMMER, JR, Water and Wastewater Technology, PHI Learning Private Limited, New Delhi. 2009.
3. M.N.Rao, A.K.Datta, Waste Water Treatment, Oxford & IBH PUBLISHING CO. PVT. LTD,New Delhi,2007.
4. S.P.Arora,S.P.Bindra, Building Construction, dhanpat rai publication, New Delhi. 2009.
5. Section 11. Sanitary Appliances and Water Fittings. IS Code- SP: 21-1983.
6. Hand book on Water Supply and Drainage with Special emphasis on plumbing IS Code – SP : 35 – 1987.
7. Part of Section 1: Water Supply. IS CODE – SP : 7 – 1992.
8. IS Code of Basis Requirements for Water supply drainage and sanitation. IS Code – IS 1172: 1983.
9. Code of Practice for Water Supply in Buildings. IS Code – IS 2065: 1983.
10. William H.Severns and Julian R.Fellows, Airconditioning and Refrigeration, John Wiley and Sons, London, 1988.
11. D.J.Groomet- Noise, Building and People -Pergumon Press - 1977.

15ART402	CONTEMPORARY ARCHITECTURE I									SEMESTER-IV	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To give exposure to the critiques of modern architecture.
- To study in detail the different postmodern directions in architecture
- To study about the influence of industrial revolution and Architecture
- To understand about the Modern era of Architecture
- To understand about the design evolutions of various contemporary Architects
- To understand the evolution of Western Architecture

COURSE OUTCOME:

1. Student will understand the spread and varied later directions of modern architecture across the world.
2. Student will understand the architectural production from the 1960s as driven by large scale changes across the world.
3. Student will become familiar with contemporary forces and directions in architecture across the world.
4. Student will understand the basis of Architecture revolutions and its changes in every decade
5. Student will understand the Ideologies of various Architects & their Works
6. Student will impart this Knowledge in his Architectural Design

UNIT- I

EVOLUTION OF MODERN ARCHITECTURE & INFLUENCE OF NEW MATERIALS

Reasons for the evolution of Modern Architecture, origins-Neo Classicism Industrial revolution and its impact – Emergence of new building typologies, New Materials and Technologies- steel, glass and concrete

UNIT- 2

REVIEWING INDUSTRIALISATION

Arts & Crafts movement in Europe and America; Art nouveau, and the works of Horta, Guimard, Gaudi and Macintosh; Organic Architecture -Early works of F.L.Wright. Chicago school; Art deco Architecture in Europe and America.

UNIT- 3

EVOLUTION OF MODERNISM, POST MODERNISM AND CRITIQUE

Viennese secession, Adolph Loos and debates on ornamentation ; Futurism, Expressionism works of Mendelssohn & Taut, Cubism, Constructivism, De stijl and their influence on Architecture. Bauhaus school & Walter Gropius, Modernism and the International style, Brutalism, Writings of Venturi - Jane Jacobus - Aldo Rossi - Christopher Alexander.

UNIT- 4

WESTERN ARCHITECTURE

Ideas and works of Richard Meier (Smith House, Connecticut and Getty Centre, Brent Wood, Los Angeles), Charles Moore (Architect's Own House at Orinda and Piazza d'Italia, New Orleans), Bernard Tschumi (Kyoto Railway Station Project and Parc de la Villette, Paris), Frank Gehry (AeroSpace Museum, Santa Monica and Guggenheim Museum, Bilbao), Norman Foster (Hong Kong Shanghai Bank and Renault Distribution Centre, Swindon, England),

UNIT- V

MODERN ARCHITECTURE

Zaha Hadid (The Peak Club, Hong Kong and IBA Housing Block 2, West Berlin), Daniel Libeskind (Jewish Museum, Berlin and World Trade Centre, New York), Rem Koolhaas (Dance Theatre, The Hague and Netherlands Sports Museum), Santiago Calatrava (Lyon- Satolas Railway Station and Olympic Stadium at Athens), Renzo Piano (Pompidou Centre, Paris and Menil Museum, Houston) - Deconstructivist Theory – Parametric.

SUGGESTED READINGS::

1. Charles Jencks, The Language of Post-Modern Architecture, 1984.
2. D.Ghirardo, Architecture After Modernism, Thames and Hudson, London, 1990.
3. Kenneth Frampton, Modern Architecture: A Critical History, Thames and Hudson, London, 1994.
4. Miki Desai et.al, Architecture and Independence, Oxford University Press, New Delhi, 1998.
5. Peter Szalapaj, Contemporary Architecture ,Architectural Press- An imprint Elsevier, Burlington, 2008.
6. Catherine Slessor Contemporary Architecture Images Publishers Australia. 2002.

15ART403	DESIGN OF STRUCTURES I									SEMESTER-IV	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To understand the concepts and design of structures in architecture
- To understand the different structural materials used for various buildings with calculations
- To understand about the Footing Calculations & Applications
- To understand about the Column Calculations & Applications
- To understand about the Beam Calculations & Applications
- To Understand about the fundamentals of Staircase structure

COURSE OUTCOME:

1. Student will be able to apply the concepts/techniques of finding stresses.
2. Student will understand to calculate simple bending theory to find deflection in beams.
3. Student will be able to analyse and solve different types of columns.
4. Student will be able to analyse the different types of indeterminate beams.
5. Student will be able to understand about the Structural systems & Calculations of Slab
6. Student will be able to understand the Fundamental of Staircase.

UNIT - I

TIMBER – BEAMS

Grading of Timber – Permissible Stresses – Design of timber beams – Madras terrace roof.

UNIT - II

STEEL SECTIONS AND WELDED JOINTS

Properties of rolled steel sections, Types of welded joints – Advantages and disadvantages – Design of Fillet welds (Excluding eccentric connections).

UNIT - III

TENSION MEMBERS

Introduction – Net sectional area – permissible stresses. Design of Axially loaded Tension member

UNIT - IV

COMPRESSION MEMBERS

Introduction – various sections – built up section – Design of columns (excluding Lacing, Battening and other connections.)

UNIT - V

STEEL BEAMS

Allowable stresses, General specifications, Design of laterally supported beams.

Total : 45 Hrs/Semester

SUGGESTED READINGS:

1. Ramachandra S., Design of Steel Structures, Standard Book House, Delhi, 1984.
 2. A.S.Arya, Structural Design in Steel, Masonry and Timber, Nemchand and Bros, Roorkee, 1971.
 3. National Building Code of India, 1983, Part VI, Structural Design.
 4. Gurucharan Singh, Design of Steel Structures, Standard Publishers, New Delhi, 1982.
 5. Negi "Design of steel Structures" - Tata Mcgraw Hill Book Company, New Delhi 1997.
 6. Elias G.Abu-Saba Design of Steel Structures CBC Publishers New Delhi. 1997.
 7. IS Code of practice for BIS 800:2007
- IS Code of practice for Timber design.

15ARP411	SURVEYING AND SITE PLANNING									SEMESTER-IV	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To understand the principles of surveying, classification, types of surveys and their applications.
- Know about techniques of surveying.
- Understand the concepts of levelling and its applications.
- To understand about contour applications
- Get exposed to total station surveying, GIS and GPS.
- To understand the site, its premises and various factors involved

COURSE OUTCOME:

1. Student will understand the various systems of Surveying
2. Student understand the concept of levelling and its applications on site for various types of buildings.
3. Student will understand about the larger survey context using the total station and GIS mapping
4. Student will understand about the Site Inventory and Site analysis
5. Student will learn about Hill survey and method of Contouring
6. Student will learn about the item planning principles, methods and its applications in architectural design.

UNIT - I

SURVEYING

Definition, classification, principles of surveying, chain surveying and compass surveying.

UNIT - II

PLANE TABLE SURVEY

Plane table and accessories, methods of plane table survey, Radiation, Intersection, traversing and resection.

UNIT3

LEVELING.

Definition, classification, booking and reduction of levels.

Theodolite – study of instruments, definition of different terms, temporary adjustments, uses, measuring horizontal and vertical angles, method of repletion, extension lines.

UNIT - IV

CONTOURING

Characteristics of contours, direct and indirect methods of contouring, interpolation, uses of contours, setting out works such as centre lines of a building, grade for sewer. Earth work calculation , area and volume.

UNIT - V

TOTAL STATION & GIS

Introduction and Characteristics – Handling and setting up a Total Station – Angle and Distance Measurement – Traversing – Introduction to GIS – Concept of GIS Mapping

SUGGESTED READINGS:

Rangwala, Surveying & Levelling, Charotar Publishing House, Gujarat, 2005.

Duggal, S. K. “Surveying (Vol – I)”, Tata McGraw-Hill publishing Company Ltd., New Delhi, 1996.

Surveying and leveling (Part I) by Kanetkar TP and Kulkarni SV

Wolf, Paul R. and Ghilani, Charles D., Elementary Surveying an Introduction to Geomatics: Fifth Edition, Upper Saddle River, New Jersey: Pearson Prentice Hall, 2006

Banister.A&Raymond.S – 1992, Surveying , ELBS 6th Edition

Punmia.B.C, 2000, Surveying, Volumes I, II, III, Laxmi publications.

15ARS421	ARCHITECTURAL DESIGN IV									SEMESTER-IV	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach
5. Student will be able to research, Analyse and Deliver a Architectural Design.
6. Student will be able to Communicate effectively through the design ideas

UNIT - I to 5:

RURAL PROJECT

Problems related to Rural Housing - Visits to selected village – based on Rural surveys on socio-economic, physical, housing and visual surveys, etc. to study existing conditions - analysis of survey data - preparation of report and presentation in a seminar - preparation of design brief solutions for housing and community facilities.

SUGGESTED READINGS::

1. De Chiara and Callender, Time Saver Standard for Building Types, McGraw Hill Co., 2nd Edition, 1980.
2. Edward D.Mills, Planning - The Architects Handbook - 10th Edition, British Library Cataloguing in Publication Data, 1985.
3. Wakita Linde, The Professional Practice of Architectural Working, Drawing John Wiley & Sons, 1984.
4. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGraw Hill Book Co., 1982.
5. Julius Panero& Martin Zelnik, Human Dimension and Interior Space, Whitney Library of Design Publication, 1979.
6. Neufert Architect's Data, Rudolf Herg, Crosby Lockwood and Sons Ltd., 1970.

15ARS422	BUILDING MATERIALS AND CONSTRUCTION IV									SEMESTER-IV	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	5	Credits			4

COURSE OBJECTIVE:

- To give an introduction to liquid storage structure and retaining wall
- To give an introduction about retaining wall
- To understand about the design of R.C.C slabs & footing
- To give an introduction to glass, plastic and related materials in building construction.
- To provide familiarity with advanced building construction techniques (shell structure
- To learn about the materials as well as design with them.

COURSE OUTCOME:

1. Student will learn about the Liquid storage structure design calculations and applications
2. Student will learn about Retaining wall
3. Student will learn about the Structural design of R.C.C slab & Footing
4. Student will gain Knowledge of glass, plastics, paints and finishes in building construction.
5. Student will become familiar with advanced materials and construction techniques of shell structures
6. Student will gain knowledge in design the R.C.C slab and footing

UNIT - I

FERROUS METALS

Brief study on manufacture, properties and uses of cast iron, wrought iron, pig iron and steel - anticorrosive measures for steel - mechanical and heat treatment of steel - market forms of steel - structural steel, stainless steel, steel alloys - properties and uses - current developments.

UNIT - II

STEEL CONSTRUCTION

Structural steel sections - types of connections in steel - steel in foundations, columns and beams - different types of steel roof trusses including northlight truss - space frames - materials for roofcovering. Steel staircases and handrails, salusters..

UNIT - III

STEEL STAIRS, DOORS, WINDOWS

Steel doors and windows – safety doors, dock doors, cold storage doors, revolving doors - collapsible gates - rolling shutters. Steel in furniture and other interior uses

UNIT - IV

NON FERROUS METALS

Aluminium and Aluminium Alloys - brief study on manufacture, properties and uses -Aluminium products - extrusions, foils, castings, sheets, etc. - brief study of other non-ferrous metals like copper, bronzebrass, tin and lead, properties and uses - current developments.

UNIT - V

CONSTRUCTION USING NON-FERROUS METALS

Aluminium doors - revolving, sliding, pivoted. Aluminium windows and ventilators - sliding, fixed, pivoted, tophung, bottom hung, louvred, fixed. Aluminium partitions, false ceiling, Aluminium roofing -northlight glazing bar. Use of other nonferrous metals like copper, bronze, brass, etc. in architectural construction.

SUGGESTED READINGS::

1. S.C.Rangwala, Engineering Materials, Charotar Publishing House, India, 1997.
2. B.C.Punmia, Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 1993.
3. Arthur Lyons - Materials for Architects and Builders - An Introduction - Arnold, London, 1997.
4. Harold B.Olin, Construction Principles Materials and Methods, The Institute of Financial Education, Chicago, 1980.
5. W.B.Mckay Building Construction, Longmans, U.K. 1981.

15ARS423	CLIMATERESPONSIVE ARCHITECTURE II										SEMESTER-IV
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To study about climatic factors and Passive design concepts
- To understand about the of external and internal factors of Climate for a certain location
- To understand deeply about the Microclimatic influences in a building
- To understand about the Solar geometry and it impacts in a building
- To understand the Air movement & its principles and Applications for human thermal comfort
- To understand about the Classification of climate and Design strategies recommendations for each climatic Zone

COURSE OUTCOME:

1. Student will understand the whole climatic scenario of the world
2. Student will learn about the Solar geometry, sun path its irradiation effects and control
3. Student will learn about heat transfer in buildings due to materials and design implications.
4. Student will understand about the Various ventilation principles and techniques for good ventilation
5. Student will understand hybrid design strategies and its design applications for different climatic zones
6. Student will develop the skill of doing a climatic design for any building with optimum recommendations.

UNIT- I

CLIMATE & SHELTER

Over view of the different Passive Solar Techniques & Climate responsive design features adopted in the traditional / vernacular architecture of various places in different climate zones – Control of Micro-climate around the building by settlement pattern, built form – open space relationship & façade articulation & appropriate use of building materials in historic buildings

UNIT- II

SOLAR ENERGY & BUILDING

Solar geometry and built form – Various techniques of shading to reduce heat gain in tropical climate –

Various methods of Maximising exposure to solar radiation in cold & temperate climate. Heating & cooling loads – Energy estimates - Energy conservation – Efficient day lighting – Solar Water heating system. Exercises on heating and cooling load calculations in buildings.

UNIT- III

PASSIVE HEATING & COOLING

Heating: General principles – Direct gain systems - Glazed walls, Bay windows, Attached sun spaces etc. Indirect gain systems – Trombe wall, Water wall, Solar Chimney, Transwall, Roof pond, Roof radiation trap, Solarium etc - Isolated gain systems – Natural convective loop etc. Cooling: General principles – Evaporative cooling, Nocturnal radiation cooling, Passive Desiccant cooling, induced ventilation, earth sheltering, Berming, Wind Towers, earth – Air tunnels, Curved Roofs & Air Vents, Insulation, Vary Thermal wall etc.

UNIT- IV

BUILDING DESIGN CONCEPTS

Land form & orientation – Vegetation & Pattern – Water Bodies – Open Space & Built form - Plan form & Elements – Roof form – Fenestration pattern & Configuration – Building envelope & finishes. Choosing between Active-Passive-Hybrid Design Systems .

UNIT- V

SUSTAINABLE ARCHITECTURE

Sustainability – Design Methods – Resource Optimization – Biomimetics – Green Architecture - Green Building Rating Systems – Case studies of selected sustainable buildings.

SUGGESTED READINGS:

1. MiliMajunder, Teri – Energy – Efficient Bldg in India – Thomson Press , New Delhi – 2001
2. Arvind Krishnan & Others – Climate Responsive Architecture, Tata McGraw –Hill New Delhi 2001.
3. Ralph M .Lebens – Passive Solar Architecture in Europe – 2, Architecture Press, London 1983.
4. Charles. J. Kibert, ‘Sustainable Construction’ John Wiley and sons Inc, USA.
5. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi.

SEMESTER 5

15ART501	CONTEMPORARY ARCHITECTURE II									SEMESTER-V	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To provide the student an in-depth knowledge of modern design philosophies in the evolution of innovative architectural forms and designs in the Indian context.
- To give an outline of architectural approaches across the world from late 20th century.
- To study in detail the different post-modern directions in architecture. +
- To provide information about the Alternate Practice
- To understand about the evolution of Architectural design of pre – independence
- To understand the Recent trends in Architecture

COURSE OUTCOME:

1. Student will learn about the spread and varied later directions of modern architecture across the world.
2. Student will become familiar with contemporary forces and directions in architecture across the world and in India
3. Student will understand about the post-independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.
4. Student will understand about the Post- independence revolution of design in India
5. Student will know about the Alternate practices
6. Student will gain knowledge in recent trends of Architecture & Design

UNIT- I

ALTERNATIVE PRACTICE

Ideas and Works of Fathy - Baker - Ando -Soleri – Bawa – Buckminster fuller
Architects of Auroville .

UNIT- II

PRE – INDEPENDENT ARCHITECTURE IN INDIA

Monumental buildings of Early colonial period – Examples – St.Pauls Cathedral, Calcutta& Bombay Townhall –Architectural character of Indo-Saracenic and Classical revival –University of Madras Senate House & Victoria Memorial hall, Calcutta – Later Colonial period – Contribution of Edwin Lutyens & Herbert Baker to the lay-out and Architecture of New Delhi – Rashtrapathi Bhavan & Parliament House.

UNIT- III

POST-INDEPENDENT ARCHITECTURE IN INDIA

Post-Independence Architecture in India – Works of Corbusier in Chandigarh and Ahmedabad (Legislative Assembly Complex including High Court, Legislative assembly and Secretariat, Chandigarh and Mill Owners’ Building, Ahmadabad) Louis Kahn’s contributions – the IIM, Ahmedabad, Koenigsberger and the Bhubaneswar experiment.

UNIT- IV

POST – INDEPENDENT ARCHITECTURE IN INDIA

Ideas and works of BV Doshi (Institute of Indology Ahmedabad, IIM-Bangalore and Gufa, Ahmedabad), Charles Correa (RamaKrishna House, Ahmedabad, KanchenJunga Apartments, Mumbai and MRF Headquarters, Chennai), Raj Rewal (Pragati Maidan, New Delhi and Asian Games Village, New Delhi), Achyut Kanvinde(IIT, Kanpur and Nehru Science Centre, Mumbai), Uttam Jain(Lecture Theatres, Jodhpur and Engineering College, Kota), Laurie Baker(Centre for Development Studies, Thiruvananthapuram and St. John Cathedral at Tiruvalla) and Anant Raje(IIFM, Bhopal and Management Development Centre, IIM-Ahmedabad)

UNIT- V

RECENT TRENDS IN INDIAN ARCHITECTURE

Recent developments in architecture of India – works of Selected architects – Current architecture practice.

SUGGESTED READINGS:

1. Morgan, Ann Lee & Taylor Colin, 1987, Contemporary Architecture, 2nd Edition, St.James Press
2. Sarabjit Bahga. S, Modern Architecture in India,
3. Ar.Pramod Beri, 2009, Form follows feeling, Anjali Prakashan, New Delhi

15ART502	DESIGN OF STRUCTURES II									SEMESTER-V	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To get introduced to basic structural members in timber and steel.
- To give knowledge to design different timber components in a building.
- To enable an understanding of the types, efficiency and strength, advantages and d
- To know the disadvantages of rivet and welded joints in steel.
- To enable the design of tension (beams) and compression (columns) steel members in a building under different conditions.
- To Understand the concept of Structural system of Steel & Timber

COURSE OUTCOME:

1. Student will understand about Various Timber sections
2. Student will understand about the design timber beams and columns by applying the code provisions.
3. Student will understand about the Steel Sections and its usage.
4. Student will be able to design steel joints for maximum efficiency and strength.
5. Student will be able to design tension and compression members for different conditions by applying the code provisions.
6. Student will be able to design different types of laterally unsupported & supported beams for different conditions.

UNIT- I

PROPERTIES OF STEEL AND CONCRETE

Structural properties of concrete - Grades and Strength of Concrete - durability - code provisions and design requirements of steel and concrete.

UNIT- II

LIMIT STATE DESIGN - INTRODUCTION

Various limit stages - characteristic load and characteristic strength of materials - partial safety factor - stress-strain relationship of steel and concrete - safety and serviceability requirements.

UNIT- III

LIMIT STATE DESIGN OF BEAMS & SLABS

Analysis and Design of rectangular sections for bending - singly and doubly reinforced. Design of one way and two way slabs using IS Code co-efficients for various edge conditions.

UNIT- IV

LIMIT STATE DESIGN OF COLUMNS

Types of columns – Analysis and Design of Short Columns for Axial, Uniaxial and biaxial bending – Use of Design aids.

UNIT- V

LIMIT STATE DESIGN OF STAIRCASE

Types of staircases - Design of doglegged staircase.

SUGGESTED READINGS:

1. P.Dayaratham, Design of Reinforced Concrete Structures, Oxford and IBH Publishing Co., 1983.
 2. N.C.Sinha and S.K.Roy, Fundamentals of Reinforced Concrete, S.Chand & Co., New Delhi, 1983.
 3. S.N. Sinha, 'Reinforced Concrete Design' Tata McGraw Hill, New Delhi 1998.
 4. Dr.B.C.Punmiya, Reinforced Concrete Structures, Standard Laxmi publication, Delhi, 1994.
 5. Chu-Kia Wang, Charles G.Salmon, Reinforced Concrete Design, Addison Wesley Educational Publishers, New Delhi, 1998.
 6. SS Mahadevan, Reinforced Concrete Design, The Science & Technology Book Publishers, Chennai. 2007.
- S.Unnikrishna Pillai, Devdas Menon, Reinforced Concrete Design, Tata McGraw-Hill Publishing Company Ltd, New Delhi. 2008.

15ARS521	ARCHITECTURAL DESIGN V									SEMESTER-V	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Mixed use Architectural Design.
6. Student will be able to Communicate effectively through the design ideas

TOPICS

Small complexes - multi planning circulation analysis - massing problems involving building technology - Design and detailing for movement of physically handicapped and elderly persons within and around buildings. examples, shopping centre (Commercial) , apartments (residential) Nursing home (institutional) home for aged. Construction and manipulation of three dimensional building data bases, Rendering 3D images. Presentation techniques, preparing scaled models using different materials.

Design Process to be approached stage wise through Architectural Programming. Site Planning fundamentals as relevant to small projects to be introduced in the design.

SUGGESTED READINGS:

1. Edward D.Mills, Planning, 4 volumes, Newnes, Butterworths, London, 1976.
2. E and O.E. Planning. Liffie Books Ltd., London, 1973.
3. National Building Code IST
4. De Chiara Callender, Time Saver Standard for Building Types, McGraw Hills Co., 1973.

15ARS522	BUILDING MATERIALS AND CONSTRUCTIONS V									SEMESTER V	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	5	Credits			4

COURSE OBJECTIVE:

- To give an introduction to glass as a material in architectural construction
- To give an introduction about plastic
- To give an introduction about composite materials
- To understand about the design of timber furnitures, paneling, partition etc.
- To give an introduction to cladding, flooring and painting in building construction.
- To provide familiarity with advanced building construction techniques (shell structures) and materials as well as design with them.

COURSE OUTCOME:

1. Student will learn about the Composition, manufacturing method, treatment, properties and uses of glass
2. Student will learn about Plastic building products
3. Student will learn about Timber floors , build in furnitures , interior details
4. Student will gain Knowledge of glass, plastics, paints and finishes in building construction.
5. Student will become familiar with Secondary Building products – windows, doors, sky light domes
6. Student will gain knowledge about Smart Materials: Characteristics, classification, properties, energy behaviour, intelligent environments.

UNIT I

GLASS

Composition of glass - brief study on manufacture, treatment, properties and uses of glass - special types of glass, sheet glass, plate glass, safety glass, tint coated glass -Glass blocks - properties and applications in the building industry - current developments

UNIT II

PLASTICS, COMPOSITE MATERIALS

Primary Plastic building products – walls, partitions and roofs – design and construction details

Secondary Building products – windows, doors, sky light domes – handrail - design and construction details

UNIT III

TIMBER, ALLIED PRODUCTS

Timber floors , build in furnitures , interior details

UNIT IV

CLADDING,FALSE CEILING, FLOORING AND PAINTING

Stone, ACP, wood, Glass, curtain wall, Structural glazing,(reflected ceiling plan), Flooring and painting

UNIT V

INTRODUCTION TO CURRENT DEVELOPMENTS IN BUILDING INDUSTRY

Smart Materials: Characteristics, classification, properties, energy behaviour, intelligent environments.

Recycled and ecological materials and energy saving materials: Straw-bale, card board, earthsheltered structures, recycled plastics, recycled tyres, paper-crete, sandbags, photovoltaic, solar collectors, light-pipes, wind catchers. Exercises of the above through case studies and drawings.

SUGGESTED READINGS:

1. S.C.Rangwala, Engineering Materials, Charotar Publishing House, India, 1997.
2. B.C.Punmia, Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 1993.
3. Arthur Lyons - Materials for Architects and Builders - An Introduction - Arnold, London, 1997.
4. Harold B.Olin, Construction Principles Materials and Methods, The Institute of Financial Education, Chicago, 1980.
5. W.B.Mckay Building Construction, Longmans, U.K. 1981.

15ARS523	BUILDING SERVICES III									SEMESTER-V	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	5	Credits			4

COURSE OBJECTIVE:

- To inform about the principles and laws of Water distribution systems in buildings.
- To inform about the principles and laws of sewerage systems in buildings.
- To inform about the principles and laws of plumbing systems
- To inform about the electrical layout for residential Building
- To understand about compressors, evaporators and refrigerant control devices
- To Inform about the integration of service with the Architectural Design

COURSE OUTCOME:

1. Student will gain Knowledge of design of Water distribution systems in buildings
2. Student will learn and understand about the sewerage systems in buildings.
3. Student will learn and understand about the plumbing systems
4. Student will understand the electrical layout for residential Building
5. Student will gain basic knowledge about compressors
6. student will gain Knowledge in evaporators and refrigerant control devices

UNIT- I

WATER CHARACTERISTICS AND QUALITY

Surface and ground water sources - quality/quantity - nature of impurities – need for treatment

UNIT- II

FUNDAMENTALS OF SEWAGE TREATMENT AND SEWERAGE SYSTEMS

Environmental sanitation -Sanitation in buildings. Arrangement of sewerage systems in Housing - Rainwater disposal and storm water drainage from buildings.

UNIT- III

ELECTRICAL SYSTEMS AND ILLUMINATION

a)Basics of electricity - Single/Three phase supply - Protective devices in electrical installations - Earthing for safety - Types of earthing - ISI specifications.

b)Principles of illumination: Modern theory of light - Synthesis of light - Additive and subtractive synthesis of colour - Luminous flux - Candela - Solid angle illumination - Utilization factor - depreciation factor - MSCP - MHCP - Laws of illumination.

UNIT- IV

MECHANICAL SYSTEMS

a)Pumps – uses & types and their selection, installation and maintenance, Hot Water Boilers.

b)Basic refrigeration principles: Thermodynamics - Heat - Temperature, measurement transfer - Change of state - Sensible heat - Latent heat of fusion, evaporation, sublimation - Saturation temperature -Super heatedvapour- subcooled liquid - pressure temperature relationship for liquids – Refrigerants.

UNIT- V

FUNDAMENTALS OF ACOUSTICS

Sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies.Types of noises, transmission of noise, transmission loss, noise control and sound insulation and remedial measures, determination of density of a given building material, absorption co-efficients and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

SUGGESTED READINGS::

1. William H. Severns and Julian R. Fellows, Airconditioning and Refrigeration, John Wiley and Sons, London, 1988.
2. Robert D. Finch, Introduction to Acoustics, Prentice Hall of India Private Limited, New Dehli, 2008.
3. MARK J. HAMMER MARK J. HAMMER, JR, Water and Wastewater Technology, PHI Learning Private Limited, New Delhi. 2009.
4. M.N.Rao, A.K.Datta, Waste Water Treatment, Oxford & IBH PUBLISHING CO. PVT. LTD, New Delhi, 2007.
5. Section 11. Sanitary Appliances and Water Fittings. IS Code- SP: 21-1983.
6. Hand book on Water Supply and Drainage with Special emphasis on plumbing IS Code – SP : 35 – 1987.
7. Part of Section 1: Water Supply. IS CODE – SP : 7 – 1992.
8. IS Code of Basis Requirements for Water supply drainage and sanitation. IS Code – IS 1172: 1983.
9. Code of Practice for Water Supply in Buildings. IS Code – IS 2065: 1983.

15ARES531A	PHYSICAL PLANNING									SEMESTER- V	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce the vocabulary, elements and classification of human settlements.
- To learn about the planning theories
- To give exposure to planning concepts at different scales of settlements.
- To understand about the planning settlement theories
- To gain understanding about the land use planning
- To give an understanding of planning addressing current issues.

COURSE OUTCOME:

1. Student will understand morphology of settlements and their generating forces and characteristics.
2. Student will understand the role of planning processes in making positive changes to settlements.
3. Student will gain knowledge and awareness of planning interventions with respect to the current world.
4. Student will gain understanding about the city evolution process due to planning
5. Student will gain Knowledge about existing settlements by Survey studies
6. Student will gain vast knowledge about Landsue patterns and planning theories

UNIT- I

HUMAN SETTLEMENTS AND PLANNING THEORIES

Origins, evolution and growth of settlements. Relation between urban and rural settlements

Urbanisation, Industrialisation and urban growth, definitions and inter relationship. Trends in urbanization in India since Independence. Growth of metropolitan cities and their management.

UNIT- II

PLANNING THEORIES

Enunciated by Ebenezer Howard, Patrick Geddes, Soria Y Mata, Doxiadis, Le-Corbusier, Clarence Stein, Clarence Arthur perry, Hilberseimer.

UNIT- III

EVOLUTION OF CITY

Evolution of city and Components of a city - Central business district of a city, Special economic zone, coastal regulatory zone, fringe area.

UNIT- IV

LANDUSE PLANNING

Land use classification for cities, analysis of land uses in Indian cities. Demography pattern, social & physical infrastructure, environmental and pollution, traffic and road network.

UNIT- V

PLANNING TECHNIQUES

Study and analysis of existing settlements, methodology of conducting diagnostic surveys and studies, land use survey, socio economic survey, traffic surveys and presentation of data

SUGGESTED READINGS:

1. Gallion and Eisner, The Urban Pattern: City Planning and Design, Van Nostrand, 5th Edition, 1986
2. Chapin, UrbanLanduse Planning, University of Illinois Press, Chicago, 1995.

15ARES531B	STRUCTURES AND ARCHITECTURE								SEMESTER-V	
Marks	Internal	40	External			60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To learn about the structural design of the pre industrial era
- To learn about the historic evolution of structural design
- To learn about the structural design of the postindustrial era
- To learn about the large span structures of the contemporary period
- To learn about the prototype structures
- To learn the advanced level structures in airport, railway station

COURSE OUTCOME:

1. An understanding of the Structural design of the Pre industrial period
2. An understanding of evolution of various structures and design changes
3. An understanding of the post-industrial structural design
4. An understanding of the structural design through case studies
5. An understanding of the large-scale structural design
6. An understanding of the advanced level structures in Airport, railway station

UNIT - I

HISTORY OF STRUCTURAL DESIGN IN THE PRE INDUSTRIAL ERA

Development of monolithic and rock cut structures- trabeated construction-arcuate construction vaults and flying buttresses- tents and masted structures and bridges through ancient and medieval history.

UNIT - II

HISTORY OF STRUCTURAL DESIGN IN THE POST INDUSTRIAL PERIOD

Post Industrial modular construction of large span and suspension structures in steel and concrete-projects of Pier Luigi Nervi, Maillart, Candella, Buckminster Fuller and Eero Saarinen.

UNIT - III

CONTEMPORARY STRUCTURAL EXPRESSION THROUGH CASE STUDY

The select case studies could include KCR Terminal at Hung Hom, Hong Kong, B3 Offices in Stockley Park, Sainsbury Centre for Visual Art, Renault Centre and Swindon UK by Norman Foster and Stansted Airport Terminal, London, UK by Foster/Arup British Pavilion EXPO 1992, Seville, Spain and Waterloo International Terminal by Nicholas Grimshaw

UNIT - IV

CONTEMPORARY STRUCTURAL EXPRESSION THROUGH CASE STUDY – II

The select case studies could include Inmos Microchip Factory, Centre Commercial St. Herbtain, PA Technology, Princeton and Fleetguard, Quimper UK by Richard Rogers Athens Olympic Stadium and Village, Bridges and Public Bus Stop in St. Gallen, Railway Station, Lyon, France and Stadelhofen Railway station, Zurich Schweiz by Santiago Calatrava Kansai International Airport, UNESCO Workshop, the Jean-Marie Tjibaou Cultural Center, Menil Museum, Thomson Optronics Factory, IBM Traveling Exhibition Pavilion, Columbus International Exposition, Genoa Italy and Lowara Officers, Montecchio Maggiore Italia by Renzo Piano Building Workshop

UNIT 5

SEMINAR

Seminar to present a study of architectural form and structural expression through select cases which will aid understanding of structural philosophy and analysis, building envelope and services and construction sequence.

SUGGESTED READINGS:

1. “Paper Arch” and Japan Pavilion at Expo 2000 in Hannover by Shigeru Ban
2. Greene King Draught Beer Dept and Schlumberger Cambridge Research Centre, UK by Michael Hopkins
3. Design Center, Linz, Austria and Two Family House in Pullach Thomas Herzog
4. King Abdul Aziz International Airport, Haj Terminal by SOM
5. Pavilion of the Future, Expo 92, Seville by Martorell, Bohigas& Mackay (MBM)
6. Daring Harbour Expo Center, Sydney Australia by P. COX
7. Olympic Archery Building by Enric Miralles& Carme Pinos
8. Eagle Rock House by Ian Ritchie
9. Le Grande Arche de La Defense by J O Spreckelsen

15ARES531C	SUSTAINABLE ARCHITECTURE								SEMESTER-V	
Marks	Internal	40	External			60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To understand the concept of sustainability
- To understand the impacts of environment today and to follow the steps to sustainability
- To work towards sustainable development and to understand low impact construction practices,
- To understand the life cycle costs and alternative energy resources.
- To familiarize the students with the various rating systems for building practices with case studies.
- Through case studies to understand the concept of sustainable communities and the economic and social dimensions.

COURSE OUTCOME:

1. Student will understand about climate change and the need for the sustainable buildings
2. Student will understand the energy-based concepts and resource optimisation
3. Student will understand about the environmental impacts of today and Follow the Sustainable approach
4. Student will gain ability to design energy efficient buildings
5. Student will understand the green concepts and apply them in every aspect and approach towards sustainable architecture
6. Student will understand about the building simulation for energy analysis and for various design solutions

UNIT - I

Concept of Sustainability – Carrying capacity, sustainable development – Bruntland report – Ethics and Visions of sustainability.

UNIT - II

Eco system and food chain, natural cycles – Ecological foot print – Climate change and Sustainability.

UNIT - III

Selection of materials Eco building materials and construction – Biomimicry, Low impact construction, and recyclable products and embodied energy. Life cycle analysis. Energy sources – Renewable and non-renewable energy.

UNIT - IV

Green building design – Rating system –LEED, GRIHA, BREEAM etc., case Studies.

UNIT - V

Urban ecology, social and economic dimensions of sustainability, urban heat Island effects, sustainable communities – Case studies.

SUGGESTED READINGS :

1. Sustainable Architecture and Urbanism: Concepts, Technologies and examples by Gauzin-Muller(D) – Birkhauser 2002.
2. Eco-Tech : Sustainable Architecture and High Technology by Slessor© - Thames and Hudson 1997.
3. Ecodesign : A manual for Ecological Design by Yeang(K) – Wiley Academy 2006.
4. Sustainable Architecture : Low tech houses by Mostaedi (A) – CarlesBroto 2002.
5. HOK guide book to sustainable design by Mendler (S) & Odell (W) – John willey and sons 2000.
6. Environmental brief : Path ways for green design by Hyder(R) – Taylor and Francis 2007.
7. Green Architecture: Design for a sustainable future by Brenda and Vale (R) – Thames and Hudson 1996.

15ARES531D	ACOUSTICS								SEMESTER-V	
Marks	Internal	40	External			60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To understand the science behind acoustical design and Lighting design
- To expose students to understand noise control, sound transmission, Daylighting and artificial lighting.
- To familiarize the students with various building and interior elements for Acoustics and lighting
- To familiarize the students with the basic principles of acoustic design
- To familiarize the students with the basic principles of Lighting design
- To familiarize the student with the applications of Acoustical materials

COURSE OUTCOME:

1. Student will understand the theoretical concepts of acoustics
2. Student will understand the theoretical ideas and concepts of lighting
3. Student will be able to understand the basis of noise reduction and design applications of noise control
4. Student will be able to understand the basis of Lighting and method at provide daylighting and Artificial lighting as per the functionality of the space.
5. Student will understand about Daylighting concepts & its Applications
6. Student will understand about efficient lighting techniques & its Applications

UNIT - I

FUNDAMENTALS

Sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies, human ear characteristics - Tone structure.

UNIT - II

SOUND TRANSMISSION AND ABSORPTION

Outdoor noise levels, acceptable indoor noise levels, sonometer, determinate of density of a given building material, absorption co-efficient and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

UNIT - III

NOISE CONTROL AND SOUND ABSORPTION

Types of noises, transmission of noise, transmission loss, noise control and sound insulation, remedial measures and legislation.

UNIT - IV

CONSTRUCTIONAL MEASURES

Walls/partitions, floors/ceilings, widow/doors, insulating fittings and gadjets, machine mounting and insulation of machinery.

UNIT - V

ACOUSTICS AND BUILDING DESIGN

Site selection, shape, volume, treatment for interior surfaces, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, schools, residences. Call Centers, Office building and sound reinforcement systems for building types.

SUGGESTED READINGS :

1. Dr.V.Narasimhan - An Introduction to Building Physics - Kabeer Printing Works, Chennai-5 - 1974.
2. D.J.Groomet - Noise, Building and People - Pergumon Press - 1977.
3. Thomas D.Northwood - Architectural Acoustics - Dowden, Hutchinson and Ross Inc. – 1977.
4. B.J.Smith, R.J.Peters, Stephanie Owen - Acoustics and Noise Control - Longman Group Ltd., - New York, USA 1982.
5. David Eagan concepts in Architectural Acoustics.
6. Harold Burris – Meyer and Lewis Good friend, Acoustics for Architects – Reinhold

15ARES531E	ENVIRONMENTAL PLANNING									SEMESTER-V	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To understand the impact of man's activities on the environment
- To gain knowledge about the ecology of the whole world
- To gain knowledge about the Environmental impacts
- To understand about the Renewable & Non – renewable sources
- To gain knowledge about the Environmental laws
- To gain Knowledge about environmental acts & Policies for industries

COURSE OUTCOME:

1. Student will understand about the ecosystem and approach towards sustainability
2. Student will gain knowledge about the environmental impacts
3. Student will gain knowledge in
4. Student will be able to understand the current environmental conditions and to work towards a sustainable approach
5. Student will know to integrate the global environmental situation with the policy level decisions
6. Student will become capable of envisioning for the future environmental benefits.

UNIT - I to 5

Man – biosphere – ecosystems – resource identification and its implications for development – soil water , land , plants , animals , renewable energy and non renewable energy . preparation and analysis or resource inventories

Environmental Impact Assessment – methodologies and techniques

Environment legislation – significance of law – relationship to development – evolution of planning legislation – National environmental policy

SUGGESTED READINGS::

- 1.Richard p. Dober – Environmental design – VNR company – Newyork 1969
- 2.Albert J. Rutledge – Anatomy of a Park – Mc Graw hill book co., USA 1971
- 3.Harvey m. Rubenstein – A Guide to site and environmental planning , vol 3 – John wiley and sons , Newyork, 1987

15ARES531F	VERNACULAR ARCHITECTURE									SEMESTER-V	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce the study of vernacular architecture as a process and not a product.
- To provide an overview of the various approaches and concepts to the study of vernacular architecture.
- To study the various vernacular architecture forms in the different regions of the country.
- To gain Knowledge about the methods & techniques of Vernacular Architecture
- To gain understanding about the climatic considerations & Design aspects of vernacular Architecture
- To gain understanding about socio- economic aspects of the vernacular & Traditional Architecture

COURSE OUTCOME:

1. Student will understand the Indian vernacular architecture as a process and to also provide an overview of various approaches and concepts towards its study.
2. Student will gain Knowledge of vernacular architectural forms in different regions.
3. Student will gain understanding of the impact of colonial rule on vernacular architecture in India
4. Student will understand about the climatic consideration & Design aspects
5. Student will understand the socio economic aspects existed in the various regions through the study of vernacular Architecture
6. Student will gain knowledge in the vernacular methods of construction and ways to incorporate in this modern architecture.

UNIT - I

INTRODUCTION

Definition and classification of Vernacular architecture – Vernacular architecture as a process – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview

UNIT - II

APPROACHES AND CONCEPTS

Different approaches and concepts to the study of vernacular architecture: an overview – Aesthetic, Architectural and anthropological studies in detail

UNIT - III

VERNACULAR ARCHITECTURE OF THE WESTERN NORTHERN REGION OF INDIA

Forms spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the following: - Deserts of Kutch and Rajasthan; Havelis of Rajasthan

- Rural and urban Gujarat; wooden mansions (havelis); Havelis of the Bohra Muslims - Geographical regions of Kashmir; house boats

UNIT - IV

VERNACULAR ARCHITECTURE OF SOUTH INDIA

Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of the following-Kerala: Houses of the Nair & Namboothri community; Koothambalam, Padmanabhapuram palace.

- Tamil Nadu: Houses and palaces of the Chettinad region; Aghrahams.

UNIT - V

WESTERN INFLUENCES ON VERNACULAR ARCHITECTURE OF INDIA

Colonial influences on the Tradition Goan house

Evolution of the Bungalow from the traditional bangla, Victoria Villas – Planning principles and materials and methods of construction. Settlement pattern and house typologies in Pondicherry and Cochin.

SUGGESTED READINGS :

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997.
2. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
3. R W Brunskill: Handbook on Vernacular Architecture
4. V.S. Pramar, Haveli – Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad, 1989.
- 5.. Kulbushanshan Jain and Minakshi Jain – Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad 1992.
6. G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850, Oxford University Press, Delhi, 1989.
7. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
8. S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000

SEMESTER 6

15ART601	PROFESSIONAL PRACTICE									SEMESTER- VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To give an introduction to the architectural profession
- To know about the role of professional bodies and statutory bodies as well as ethics of the profession.
- To give familiarity with basic aspects of running an architectural practice.
- To learn about the ethics of the profession
- To give exposure to the processes involved in taking up and completing an architectural project.
- To inform about legal aspects and legislations associated with the profession.

COURSE OUTCOME:

1. Student will gain knowledge of the role of professional and statutory bodies.
2. Student will become familiar with the process involved in an Architecture Project
3. Student will gain knowledge about the Scale of Services and Fees for an Architect
4. Student will understand the code of conduct and ethical values of the Profession
5. Student will understand about the Tender & Contract
6. Student will understand about the participation, award in an Architectural competition

UNIT- I

ARCHITECT AND PROFESSION

Role of architect in society - relationship with client and contractor - code of conduct – management of an architect's office - elementary accountancy

UNIT- II

ARCHITECT'S SERVICES AND SCALE OF FEES

Conditions of engagement of an architect - normal additional, special and partial services – scale of fees for various services - claiming of fees

UNIT- III

ARCHITECTURAL COMPETITIONS

Open and closed competitions - appointment of assessors - duties of assessors - instructions to participants - rejection of entries - award of premium - guidelines prescribed by COA AND IIA for promotion and conduct of competitions

UNIT- IV

TENDER & CONTRACT

Calling for tenders - tender documents - open and closed tenders - item rate, lumpsum, labor and demolition tender - conditions of tender - submission of tender - scrutiny and recommendations

Conditions of contract - Form of contract articles of agreement - Contractor's bill certification

UNIT- V

ARBITRATION & EASEMENTS

Arbitration in disputes - arbitration agreement - sole arbitration - umpire - excepted matters - award .

Definition - types of easement – acquisition extinction and protection of easements

SUGGESTED READINGS:

1. J.J. Scott, Architect's Practice, Butterworth, London 1985
2. Publications of COA IIA Hand book on Professional Practice, The Architects publishing Corporation of India, Bombay 1987
3. Derek Sharp, The Business of Architectural Practice William Collins Sons & Co. Ltd, 8 Erafton St., London W1 1986
4. Roshan Namavathi, Professional Practice, Lakhsmi Book Depot, Mumbai 1984
5. Publication of IIA
6. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai
7. The Tamil Nadu Hill Areas Special Building Rules - 19
8. Heritage Act
9. Consumer Protection Act
10. Indian Easements Act

15ART602	HOUSING									SEMESTER-VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- Understanding of the various issues involved in urban housing
- Understand the various issues of Rural housing
- Understand about the planning and design solutions for low income groups.
- Understanding about the housing Policies & Agencies involved
- Understanding about the mass housing technologies
- Understanding about the Socio-economic Aspects

COURSE OUTCOME:

1. Student will learn the various schemes and policies in Housing in India
2. Student will understand the importance of socio-economic aspects of the People and need for Housing
3. Student will learn about housing standards
4. Student will learn about the Housing design Process
5. Student will learn about government housing, private & cooperative housing
6. Student will be able to arrive at design ideas for large scale Housing Projects

UNIT- I

INTRODUCTION

Review of housing typology, Housing demand and supply – Calculation of future need.

Housing resources and options available in housing

UNIT- II

HOUSING AGENCIES AND POLICIES

Housing Agencies and their contributions to housing development – HUDCO, State Housing Boards, Housing Co-operatives and Banks. Housing Policies in India and other countries.

UNIT- III

SOCIO ECONOMIC ASPECTS

Social factors influencing Housing Design, affordability, economic factors and housing concepts – Slum upgrading and sites and services schemes.

UNIT- IV

HOUSING STANDARDS

Different types of Housing standards – Methodology of formulating standards – Relevance of standards in Housing Development.

UNIT- V

HOUSING DESIGN PROCESS

Different stages in project development – Layout design including utilities and common facilities – Housing design as a result of environmental aspects, development of technology and community interests. Case studies of Public Sector housing, Government housing, Private and Co-operative housing – their Advantages and disadvantages.

SUGGESTED READINGS:

1. Babur Mumtaz and Patweikly, Urban Housing Strategies, Pitman Publishing, London, 1976.
2. Geoffrey K. Payne, Low Income Housing in the Development World, John Wiley and Sons, Chichester, 1984.
3. John F.C. Turner, Housing by people, Marison Boyars, London, 1976.
4. Martin Evans, Housing, Climate and Comfort, Architectural Press, London, 1980.
5. Forbes Davidson and Geoff Payne, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.

15ARP611	COMPUTER APPLICATION - III									SEMESTER-VI	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To develop the advanced Digital knowledge and skills
- To develop the skills of two-dimensional rendering
- To develop the skill and knowledge of the Building information Modelling
- To develop the Skill related to building visualization,
- To develop the skill of multimedia presentations, brochures,
- To develop the skill of video presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will be able to understand the use of digital tools in the realm of visual composition,
2. Student will understand the drafting & Details through Software
3. Student will develop the skill of 3D visualization and rendering
4. Student will understand the concept of BIM- building information modelling through the specific software
5. Student will gain the Skill of Multimedia & video making presentations required for Architectural practice
6. Student will gain knowledge about the latest developments of digital applications in Architecture

TOPICS

1. Advanced techniques in rendering with differential lighting for realistic rendering
2. Animations and Walkthroughs
3. Simulating gravity, wind and other effects in the scene, distributed rendering
4. Application of videography in architecture
5. Basics of developing and hosting websites

Recommended Software: 3ds Max, rhino, lumion, vector works, BIM, Ecotect, v-ray rendering techniques

SUGGESTED READINGS:

1. Rendering Techniques for mixed reality, Thomas Girlinger, Daniel Dauch, Andre Stork, Springer, Berlin, October 2009
2. 3D Computer Animated Walk Throughs, Clark Cory, Scott Meador, William Rosi, McGraw Hill 2009.
3. The Animation Book: A complete guide to animation and film making, Kit Laybourne, Three Rivers Press, December 1998
4. Creating a website, Matthew McDonald, Pogue Press, January 2009

15ARS621	ARCHITECTURAL DESIGN VI									SEMESTER-VI	
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits			7

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Campus Design.
6. Student will be able to Communicate effectively through the design ideas

TOPICS

Design of large structures - Multiuse multi span - non masonry building types involving buildings – Design and detailing for movement and use by physically handicapped people within and around building technology and services. Examples: college (Institutional) office buildings Resorts - etc. Preparation of working drawings using CAD for the design exercises.

Design Process to be approached stage wise through Architectural Programming. Advanced concepts of Site Planning as relevant to small and medium sized campuses to be introduced in the design.

SUGGESTED READINGS:

1. Edward D mills, planning, 4 volumes, Newnes Butterworths, London 1976
2. E and OE planning 11ffe Books Ltd., London, 1973
3. National Building Code 151
4. De Chara and Callendar, Tune, saver standards for building types. McGraw Hall Col. 1983.

15ARS623	ARCHITECTURAL DETAILING AND BUILDING SERVICES DETAILING									SEMESTER- VI	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits			4

COURSE OBJECTIVE:

- To enable students to appreciate the challenges in detailing for both the newly designed buildings as well as while carrying out additions and alterations to existing buildings.
- To enable students to understand the various Fittings, Furniture & Equipment (FFE) that are needed in buildings and their installation methods.
- To create architectural drawings for construction and as a base for structures and services drawings.
- To develop the skill of architectural working drawings
- To develop the skill of reading various drawings for the Site execution
- To design, incorporate and detail architectural and interior components of the architectural design project

COURSE OUTCOME:

1. Student will gain understanding of all the aspects that go into the making of a building through study of drawings related to construction.
2. Student will gain the ability to resolve spatial concerns with technical aspects and services of a building.
3. Student will understand to design and detail components within a building.
4. Student will gain knowledge in interior detailing and planning
5. Student will gain knowledge in Interior furniture, fixtures as per the functionality
6. Student will gain understanding in the installation methods of cladding, integrated services by means of detailed drawings etc

UNIT - I

DETAILING OF WALLS, ROOFS AND FLOORING FOR INSTITUTIONAL BUILDINGS

- a) Detailing of a residence - selected spaces.
 - b) Detailing of classrooms, library (in school, college)
 - c) Detailing of lecture hall, auditorium, exhibition spaces
- Exercises of the above through case studies and drawings.

UNIT - II

DETAILING OF WALLS, ROOF, FLOORING FOR COMMERCIAL BUILDINGS

- a) Detailing of shop-fronts, office spaces for commercial buildings including detailing of crucial elements such as entrance porches, main doors, staircases, show-windows, enclosed and air-conditioned atrium spaces.
 - b) Detailing of façade and selected spaces for apartment buildings, hotels and hostels.
- Exercises of the above through case studies and drawings.

UNIT - III

DETAILING OF BUILT-IN FURNITURE AND FITTINGS

Detailing of built-in elements like kitchen counters, cupboards, cabinets, toilets, toilet fitting. Exercises of the above through case studies and drawings.

UNIT - IV

DETAILING OF EXTERIOR AND INTERIOR ARCHITECTURAL ELEMENTS

Detailing of architectural elements like indoor fountains, water walls, transparent floors, street furniture, hard and soft landscape, swimming pools, water bodies and courtyard spaces. Detailing of interior architectural elements in existing buildings (e.g. Staircase in bookshops, restaurants, playpen in restaurants, reception areas in hotel lobbies etc.) Exercises of the above through case studies and drawings.

UNIT - V

DETAILING OF EXTERIOR AND INTERIOR SERVICES

Detailing of building services – Toilet Water & Plumbing Details – Air conditioning details – Fire suppression & alarm – Electrical Layouts – Lift & Escaltors etc.

SUGGESTED READINGS:

1. De Chiara and Callendar, Time Saver Standard Building Types, McGraw Hill Co,1980.
2. Richardson Dietruck, Big Idea and Small Building, Thames and Hudson, 2002
3. Edward D Mills, Planning – The Architecture Handbook, British Library Cataloguing in Publication Data, 1985
4. Susan Dawson, Architect's Working Details(Volume 1-10), 2004
5. Swimming Pools, Lane Book Company, Menlo Park, California
6. Nelson L Burbank, House Carpentry Simplified, Simmons-Board- Man
7. Publishing Corporation, New York,
8. Landscape Construction
9. Grant W. Reid , Landscape Graphics, Whitney Library of Design, 1987

15ARE631A	LANDSCAPE ARCHITECTURE									SEMESTER-VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce the various aspects of outdoor design and site planning
- To teach them to enhance & improve the quality of built environment, functionally and aesthetically.
- To stress on the role of landscape design in sustainability, to provide an overview of ecological balance and impacts of human activities and the need for environmental protection and landscape conservation.
- To study the historical method of garden Design
- To understand the significance of urban landscape.
- To provide familiarity with the various elements of landscape architecture and the principle of landscape design.

COURSE OUTCOME:

1. Student will understand the role of landscape design with respect to macro scale of sustainability and ecology
2. Student will understand the micro scale of shaping of outdoor environments.
3. Student will gain Knowledge about the elements of landscape design and their scope.
4. Student will know about the Sensitivity towards evolution of different garden and landscape design across time and context.
5. Student will understand the historical method of landscape design
6. Student will understand the urban scale landscape design.
7. Student will be able to do landscape design with respect to site planning and different functional typologies of spaces

UNIT- I

INTRODUCTION

Introduction to landscape architecture; role of landscape design in architecture; Introduction to site planning, site analysis & landscape design. Site selection criteria for landscape projects.

UNIT- II

ELEMENTS IN LANDSCAPE DESIGN

Hard and soft landscape elements, Plant materials, classification, characteristics, use and application in landscape design; Water and Landform.

UNIT- III

GARDEN DESIGN IN HISTORY

Landscape and garden design in history - French, English, Japanese, Renaissance and Moghul . Study of notable examples.

UNIT- IV

URBAN LANDSCAPE

Significance of landscape in urban areas; road landscaping; waterfront development, landscaping of residential areas , Industrial landscaping .

UNIT- V

LANDSCAPE DESIGN

Basic principles of planting design; Spatial development in landscape design; Detailed landscape design of any small project including paving and street furniture design

SUGGESTED READINGS:

1. Michael Laurie , An Introduction to Landscape Architecture, Elsevier, 1986.
2. Geoffrey And Susan Jellicoe, The Landscape of Man, Thames And Hudson, 1987.

15ARE631B	PRODUCT DESIGN									SEMESTER-VI
Marks	Internal	40	External			60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To gain Knowledge about the various styles of furniture
- To gain knowledge about the manufacturing of various materials/ product
- To learn about visual codes & Symbols
- To understand the importance of Artefacts, murals and Artwork
- To learn about various products for the Physically challenged
- Understanding the methods and techniques involved in furniture and product design.

COURSE OUTCOME:

1. Student will gain knowledge about the various furniture and products
2. Student will understand the needs of the industry demand and product value
3. Student will gain knowledge in Composite materials and Products
4. Student will gain knowledge about Packaging design
5. Student will gain knowledge about the House hold items / products
6. Student will be able to do a Product design for the client

UNIT- I

INTRODUCTION

An brief introduction to Product Designing – Various elements – History of Product Design – Definition of Product Design, understanding of Product Design - Purpose of Product Design – Role of Product Designers.

UNIT- II

HUMAN FACTORS

Definition of human factors, Application of human factors data. Human activities, their nature and effects. Man-machine system and physical environment. Human performance and system reliability. Information input and processing. Human control systems. Applied anthropometry – Human response to climate.

UNIT- III

ASPECTS OF PRODUCT DESIGN

Visual, Auditory, Tactual, Olfactory human mechanisms, Physical space and arrangement. Visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols.

UNIT- IV

PRODUCT DESIGN

Form, Colour, Symbols, User specific criteria, Material, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.

UNIT- V

DESIGN EXERCISES

Design of Household elements, tools and devices – Spoon/Cutlery. Design of furniture – Chairs/Computer table, Kitchen racks, Cabinets etc. Design of Industrial Product – Watch Dial, Gear Wheels, Automobile Headlights etc. Element design for the physically and mentally different people.

SUGGESTED READINGS::

1. Time Saver Standards for Interior Design
2. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGrawhill Co., USA, 1982.
3. Francis D.K.Ching, Interior Design Illustrated, VNR Publications, New York, 1987.
4. An invitation to Design, Helen Marie Evans.

15ARE631C	INTERIOR DESIGN									SEMESTER-VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To provide familiarity with the characteristics of interior spaces
- To gain knowledge in all type's furniture across history.
- To introduce the profession of interior design and bring out its role.
- To inform about the various components of interior space and give an understanding of the design aspects involved in each
- To provide knowledge in Interior services
- To provide knowledge in interior specification & costing

COURSE OUTCOME:

1. Student will gain knowledge and understanding in Interior design
2. Student will understand the various elements in Interior Design
3. Student will gain knowledge in terms of Interior design lighting and accessories
4. Student will gain an overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.
5. Student will be able to do specification for an Interior Design layout
6. Student will be able to design a Interior project with all working drawings

UNIT- I

INTRODUCTION TO INTERIOR DESIGN

Definition of interior design -design of interior spaces as related to typologies and functions, themes and concepts - Study of the history of interior design through the ages relating to historical context, design movements and ideas etc.

UNIT- II

ELEMENTS OF INTERIOR DESIGN

Introduction to various elements in interiors like floors, ceilings, walls, staircases, openings, interior service elements, incidental elements etc. and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects - design projects.

UNIT- III

INTERIOR DESIGN SERVICES - LIGHTING, ACCESSORIES, LANDSCAPE

Study of interior lighting - different types of lighting, their effects, types of lighting fixtures. Other elements of interiors like accessories used for enhancement of interiors - paintings, objects de art, Interior landscaping - elements like rocks, plants, water, flowers, fountains, paving, artefacts, etc. their physical properties, effects on spaces and design values.

UNIT- IV

FURNITURE DESIGN

Study of relationship of furniture to spaces and human movements furniture design as related to human comfort, function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas - study on furniture for specific types of interiors like office furniture, children's furniture, residential furnitures, display systems, etc. - projects on furniture design.

UNIT- V

CASE STUDIES AND PROJECT

Study of Contemporary design in India and abroad with reference to interior design and decoration. Study of projects related to Residential Interiors, Commercial Interiors, Hospital Interiors etc. as regards to design scheme, functionalism, aesthetics, services integration, interior materials and details. Small scale interior projects such as Interior of an Office, Restaurant, Kids bedroom etc.

SUGGESTED READINGS::

1. Francis D.K.Ching, Interior Design Illustrated, V.N.R. Pub. NY 1987.
2. An Invitation to design, Helen Marie Evans.
3. Steport- De - Van Kness, Logan and Szebely, Introduction to Interior Design Macmillan Publishing Co., NY 1980.
4. Inca/Interior Design Register, Inca Publications, Chennai 1989.
5. Kathryn B.Hiesinger and George H.Marcus, Landmarks of twentieth Century Design; Abbey Ville Press, 1993.
6. SyanneSlesin and Stafford Ceiff- Indian Style, Clarkson N.Potter, Newyork, 1990.
7. The Impulse to adorn - Studies in traditional Indian Architecture. - Editor Dr.Saranya Doshi, Marg Publications, 1982.

15ARE631D	ARCHITECTURAL CONSERVATION									SEMESTER-VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce the various issues and practices of Conservation
- To familiarize the students with the status of conservation in India
- To teach them about the various agencies involved in the field of conservation worldwide and their policies.
- To outline the status of conservation practice in the country
- To learn about the various guidelines for the preservation, conservation and restoration of buildings.
- To inform the students about the character and issues in our heritage towns through case studies.

COURSE OUTCOME:

1. Student will understand the importance of heritage, issues and practices of conservation through case studies.
2. Student will become familiar with historic materials and their properties, different technologies for investigating masonry, foundation and also traditional and modern repair methods
3. Student will gain knowledge about the government agencies involved in Conservation
4. Student will understand the methods of urban Conservation.
5. Student will gain knowledge about various methods of Conservation techniques and Design
6. Student will gain knowledge about various policies involved in Conservation and practice in India

UNIT - I

INTRODUCTION TO CONSERVATION

e conservation- Need, Debate and purpose.

Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM , UNESCO and their role in Conservation

UNIT - II

CONSERVATION IN INDIA

Museum conservation – monument conservation and the role of Archeological Survey of India – role of INTACH – Central and state government policies and legislations – inventories and

projects- select case studies of sites such as Hampi, Golconda, Mahabalipuram -craft Issues of conservation

UNIT - III

CONSERVATION PRACTICE

Listing of monuments- documentation of historic structures- assessing architectural character – historic structure report- guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of Palaces in Rajasthan, Chettinad and Swamimalai dwellings, seismic retrofit and disabled access/ services additions to historic buildings-heritage site management

UNIT - IV

URBAN CONSERVATION

Over view of urban history of India and Tamil Nadu- understanding the character and issues of historic cities – select case studies of towns like Srirangaram, Kumbakonam and Kanchipuram - historic districts and heritage precincts.

UNIT - V

CONSERVATION PLANNING

Conservation as a planning tool.- financial incentives and planning tools such as Transferable Development Right(TDR)-urban conservation and heritage tourism-case studies of sites like for Cochin, Pondichery French town.- conservation project management

SUGGESTED READINGS :

1. Donald Appleyard, The Conservation of European Cities, M.I.T. Press, Massachusetts
2. James M. Fitch, Historic Preservation: Curatorial Management of the Built World by University Press of Virginia; Reprint edition (April 1, 1990)
3. A Richer Heritage: Historic Preservation in the Twenty-First Century by Robert E. Stipe
4. Conservation Manual , Bernard Fielden; INTACH Publication
5. B.K. Singh, State and Culture, Oxford, New Delhi
6. A.G. K. Memon ed. Conservation of Immovable Sites, INTACH Publication, N.Delhi.
7. Seminar Issue on Urban Conservation.

15ARE631E	ARCHITECTURAL JOURNALISM								SEMESTER-VI		
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce general skills necessary for the practice of professional journalism.
- To introduce the fundamentals of writing, explain different strategies and their criticism.
- To give particular exposure to architectural journalism.
- To introduce photojournalism, bring out importance/ contributions of photograph
- To learn about the various work of architects through Interviews
- To gain knowledge in modern photography techniques.

COURSE OUTCOME:

1. Student will gain the ability to critically think and analyse about the effects of architecture on society as well as the tools to enable recording of the same
2. Student will be able to express by means of effective communication, writing and video documentation
3. Student will learn about the composition of content in Architecture Journals
4. Student will learn about Photography and Photo Journalism
5. Student will be able to document, analyse and critic the work by means of interview and data collection
6. Student will develop the proficiency in Field program, interviews and Architectural Document writing

UNIT- I

PHOTOGRAPHY & TECHNIQUES

Concept of color; concepts of lighting, distance, visual angle, frames; media; Types of camera, properties and priorities; Exposure, Aperture, Speed; Photographic films. Techniques of photography relevant to architecture.

UNIT- II

JOURNALISM

Analysis of recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics; discursive techniques, analysis of major critical themes, thematic categories in architectural writing over the past three centuries.

UNIT- III

ANALYSIS OF WORKS

Works of Indian and international writers and critics will be presented and discussed. Seminars on Indian architectural writers, journalists and critics

UNIT- IV

FIELD PROGRAM

Exercise on integrating photography in architectural journalism.

UNIT- V

DOCUMENTING AND REPORTING

Preparation of documentaries and reports in any media such as Video, Still images, Reports, presentations etc., and present as a Seminar.

SUGGESTED READINGS:

1. Dave Saunders, Professional Advertising Photography, Merchurst, London 1988
2. Roger Hicks, Practical photography, Cassell, London 1996
3. Julian Calder and John Garrett, The 35mm Photographer's Handbook, Pan Books, London 1999
4. Julie Adair King, Digital Photography for Dummies, COMDEX, New Delhi 1998

15ARE631F	ADVANCED STRUCTURES									SEMESTER-VI	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To get introduced to basic structural members in masonry & steel
- To give knowledge to design different slab & column components in a building.
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of rivet and welded joints in steel.
- To enable the design of tension (beams) and compression (columns) steel members in a building under different conditions.
- To gain understanding in pre stressed concrete
- To Understand the concept of Structural system of Steel sections

COURSE OUTCOME:

1. Student will understand about various masonry sections
2. Student will understand about the design of circular columns by applying the code provisions.
3. Student will understand about the Flat slabs and its usage.
4. Student will be able to design steel joints for maximum efficiency and strength.
5. Student will be able to design tension and compression members for different conditions by applying the
6. code provisions.
7. Student will be able to design different types of laterally unsupported & supported beams for different conditions.

UNIT- I

MASONRY

Analysis and Design of masonry walls – use of Nomograms - code requirements

UNIT- II

CIRCULAR SLABS

Design of RCC Circular slabs - simply supported and fixed slabs with uniformly distributed loads .

UNIT- III

FLAT SLABS

Design principles for flat slabs- coffer slabs - code provisions.

UNIT- IV

DESIGN OF FOOTINGS

Types of footings – Design of wall footings – Design of Axially loaded rectangular footing (Pad and sloped footing). Design of Combined Rectangular footings.

UNIT- V

PRESTRESSED CONCRETE

Principle of pre-stressing, methods of pre-stressing, advantages and disadvantages - applications to simple problems.

SUGGESTED READINGS:

1. P. Dayarathnam, 'Design of Reinforced Concrete Structures' second edition, Oxford and IBH publishing Co., New Delhi 1984.
2. Ashok K. Jain, Reinforced Concrete Limit State Design Nemchand and Bros., Roorkee, 1983.
3. N.L. Shinha and S.K. Roy, Fundamental of Reinforced Confrete, S.Chand and Company, New Delhi, 1983.

15ARE631G	DISASTER MANAGEMENT								SEMESTER-VI		
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To create awareness about natural disasters-factors
- To be aware of the disaster cause them-and to foster knowledge about strategies
- To learn about the methods of disaster prevention and management-
- To understand the fragile Eco-systems and factors that cause global climatic changes.
- Overview of major natural disasters-design & planning solutions
- To learn about disaster mitigation-organizational and management aspects.

COURSE OUTCOME:

1. Student will be able to understand the cause and effects of natural disasters
2. Student will understand about climate change & disaster influences due to natural calamities
3. Student will learn to understand the prevention and design resistant structures
4. Student will understand the strategies to be implemented for disaster Mitigation.
5. Student will learn about Disaster management & recovery
6. Student will gain knowledge in design and Planning solutions of disaster proof structures

UNIT- I

INTRODUCTION TO NATURAL HAZARDS

Understanding the effects of natural calamities such as floods, tropical cyclones, earthquakes, landslides, heat waves , droughts & Tsunami.Climate changes, global sea rise, coastal erosion, environmental degradation, large dams & earth tremors, roads buildings & landslides, urbanization & desertification, cyclone effects on coastal towns.

UNIT- II

CASE STUDIES OF NATURAL DISASTERS IN INDIA

Earthquakes at Bhuj, Latur, etc., Cyclones in coastal Andhra pradesh& Orissa, Landslides in Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu.

UNIT- III

STRATEGIES FOR DISASTER PREVENTION & MITIGATION

Pre disaster, emergency, transition, and recovery. Disaster management plan, Natural crisis management committee [NMC], State crisis management group [SCMG].

UNIT- IV

DESIGN & PLANNING SOLUTIONS

Design guidelines for disaster proof construction at appropriate situations.-Engineering, architectural, landscape & planning solutions for different types of calamities.- Norms, standards and practice procedures for shelter & settlement. Seismic repairs & retrofitting of damaged and undamaged buildings.

SUGGESTED READINGS::

1. Earthquake Resistant Design for Built Environment. Compiled notes by Department of Architecture and Planning, IIT-Roorkee. December 2003.
2. Das P.K, A.R.Ramanathan, An Introduction to Seismic Safety in Architecture, 2007
3. Paul D.K. Singh, Yogendra, Short Term Training Course on Earthquake Resistant Design of Buildings, ADPC, IIT Roorkee & DMMC, Dehradun, 2002
4. S.Rajagopal - *Problems of housing in cyclone prone areas* - SERC, Vol.2, Chennai, 1980
5. Office of the UN Disaster Relief Coordinator - *Disaster prevention and mitigation*, Vol 12, Social and Sociological aspects - UNO, NY, 1986
5. F.C. Cony et.al - *Issue and problems in the prevention of disaster and housing* - A review of experiences from recent disasters - Appropriate reconstruction and training information centre, 1978
6. S.Ramani, *Disaster management - Advanced course on modern trends in housing* - SERC, Vol 2, Chennai, 1980

SEMESTER 7

15ARP711	PRACTICAL TRAINING - I									SEMESTER-VII	
Marks	Internal	400	External				600	Total	1000	Exam Hours	6
Instruction Hours /week	L	0	T	0	P/S	0	Credits				14

COURSE OBJECTIVE:

- To introduce the challenges of architectural practice.
- To enable overall understanding of different stages in real life architectural projects in practice.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice
- To work from initiation of project, development of concepts into schematic drawings
- To know about the approval process, presentations and release of working drawings
- To get involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process

COURSE OUTCOME:

1. Student will get and overall idea of the nuances of architectural practice.
2. Student will understand about the total process that takes place in an Architectural firm
3. Student will understand the Specifications of a project, time involved and the execution process
4. Student will gain knowledge in architectural working drawings
5. Student will gain experience of client meetings & site Execution
6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project

TOPICS

The choice of the place of training shall be Architectural Firms, Organizations, Development Authorities, etc. which are headed by eminent architects. The choice of the office shall be approved by the Training Committee of the Faculty of Architecture. The practical training, primarily involves learning in the office and on the site. The progress of training shall be assessed periodically by reports from the employers of trainees and by the Training Committee of the Faculty of Architecture.

The evaluation of the practical training will be based on the following features.

- Client meeting and interaction
- Site visits, verification and measurements
- Concept and scheme development
- Construction documents / drawings
- Training portfolio I

SEMESTER 8

15ARP811	PRACTICAL TRAINING II									SEMESTER-VIII	
Marks	Internal	400	External				600	Total	1000	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	0	Credits			14

COURSE OBJECTIVE:

- To introduce the challenges of architectural practice.
- To enable overall understanding of different stages in real life architectural projects in practice.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice
- To work from initiation of project, development of concepts into schematic drawings
- To know about the approval process, presentations and release of working drawings
- To get involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process

COURSE OUTCOME:

1. Student will get and overall idea of the nuances of architectural practice.
2. Student will understand about the total process that takes place in an Architectural firm
3. Student will understand the Specifications of a project, time involved and the execution process
4. Student will gain knowledge in architectural working drawings
5. Student will gain experience of client meetings & site Execution
6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project

TOPICS

The choice of the place of training shall be Architectural Firms, Organizations, Development Authorities, etc. which are headed by eminent architects. The choice of the office shall be approved by the Training Committee of the Faculty of Architecture. The practical training, primarily involves learning in the office and on the site. The progress of training shall be assessed periodically by reports from the employers of trainees and by the Training Committee of the Faculty of Architecture.

The evaluation of the practical training will be based on the following features.

- Independent handling of small projects
- Contribution in medium and large scale projects
- Training portfolio II

15ARP821	DISSERTATION									SEMESTER-VIII	
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To inculcate the spirit of research in architecture.
- To enable the acquisition of in-depth knowledge in a specific aspect/ issue in the discipline of architecture
- To develop perspectives on the same through reading, study, analysis and thought.
- To develop the skill of experimentation by their own course of study
- To facilitate the development of a coherent line of thinking and express it through clear writing.
- To serve as prelude to Thesis.

COURSE OUTCOME:

1. Student will learn to research on a specific interested topic and collect appropriate data
2. Student will develop the skill of analytical approach towards the related topic
3. Student will be able to develop a coherent line of thought based on point of view,
4. Student will be able to do observation, analysis and study
5. Student will be able to prepare a dissertation report which is based on accepted norms of technical writing.
6. Student will become prepared for the larger thesis project.

Unit I to Unit V

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

SUGGESTED READINGS:

1. Knight, A. and Ruddock, L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. All relevant Local, National and International Codes related to the Dissertation topic.
5. All relevant Books and Publications related to the Dissertation topic.

SEMESTER 9

15ART901	PROJECT MANAGEMENT									SEMESTER-IX	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- To introduce different Project management techniques
- To learn about project control, updating & Monitoring
- To Know about network concepts, network elements and inter - relationships
- To know about PERT network
- To know about CPM
- To enable understanding of management systems for accomplishing the task efficiently in terms of quality, time and cost.

COURSE OUTCOME:

1. Student will understand a project from concept to commissioning.
2. Student will understand the feasibility study & facility programme, design, construction to commissioning.
3. Student will be able to apply project management techniques in achieving objectives of a project like client needs, quality, time & cost.
4. Student will understand about the Project Costing
5. Student will understand about the various software of project management.
6. Student will gain understanding of principles of management, construction scheduling, scope definition and team roles

UNIT- I

INTRODUCTION TO PROJECT MANAGEMENT

Introduction to project Management concepts - background of management, purpose, goal and objectives, characteristics of projects and different aspects of management.

Traditional management system, Gantt's approach load chart, progress chart, bar chart merits and limitation. Schedule time, estimates units

UNIT- II

PROJECT PROGRAMMING

Project programming, resources balancing, phasing of activities, programs, scheduling, project control, reviewing, updating and monitoring. Exposure to relevant software such as MS Project, Primavera, Introduction to modern management, concepts, uni-dimensional management techniques - Introduction to PERT and CPM introduction to network concepts, network elements and inter-relationships.

UNIT- III

NETWORK TECHNIQUES

Network techniques, network logic - interrelationships, activity information, data sheets, development of network. CPM for management, CPM network analysis, identification of critical path float computation result sheets.

UNIT- IV

PERT NETWORK

PERT Network, introduction to the theory of probability and statistics, probabilistic time estimation for the activities of PERT network

UNIT- V

PROJECT COST

Introduction to two dimensional network analysis, activity cost information. Cost time relationship, crashed estimates for the activities, compression potential, cost slope, utility, data sheet, project direct cost and indirect cost. Crashed programmes, network compression least cost solution least time solution, optimum time solution. Network techniques, PERT/CPM, generating alternative strategies using computers

SUGGESTED READINGS:

1. Project management for design professionals By William Ramroth
2. Jerome D. Wiest and Ferdinand K. Levy, A Management Guide to PERT/CPM, Prentice Hall of Indian Pub.Ltd. New Delhi, 1982.

15ART902	URBAN DESIGN									SEMESTER-IX	
Marks	Internal	40	External				60	Total	100	Exam Hours	3
Instruction Hours /week		L	3	T	0	P/S	0	Credits			3

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Urban Design proposal
6. Student will be able to Communicate effectively through the design ideas.

UNIT- I

INTRODUCTION

Relationship between Architecture, Urban Design and Town Planning - Perception of city form and pattern – Townscape elements

UNIT- II

ROLE OF PUBLIC SPACE IN URBAN AREAS

Introduction to public spaces. Evolution of public spaces. Comparative analysis of public spaces, their organization and articulation.

UNIT- III

ORGANIZATION OF SPACE

Understanding, organizing and articulation of spaces for residential, commercial, industrial and recreational areas.

UNIT- IV

URBAN RENEWAL

Causes and consequences of urban blight and obsolescence – slums and shanties – methods of conducting surveys, analysis and presentation of data, prevention of formation of slums and squatter settlements. Environmental and management issues.

UNIT- V

URBAN REDEVELOPMENT

Objectives, surveys programs of urban redevelopment and public involvement and participation.

SUGGESTED READINGS:

1. Gordon Cullen - The concise TOWNSCAPE - The Architectural Press - 1978
2. Lawrence Halprin- CITIES - Reinhold Publishing Corporation N.Y. 1964.
3. Gosling and Maitland - URBAN DESIGN -St.Martin's Press, 1984.
4. Jonathan Barnett - An Introduction to Urban Design - Harper & Row, Publishers, N.Y.,1982

15ARS921	ADVANCED DESIGN – URBAN									SEMESTER-IX	
Marks	Internal	200	External				300	Total	500	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	12	Credits			8

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
- 5 . Student will be able to research, Analyse and Deliver a Urban Design proposal
6. Student will be able to Communicate effectively through the design ideas.

TOPICS

Design of advanced and complex problems - comprising group multi storeyed structures and infrastructure - with regard to climatic conditions, orientation, services, circulation problems relating to large developments Design and detailing for movement and use by handicapped persons within and around building and campuses to be addressed – examples: campus design, urban centers, Housing for Senior citizens.

Time problem using computer aided design such as AUDITORIUM, THEATRE etc., and Working Drawings to be done for the design projects.

SUGGESTED READINGS:

1. Edward D Mills, planning, 4 volumes, newness Butterworths, London 1976
2. E and OE Planning London, Books Ltd 1973
3. National Building Code ISI
4. De Chira and Callendar- Time saver standards for Building Types - Mc Graw Hill Co., 1973.

15ARS922	ESTIMATION AND COSTING									SEMESTER-IX	
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits			4

COURSE OBJECTIVE:

- To provide the student adequate knowledge to write the specifications for a given item of work
- To gain knowledge in specification
- To gain Knowledge in Estimation of Civil Work
- To gain knowledge in estimation of Carpentry work
- To gain Knowledge in the estimation of Plumbing work
- To understand to work out the unit cost of individual items based on their specifications and arrive at the overall cost of the project.

COURSE OUTCOME:

1. Student will be able to understand and write specification for the given item of work
2. Student will gain knowledge & Understanding of Estimation of civil work
3. Student will gain knowledge about estimation of Carpentry work
4. Student will gain knowledge about estimation of plumbing work
5. Student will be able to do calculate the quantities on site with Field measurement book
6. Student will learn about various calculation of bill of quantities for Interiors

UNIT- I

SPECIFICATION

Necessity of specification, importance of specification, - How to write specification, - Types of Specification, -Principles of Specification writing, - Important aspects of the design of specification – sources of information – Classification of Specification.

UNIT- II

SPECIFICATION WRITING

Brief Specification for 1st class, 2nd class, 3rd class building. Detailed specification for earthwork excavation, plain cement concrete, Reinforced concrete, first class and second class brickwork, Damp proof course, ceramic tiles/marble flooring and dadoing, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

UNIT- III

ESTIMATION

Types & purpose, Approximate estimate of buildings – Bill of quality, - Requirement for preparing estimation, factors to be considered, - principles of measurement and billing, contingencies, Elementary billing and measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work – abstract of an estimate.

UNIT- IV

DETAILED ESTIMATE

Deriving detailed quantity estimates for various items of work of a building. Like earthwork excavation, brick work, plain cement concrete, Reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course for a single storied building using centre line method and long and short wall method.

UNIT- V

COST ESTIMATING & COST BUDGETTING

Function of Cost planner – liaison with consultant, operation cost Exercise in variation, Cost adjustment and Cost analysis. Role of various financial agencies for building & land development. Economic feasibility reports – valuation, depreciation and its implications.

SUGGESTED READINGS:

1. Dutta, Estimating and Costing, S.Dutta and Co., Lucknow
2. S.C.Rangwala, Elements of Estimating and Costing, Charoter Publishing House, India.
3. W.H.King and D.M.R.Esson, Specification and Quantities for Civil Engineers, The English University Press Ltd.
4. T.N.Building Practice, Vol.1, Civil, Govt. Publication.P.W.D. Standard specifications, Govt. Publication.

15ARE931A	DEVELOPMENTAL RULES AND REGULATIONS								SEMESTER- XI		
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To develop understanding of the duties and liabilities of an architect
- To gain knowledge of bye-laws that relate to the building
- To understand about the environment in the Indian context.
- To Understand about legislation of corporation areas
- To understand about the Legislation of panchayat
- To understand about legislation of Industries

COURSE OUTCOME:

1. Student will be able to read and understand government related documents and incorporate it in practice
2. Student will be able to understand the building regulations and follow accordingly
3. Student will understand about the legislation of corporation areas
4. Student will understand about the legislation of panchayat
5. Student will understand about the legislation of Industries
6. Student will be able to design buildings as per the recent norms and standards

UNIT- I

LEGISLATION - CORPORATION AREAS

Chennai Corporation Building Rules 1972, Development control Rules for Chennai Metropolitan Area 1990

UNIT- II

LEGISLATION - PANCHAYATS

The Panchayat Building Rules 1942

UNIT- III

LEGISLATION - INDUSTRIES AND FACTORIES

The Tamil Nadu Factory Rules 1950

UNIT- IV

EMERGING AREAS OF IMPORTANCE

Role of urban Arts Commissions - need for special rules on architectural control and development

UNIT- V

SPECIAL LEGISLATION

Environmental Acts and Laws - Special Rules governing Hill Area Development - coastal area development and management - Heritage Act of India - Consumer protection act and their relevant provisions

SUGGESTED READINGS::

1. Publications of COA, IIA Hand book on Professional Practice, The Architects publishing Corporation of India, Bombay 1987
2. D.C. Rules for Chennai Metropolitan Area 1990
3. T.N.D.M. Building Rules, 1972
4. T.N.P. Building Rules 1942
5. Chennai City Corporation Building Rules 1972
6. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai
7. The Tamil Nadu Hill Areas Special Building Rules - 19
8. Heritage Act
9. Consumer Protection Act
10. Indian Easements Act

15ARE931B	CONSTRUCTION TECHNOLOGY									SEMESTER-IX	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To study the advancements in construction with concrete for large span structures.
- To familiarize the students with the various classifications in buildings
- To familiarize the students with the manufacture, storage and transportation of concrete.
- To inform the various equipment used in the construction industry
- To learn about the criteria for choice of equipment.
- To familiarize the students with an overview of construction management, planning and scheduling

COURSE OUTCOME:

1. Ability to understand the practice of construction technology
2. Ability to understand the construction systems for high rise buildings
3. Ability to understand the process of manufacture, storage and transportation of concrete
4. Ability to understand the various equipment used in the construction industry
5. Ability to understand the criteria for choice of equipment
6. Students will gain an overview of construction management, planning and scheduling

UNIT - I

GENERAL BUILDING REQUIREMENTS

Classification of buildings - Sites and Services - Requirements of parts of buildings.

UNIT - II

CONSTRUCTION SYSTEMS

Planning - Cast in situ construction (ready mixed pumped etc.) Reinforced concrete and prestressed concrete constructions precast concrete and pre- fabrication system - Modular coordination – Structural schemes.

UNIT - III

CONSTRUCTION PRACTICE

Manufacture, storage, transportation and erection of precast component forms, moulds and scaffoldings in construction - safety in erection and dismantling of constructions.

UNIT - IV

CONSTRUCTION EQUIPMENT

Uses of the following: Tractors, bulldozers, shovels draglins, cableways and belt conveyors, batching plants - Transit mixers and agitator trucks used for ready mix concrete pumps Gunite equipments - Air compressors - welding equipment - cranes and other lifting devices Choice of construction equipment for different types of works.

UNIT - V

CONSTRUCTION MANAGEMENT

Overview of construction management topics including estimating, cost control, quality control, safety, productivity, value engineering, claims, and legal issues - planning and scheduling

SUGGESTED READINGS :

1. R. Chudley, Construction Technology, Longman Group Limited, England, 1985
2. R. Barry, The Construction of Buildings, The English Language Book Society and Crosby Lockwood, Staples, London, 1976
1. National Building Code of India, 1983
2. Frank R. Dagostino, Materials of Construction – Details given Reston Publishing Company, nc. Virginia, 1976.
- 3.M. Mohsin, Project Planning and Control, Vikas Publishers, New Delhi, 1983

15ARE931C	INTEGRATED BUILDING MANAGEMENT SYSTEM									SEMESTER-IX	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To familiarize the student with minimum safety requirements for a high-rise building
- To understand the codes of NBC.
- To gain knowledge about the safety codes & practice
- To Gain Knowledge about the security systems
- To know and familiarize about the Building management systems in various functions
- To study fire alarm systems and fire suppression systems and their installation.

COURSE OUTCOME:

1. Student will be able to understand the practice of safety standards
2. Student will gain knowledge in Fire safety standards & practice considerations
3. Student will understand about the integrated building management systems
4. Student will gain understanding in building automation systems
5. Student will become familiar with integrated services for multistoried buildings
6. Student will learn about the new concepts of Security and building Management systems

UNIT - I

SAFETY REQUIREMENTS

Minimum safety requirements for a building, particularly for a high rise building as per the National Building Code.

UNIT - II

FIRE ALARM SYSTEMS

Objectives of a Fire Alarm System, Essential components of a Fire Alarm System, Technology of detection, Type of Statutory Standards followed in direction, Explanation on the essential clauses, various types of technologies employed in the Fire Alarm System, basic knowledge on how a Fire Alarm System is designed and installed

UNIT - III

FIRE SUPPRESSION SYSTEMS:

Objectives of a Fire Suppression System, Explanation on fire triangle, Essential components of a Fire Suppression System, different types of Fire Suppression Systems, Type of Statutory Standards followed in Suppression, Explanation on the essential clauses and basic knowledge on how a Fire Suppression System is designed and installed.

UNIT - IV

SECURITY SYSTEMS

Introduction to different types of Security Systems and why they are required. Introduction to Access Control, CCTV, Intruder Alarm and Perimeter protection Systems, Essential components of each system, various types of technologies employed in these Systems, basic knowledge on how they are designed and installed.

UNIT - V

AUTOMATION SYSTEMS

The objectives of the Building Automation system (BAS), the list of utility, safety and security systems that are generally monitored and controlled through IBMS, the various components of IBMS, types of integration with the utility, safety and security systems and the basic knowledge on how they are designed and installed.

SUGGESTED READINGS :

1. Building Automation Systems – A Practical Guide to selection and implementation – Author : Maurice Eyke
2. National Building Code of India 1983 (SP 7:1983 Part IV) – Published by Bureau of Indian Standards
3. IS 2189 – Selection, Installation and Maintenance of Automatic fire Detection and Alarm System – Code of Practice (3rd Revision) – Published by Bureau of Indian Standards.

SUGGESTED READINGS :

1. The Principles and Practice of Closed Circuit Television – Author: Mike Constant and Peter Turnbull
2. Rules of Automatic Sprinkler Installation – 2nd Edition – Published by Tariff Advisory Committee.
3. Fire Suppression Detection System – Author : John L. Bryan
4. Design and Application of Security/Fire Alarm system – Author: John E. Traister.
5. CCTV Surveillance – Author: Herman Kruegle
6. Security Systems and Intruder Alarm Systems – Author: Vivian Capel

15ARE931D	EARTH QUAKE RESISTANCE ARCHITECTURE									SEMESTER-IX	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To understand the fundamentals of Earthquake and the basic terminology
- To familiarize the students with design codes and building configuration
- To understand the site planning and performance of ground & Buildings
- To understand the seismic design codes & configurations
- To understand about the quick measures for recovery in calamities
- To understand the various types of construction details to be adopted in a seismic prone area.

COURSE OUTCOME:

1. Student will be able to understand the formation and causes of earthquakes
2. Student will gain understanding of the factors to be considered in the design of buildings
3. Student will understand the services to resist earthquakes.
4. Student will become familiar with the Seismic Design Codes & configurations
5. Student will understand about designing earth quake resistant structures
6. Student will learn about urban level planning strategies for earth quake resistance

UNIT - I

Fundamentals of earthquakes

- a) Earths structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India.
- b) Predictability, intensity and measurement of earthquake
- c) Basic terms- fault line, focus, epicentre, focal depth etc.

UNIT - II

Site planning, performance of ground and buildings

- a) Historical experience, site selection and development
- b) Earthquake effects on ground, soil rupture, liquefaction, landslides.
- c) Behaviour of various types of building structures, equipments, lifelines, collapse patterns
- d) Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

UNIT - III

I. Seismic design codes and building configuration

- a) Seismic design code provisions – Introduction to Indian codes
- b) Building configuration- scale of building, size and horizontal and vertical plane, building proportions, symmetry of building- torsion, re-entrant corners, irregularities in buildingslike short stories, short columns etc.

UNIT - IV

II. Various types of construction details

- a) Seismic design and detailing of non-engineered construction- masonry structures, wood structures, earthen structures.
- b) Seismic design and detailing of RC and steel buildings
- c) Design of non-structural elements- Architectural elements, water supply, drainage, electrical and mechanical components

UNIT - V

III. Urban planning and design

- a) Vulnerability of existing buildings, facilities planning, fires after earthquake, socioeconomic impact after earthquakes.
- b) Architectural design assignment- Institutional masonry building with horizontal spread and height restriction, multi-storeyed RC framed apartment or commercial building .

SUGGESTED READINGS:

1. Guidelines for earthquake resistant non-engineered construction, National Information centre of earthquake engineering (NICEE, IIT Kanpur, India)
2. C.V.R Murthy, Andrew Charlson. "Earthquake design concepts", NICEE, IIT Kanpur India.
3. Ian Davis (1987) Safe shelter within unsafe cities" Disaster vulnerability and rapid urbanisation, Open House International, UK
4. Socio-economic developmental record- Vol.12, No.1, Jan-Feb 2005
5. Learning from Practice- A review of Architectural design and construction experience after recent earthquakes- Joint USA-Italy workshop, Oct.18-23, 1992, Orvieto, Italy.

15ARE931E	DIGITAL ARCHITECTURE									SEMESTER-IX
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits		3

COURSE OBJECTIVE:

- To develop the advanced knowledge and skills in Digital application
- To develop knowledge in building visualization
- To develop knowledge in rendering
- To develop the digital skill sin advanced level simulations
- To get familiarized & create simple multimedia presentations brochures
- To learn about the videos & Presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will learn about the Latest digital applications used in the architectural practice
2. Student will gain knowledge about parametric applications in design
3. Student will learn about the building visualization & Simulation
4. Student will learn about Advanced rendering techniques
5. Student will learn about animation and visualization techniques used in the architecture industry
6. Student will learn about the video presentations and realistic animations of buildings

TOPICS

1. Advanced techniques in rendering with differential lighting for realistic rendering
2. Advanced techniques in building information modeling
3. Animations and Walkthroughs
4. Simulating gravity, wind and other effects in the scene, distributed rendering
5. Performance Analysis on Building Model using software.

Recommended Software: Auto desk Revit, 3ds Max, rhino, lumion, vector works, BIM, Ecotect, v-ray rendering techniques

SUGGESTED READINGS:

1. Rendering Techniques for mixed reality, Thomas Girlinger, Daniel Dauch, Andre Stork, Springer, Berlin, October 2009
2. 3D Computer Animated Walk Throughs, Clark Cory, Scott Meador, William Rosi, McGraw Hill 2009.
3. The Animation Book: A complete guide to animation and film making, Kit Laybourne, Three Rivers Press, December 1998
4. Creating a website, Matthew McDonald, Pogue Press, January 2009s

15ARE931F	ADVANCED CONCRETE TECHNOLOGY									SEMESTER-IX	
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To learn about the classification and specifications in concrete
- To learn about the Chemical composition and Testing of concrete
- To learn about the properties and durability of concrete
- To learn about the Principles and Methods of concrete mix design
- To learn about the Statistical quality control- sampling and acceptance criteria
- To learn the advanced level concrete technological applications.

COURSE OUTCOME:

1. An understanding of the classification and specifications in concrete
2. An understanding of special types of concrete and concreting methods
3. An understanding of the Chemical composition and Testing of concrete
4. An understanding of properties and durability of concrete
5. An understanding of Statistical quality control- sampling and acceptance criteria
6. An understanding of the advanced level concrete technological applications

UNIT - I

CONCRETE MAKING MATERIALS

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements. Water Chemical admixtures, Mineral admixture.

UNIT - II

CONCRETE

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage, Variability of concrete strength, durability of concrete.

UNIT - III

MIX DESIGN

Principles of concrete mix design, Methods of concrete mix design, Testing of Concrete. Statistical quality control- sampling and acceptance criteria.

UNIT - IV

SPECIAL CONCRETE

Light weight concrete, Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete, Super plasticized concrete, Hyper plasticized concrete, Epoxy resins and screeds for rehabilitation - properties and applications - high performance concrete. High performance fiber reinforced concrete, self-compacting-concrete.

UNIT - V

CONCRETING METHODS

Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering - underwater concrete, special form work.

SUGGESTED READINGS:

1. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2003.
3. A.R.Santhakumar ;"Concrete Technology",Oxford University Press,2007.
4. Rudhani G. Light Weight Concrete Academic Kiado,Publishing Home of Hungarian Academy of Sciences, 1963

15ARE931G	REAL ESTATE MANAGEMENT								SEMESTER-IX		
Marks	Internal	60	External				90	Total	150	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	4	Credits			3

COURSE OBJECTIVE:

- To give an overview of real estate development
- To understand about the market potential in the current scenario
- Stimulating an awareness of the issues involved in international real estate
- To learn about urban level policy & Decisions
- To know about the market value variations
- To gain knowledge about the leverage that the real estate could provide in the overall development

COURSE OUTCOME:

1. Student will gain knowledge in the concepts of Real estate development
2. Student will understand about Property development
3. Student will learn about urban level policies in Real estate management
4. Student will learn about the corporate Real estate management
5. Student will gain knowledge in Project financing and development
6. Student will understand the Current scenario through case studies

UNIT - I

REAL ESTATE DEVELOPMENT

Fundamentals of real estate development – concepts – techniques – recognizing institutional elements – issues encountered in various phases of development like the site evaluation and land procurement – lease hold and free hold property – development team assembly –market potential – demand estimation study – development scheme – construction and project management – Project marketing

UNIT - II

DEVELOPMENT AND PROJECT FINANCING

Project feasibility – options – development financing – asset disposal and redevelopment options – analysis of development sites and case studies – integrated case study on specific development project – reviewing and analysis – problems and strategic issues

UNIT - III

URBAN POLICY AND REAL ESTATE MARKET

Impact of government regulations and public policies on real estate markets – urban land use and location theories – Land use structures – community and neighborhood dynamics – degeneration and renewal in urban dynamics – private public participation- government policies – public and private housing and fiscal policy – Property taxation – local government finance

UNIT - IV

CORPORATE REAL ESTATE MANAGEMENT

Strategic plans to align real estate needs with corporate business plans – performance measurement techniques – identify assets acquisition or disposal – methods for enhancing values through alternative – efficient source utilization or improving user satisfaction

SEMESTER 10

15ARS1021	ARCHITECTURAL THESIS									SEMESTER-X		
Marks	Internal	400	External				600	Total	1000	Exam Hours		6
Instruction Hours /week		L	4	T	0	P/S	27	Credits				18

COURSE OBJECTIVE:

- To ensure consolidation and application of the knowledge gained in preceding years of the programme
- To develop the skill of Design in the context of a project of the student's choice.
- To enable addressing of specific projects through key, identified issues inherent in the project or
- To enable development of thought processes in specific areas/aspects into a project.
- To facilitate development of ability to complete and handle projects independently
- To develop the career of Architecture by exhibiting the skill in thesis

COURSE OUTCOME:

1. Student will gain an overall understanding of an Architectural project
2. Student will be able to research, Analyse, synthesize and present his ideas
3. Student will apply his skills developed in the previous years in this Project
4. Student will gain the ability to handle major architectural project of a larger scale
5. Student will be able to design with all Socio, economic and Environmental aspects.
6. Student will become an expertise in his domain of architectural design

UNITS: 1 to 5

The main areas of study and analysis shall be Architecture, Urban design, Urban renewal and Human settlements, Environmental Design, Conservation, Landscape Design, Housing etc.. However, the specific thrust should be architectural design of built environment.

Research Methods as applicable to architectural studies is to be taught as part of Thesis.

METHOD OF SUBMISSION

The Thesis Project shall be submitted in the form of drawings, project report, physical/ digital models, presentations and walkthroughs.

SUGGESTED READINGS:

1. E and OE Planning London Books Ltd 1973
2. National Building Code ISI
3. De Chiasa and Callendar- Time saver standards for Building Types - Mc Graw Hill Co., 1973.
4. Edward D Mills, planning, 4 volumes, newness Butterworths, London 1976

15ARS1031A	INDUSTRIAL ARCHITECTURE								SEMESTER-X		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To introduce about Industrial design building and architecture
- To understand about the types of industrial space
- To understand about precast building types & practice
- To gain knowledge in Manufacturing process of prefab structures
- To gain knowledge in on site & off-site prefabrication systems
- To understand about the overall structural system of Industrial buildings

COURSE OUTCOME:

1. Student will understand the application of Industrial buildings
2. Student will gain understanding about the pre fabrication systems
3. Student will gain Knowledge in Industrial construction
4. Student will understand about the modular components & coordination of Industrial Buildings
5. Student will understand about the overall structural system of Industrial buildings
6. Student will be able to design large scale Industrial buildings

UNIT - I

INTRODUCTION

Five year plans and thrust in housing – Issues in Urban Housing – use of modern building materials – application of modern technology – meaning of industrial building system.

UNIT - II

APPLICATION OF INDUSTRIAL BUILDING SYSTEM

Feasibility of using industrial building system in Residential and Non-Residential buildings – manufacturing of building components – Technology requirements for industrial building system – use of Industrial building system as an option for disaster mitigation.

UNIT - III

MODULAR CO-ORDINATION AND INDUSTRIALISED SYSTEM

Concept and definition of Modular dimensional discipline – Advantages and Limitations of modular principle – Components of residential buildings – precast elements.

UNIT - IV

PRE-FABRICATION SYSTEM

Objective and necessity – Off site on site prefabrication elements and construction joints – architectural and technical limitations.

UNIT - V

PROCEDURES AND ORGANISATION

Equipments used – manufacturing processes – transportation of components – assembly and finishing – Structural, social and economic issues related to industrial building system.

SUGGESTED READINGS :

1. Industrial Building and Modular Design Henrik Missen – C & CK, UK 1972.
2. Albert G.H.Dietz, Laurence Secotter – “Industrialized Building Systems for Housing” – MIT, special summer session, 1970 USA.
3. “Industrialized Building Construction” – Proceedings of National Seminar, Nov-17-18, 2000, Indian Concrete Institute, Mumbai.
4. “Innovative Construction Materials” – Proceedings of Seminar, Jan 20-21,2001, Veermata Jeejabai Technical Institute, Mumbai.

15ARS1031B	GREEN BUILDING								SEMESTER-X	
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To develop and acquire knowledge about environment and ecosystems
- To understand about the use of energy efficient technologies
- To learn about the use of natural materials and water conservation technique.
- To learn about various green building rating Systems
- To understand about the Rating of current buildings
- To understand the Bio degradability materials & recycling

COURSE OUTCOME:

1. Student will understand the basic concept of sustainability in Architecture
2. Student will gain knowledge in passive and Hybrid design strategies for designing a green building
3. Student will understand the energy usage of various types of buildings
4. Student will learn about energy efficiency and ways to minimize the energy.
5. Student will learn about the environmental impacts and assessment
6. Student will gain knowledge about the green rating systems and codes in India

UNIT - I

SUSTAINABILITY AND GREEN BUILDING

Understanding of food and energy cycle – Principles of sustainability – Natural ecosystem – Elements of green development – Introduction to green architecture – green building design – benefits – rating systems – LEED, GRIHA, BREEM, ECBC

UNIT - II

SUSTAINABLE STRATEGIES AND DEVELOPMENT

Sustainable design concepts – strategies – Design principles – Active and passive techniques – land use patterns – site development – site selection – adaptive reuse – existing buildings up gradation

UNIT - III

ENERGY – USAGE AND REGENERATION

Water – consumption – domestic usage – efficiency in usage – low flow plumbing fixtures – water appliances – rain water harvesting – reuse of gray water – energy efficiency – optimizing building envelopes configuration – renewable power- Towards net zero energy building - use of photovoltaic- automation for efficient usage – smart buildings

UNIT - IV

BIO DEGRADABLE MATERIALS AND RECYCLING

Concept of embodied energy – performance and life cycles – building materials – selection of sustainable materials – recycling waste – collection and disposal – appropriate technologies – use in landscape.

UNIT - V

ENVIRONMENTAL IMPACT ASSESMENT.

Environmental Impact Assessment – Internal frameworks & Assessment Tools.

SUGGESTED READINGS:

1. Anna Ray – Jones – Sustainable architecture in Japan – The green buildings of Nikken seiki, Wiley – academy 2000
2. Architecture and the environment – bioclimatic building design – David Lloyd (Laurence king publishers, London 1998)
3. Sustainable Architecture low tech houses – Charles Broto & Arian Mostedi Pub : Joseph Ma Minguet 2002.
4. Energy efficient buildings in India – Milli majundar. TER publication and ministry of non conventional energy sources, 2001
5. Ecology of the sky – Ivor Richards , The Image publishing groups , 2009

15ARS1031C	RESEARCH METHODS								SEMESTER-X	
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits		2

COURSE OBJECTIVE:

- To learn the importance of and undertake research and field studies
- To understand the research applications in architectural design.
- To understand the different methods and the techniques as relevant to the design profession
- To apply research in evaluation and appraisal of architectural design projects.
- To understand about the Analytical methods of research
- To understand about different survey methods

COURSE OUTCOME:

1. Student will understand the research methodology and research methods
2. Student will understand the various analytical methods
3. Student will understand the experimental methods of Research
4. Student will learn about the survey methods and documentation
5. Student will know to collect relevant data, compile and document
6. Student will be able to critically analyse the data and present it as a document

UNIT - I

Importance. Purpose and scope of research and field studies. Application in architecture in terms of design, technology, environment, economic and behavioral areas.

UNIT - II

Sequence and methods of research, Identification of problem, Hypothesis formulation objectives and methodology.

UNIT - III

Understanding and applying qualitative analytical interpretative correlation, quasi experimental, experimental, simulation and modeling techniques in Architectural design.

UNIT - IV

Pilot studies field surveys and collection of samples – physical, Architectural, Environmental organizational, preparation and Analysis of Data sheets and Questionnaires.

UNIT - V

Preparation and analysis of data sheets and questionnaires. Arriving at conclusions from the research at fiels studies. Report writing and publications.

SUGGESTED READINGS::

- 1.Knight. A and Ruddock L., “Advanced Research Methods in build Environment”, John Wiley & Sons 2008.
- 2.Groat L, and Wang D, “Architectural Research Methods”. John Wiley & Sons, 2002.
- 3.Gibbs J P “ Urban Research Methods”, (rev.ed) Von Nostrand 1988.
- 4.Kothari C R, Research Methodology – Methods and Techniques”, New Age Interntional 2004.
- 5.Khanzode V V, “ Research Methodology – Techniques and Trends”, APH Publishing, 1995.

15ARS1031D	MEDICAL ARCHITECTURE								SEMESTER-X		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To learn the importance of health care industry
- To understand the various standards suggested by the United nation for the health care industry
- To understand the Health care equipment & services
- To apply the Architectural & Interior design as per the functionality of Health care industry
- To understand the delivery systems of health care industry
- To understand about the modern concepts of health care designing, commissioning and built environment enhancement

COURSE OUTCOME:

1. Student will understand the important fields of health care industry
2. Student will understand the standards to be followed in Health care industry in accordance to architecture
3. Student will understand the services involved in the health care industry
4. Student will learn about the survey methods and documentation
5. Student will know about the various delivery systems and operations involved in health care industry
6. Student will be able to design for a health care sector with green concepts and with environmental quality

UNIT - I

Introduction to health care industry, demand of the health care industry.

UNIT - II

Health care Industry - United Nations International Standard Industrial Classification (ISIC) - Hospital activities, Medical and dental practice activities and other human health activities.

UNIT - III

Health care Industry – Global Industry Classification Standard and the Industry Classification - Health care equipment & services and Pharmaceuticals, biotechnology & related life sciences.

UNIT - IV

Health care Industry – Delivery System – Primary, Secondary, Tertiary and Quaternary, Community Health

UNIT - V

Modern concepts in planning, designing, equipping and commissioning of all such built environments which are associated with the health care industry. Future aspects of planning health care facilities and service

SUGGESTED READINGS::

- 1.Kunders .G.D, Hospitals – Facilities planning and Management, Tata Mcgraw Hill Publication, 2008
- 2.Joseph DeChiara, Julius Panero. Time-Saver Standards for Interior Design and Space Planning, McGraw-Hill Education, 2001
- 3.Peter Stone, British hospital and health-care buildings: designs and appraisals, Architectural Press, 1980
- 4.Joint Commission International Accreditation Standards for Hospitals, 2002
- 5.Carles Broto, New Health Care Facilities, Links International, 2009

15ARS1031E	EXHIBITION DESIGN								SEMESTER-X		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To learn about the introduction of the Exhibition design
- To learn about the introduction of the retail architecture
- To learn about the level of services in Exhibition & retail architecture
- To learn about the planning aspects of the Exhibition design
- To learn about the Marketing theories & retail branding
- To learn the advanced level of exhibition structures

COURSE OUTCOME:

1. An understanding of the Exhibition design
2. An understanding of the retail Architecture
3. An understanding of the major services in exhibition design
4. An understanding of planning aspects of the Exhibition Design
5. An understanding of the marketing theories & retail branding techniques
6. An understanding of the advanced level of Exhibition Structures

UNIT - I

Introduction **Discussion: The terms 'exhibition' and 'retail' and 'Space & Form- Space Layout'**

UNIT - II

Elements of environmental design: from flat graphics to 3D

UNIT - III

Ergonomics& Accessibility

UNIT - IV

Exhibition Design: Form, Feel & Function, Introduction to aesthetic, form and functional aspects of basic exhibition design , Identification of critical issues through research , Execution of the design processes
Application of visualization skills

UNIT - V

Introduction to marketing theory / retail branding Marketing theory. Display of case studies.

SUGGESTED READINGS :

1. Pam Locker, BASICS INTERIOR DESIGN 02 – EXHIBITION DESIGN, Published by AVA Publishing.
2. Lynne Mesher, BASICS INTERIOR DESIGN 01 – RETAIL DESIGN, Published by AVA Publishing.

15ARS1031F	PROGRESSIVE ARCHITECTURE								SEMESTER-X		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To understand and acquire knowledge in advanced architectural concepts and ideologies.
- To gain Knowledge about the future concepts of eminent architects
- To understand about the material usage in the current trend of architecture
- To gain knowledge about the Concept of biomimicry
- To understand about the adaptive reuse
- To gain understanding about energy integration and zero energy developments

COURSE OUTCOME:

1. Student will be able to understand and evolve futuristic design ideas and concepts
2. Student will be able to integrate various aspects of design thinking of future
3. Student will understand about the parametric design concepts and applications
4. Student will understand about the concept of Biomimicry
5. Student will gain knowledge about the Adaptive reuse
6. Student will gain knowledge about energy integration and zero energy development.

UNIT- I

Futuristic Vision

Future concepts as envisioned by Antonio Saint Elia, Frank Lloyd Wright, Corbusier.

UNIT- II

Futuristic Trends

Future trends being evolved by Marcos Novak, Neil Denari, Greg Lynn, Toyo Ito and others.

UNIT- III

Architectural Concepts and Ideas

Evolution of contemporary architectural concepts such as biomimicry, adaptive reuse, low cost development and urban regeneration.

UNIT- IV

Materials, Technology and Systems

Futuristic building materials, building tectonics and systems of the future.

UNIT- V

Energy Integration

“Zero energy” and “Energy +” buildings with emphasis on an integrated approach.

SUGGESTED READINGS:

1. Bell, J., “21st Century House”, Laurence King Publishing, 2006
2. Jodidio, P., “Building a New Millennium”, Vol.1 Taschen, 2003
3. Jodidio, P., “Architecture Now”, Vol. 2, Taschen, 2004

15ARS1031G	HGH RISE BUILDINGS								SEMESTER-X		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	0	T	0	P/S	4	Credits			2

COURSE OBJECTIVE:

- To understand the various types of multistoried buildings
- To understand the structural systems of High-rise buildings
- To understand deeply about the building service systems of high-rise buildings
- To understand about the Safety Systems in high Rise buildings
- To know about the structural systems involved in High – rise buildings
- To understand about the Bye – laws & codes of design of high-rise buildings

COURSE OUTCOME:

1. Student will learn about the Design and planning aspects of High-rise structures
2. Student will gain knowledge about the National building Codes of high-rise structures
3. Student will understand about the various development control regulations all over India
4. Student will gain knowledge about the Structural aspects of High-Rise buildings
5. Student will gain knowledge about various technical services involved in High rise buildings
6. Student will gain knowledge about functionality of the high-rise structures

UNIT - I

Introduction to High rise structures

Urban environment and physical planning considerations – architectural design considerations – space planning – planning building services – advanced service systems – automation – Bye laws and codes applicable – for every structure and service section

UNIT - II

Tall building types and floor systems

Classification of tall buildings – types – shear frames ,interacting systems – Tubular systems.

Composite steel floor systems , pre stressed and post tensioned concrete floor systems – examples

UNIT - III

Lateral load resisting systems

Braced frames – moment resisting frame systems – core and out trigger systems – benefits and drawbacks – tubular system – Hybrid systems – examples

UNIT - IV

Services for Tall buildings

Express elevators- Sky lobbies – service floor etc – Water supply system- skip stage plumbing – energy conservation methods – location and sizing of water tanks – wet risers, sumps , smoke detectors , alarms ,sprinkler systems – fire escape stairs – fire resistant doors – Fire resistant materials – fire fighting equipments.

SUGGESTED READINGS: :

1. Bennetts , Ian et al – tall building structural systems
2. Proceedings of the council for tall buildings – Vol 1 to 10
3. NBC

DETAILED SYLLABUS
M.ARCH (ADVANCED DESIGN)
2015-2016 BATCH

15MARS111	RESEARCH AND FIELD STUDIES -1								SEMESTER-I		
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	2	Credits			2

COURSE OBJECTIVE:

- To learn the importance of research & field Studies
- To understand the Research application in architectural design.
- To understand the different methods and techniques as relevant to the design profession
- To apply the research concepts in evaluation and appraisal of architectural design projects.
- To Analyse the Various methodologies of Field Survey
- To Develop the skill of preparation of report and Documentation

COURSE OUTCOME:

1. Student will understand the methods of research
2. Student will be able to develop the Skill of field study and experimentation
3. Student will understand the research application in the field of Architectural Design
4. Student will understand about the collection of data and Analyse the data
5. Student will develop the skill of documentation of various Survey and Research
6. Student will be able to prepare documents, report writing and publish in journals

UNIT-I INTRODUCTION TO RESEARCH

Importance, Purpose and Scope of Research and Field Studies. Application in architecture in terms of design, technology, environment, economic and behavioral areas.

UNIT-II RESEACRH OBJECTIVES AND METHODOLOGY

Sequence and Methods of Research. Identification of Problem, Hypothesis Formulation, Objectives and Methodology.

UNIT-III APPLICATION OF RESEARCH

Understanding and Applying Qualitative, Analytical, Interpretative, Correlational, Quasi-Experimental, Experimental, Simulation and Modelling techniques in Architectural Design.

UNIT-IV FIELD STUDIES

Pilot Studies, Field Surveys and Collection of Samples - Physical, Architectural, Environmental, Organizational. Preparation and Analysis of Data Sheets and Questionnaires.

UNIT-V ANALYSIS, PREPARATION AND DOCUMENTATION

Preparation and Analysis of Data Sheets and Questionnaires. Arriving at conclusions from the Research at Field Studies. Report Writing and Publications.

SUGGESTED READINGS:

1. Knight, A. and Ruddock., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Gibbs, J.P., " Urban Research Methods", (rev) Von Nostrand. 1988.
4. Kothari, C. R., and Gaurav Garg. *Research Methodology: Methods and Techniques*. New Delhi: New Age International (P) Limited, Publishers, 2019.

15MARS112	DESIGN SYSTEMS								SEMESTER-I		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To understand various design systems
- To Understand the different civilizations in different parts of the world through study of their source,
- To Understand the origin, context, grammar, intent and application in architectural design.
- To Understand the Contemporary design process and relevant case studies
- To Understand & develop the skill of Design thinking as per the Current change in Architectural Style
- To understand the Concept of design Systems by various literature/case studies.

COURSE OUTCOME:

1. Student will be able to understand the various design systems in the Architecture
2. Student will be able to understand the vernacular architecture and its importance
3. Student will Understand the contemporary design process
4. Student will develop the skill of Design thinking as per the Current situation
5. Student will develop the skill of presentation of his ideas by Seminar and presentation
6. Student will be able to envision the futuristic architecture

UNIT-I HISTORIC DESIGN SYSTEMS

Pragmatic, Iconic, Analogic and Canonic systems. Relationship between mathematics and architecture and hierarchies of geometry in design. Design systems through the middle ages to the renaissance period.

UNIT-II VERNACULAR DESIGN SYSTEMS

Vernacular architecture of the world and relevance of the climate in which they have evolved. Enduring nature of the vernacular in contemporary times, De-coding vernacular narratives regarding the cultures they represent.

UNIT-III CONTEMPORARY DESIGN SYSTEMS

Evolution of design systems since the modern period following industrial revolution to the advent of the digital age and representation of design.

UNIT-IV FUTURISTIC DESIGN SYSTEMS

Evolution of futuristic ideas since the 1960s in the field of design. Emerging areas of programming, expert systems and 3-D printing in design. New materials, technologies and bio mimicry- oriented design evolutions of future.

UNIT – V SEMINAR

Seminar on all the design systems -vernacular architecture – futuristic ideas and discussions

SUGGESTED READINGS:

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997
2. Bernard Rudofsky, 'Architecture without Architects', MoMA, 1964.
3. Geoffrey Broadbent - Design in Architecture - Architecture and the human sciences - John Wiley & Sons, New York, 1981
4. Francis D.K. Ching et al; A global history of Architecture; John Wiley's sons, 2nd edition 2010
5. Weber.W & Yannas.S, 'Lessons from Vernacular Architecture', Routledge, 2014.
6. Vernacular Architecture – contemporary traditions – Aishwarya Tipnis – TERI

15MARS113	EXHIBITION AND SEMINAR -1								SEMESTER-I		
Marks	Internal	100	External					Total	100	Exam Hours	6
Instruction Hours /week		L		T	0	P/S	3	Credits			2

COURSE OBJECTIVE:

- To comprehend the importance of Seminars
- To understand the Types and methods of Exhibition
- To Understand the method of presentations in International Seminars
- To Understand the method of presentations in National Seminars
- To Undertake responsibilities to conduct a conference & Seminar
- To refer reputed journals/magazines and gain the skill & Importance of good presentation methods.

COURSE OUTCOME:

1. Student will be able to know the method of Seminar events
2. Student will understand the methods of Presentation in International Seminar
3. Student will understand the methods of Presentation in National Seminar
4. Student will be able to prepare and publish journal Articles
5. Student will be able to develop the skill of writing & Presentation in Seminars
6. Student will develop the Skill of Report Writing & Presentation in Exhibitions

UNIT-I to UNIT V

CONTENT

Organizing and participating in Technical Seminars, Exhibitions, Workshops, Conferences related to architecture and allied fields. Publishing papers and articles in reputed magazines and journals. Preparing, editing and publishing reports, dossiers, documents, magazines and portfolios of master's course work.

SUGGESTED READINGS:

1. Knight, A. and Ruddock, L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods" second edition, John Wiley & Sons. 2013.
3. Gibbs, J. P., "Urban Research Methods", (rev.ed.) Von Nostrand. 1988.
4. Booth, Wayne C., Gregroy G. Colomb, and Joseph M. Williams. 2008. The Craft of Research, 3rd edition. Chicago: University of Chicago Press.
5. Zeisel, J., "Inquiry by Design", Revised edition. New York: Norton, 2006.

15MARS211	RESEARCH AND FIELD STUDIES - II							SEMESTER-II			
Marks	Internal	40	External				60	Total	100	Exam Hours	6
Instruction Hours /week		L	1	T	0	P/S	2	Credits		2	

COURSE OBJECTIVE:

- To learn the importance of research & Field Studies in advanced level
- To understand the Research application in architectural design.
- To understand the different methods and techniques as relevant to the design profession
- To apply the research concepts in evaluation and appraisal of architectural design projects.
- To Analyse the Various methodologies of Field Survey in focus area such as Sustainability, housing etc
- To Develop the skill of preparation of report and Documentation in the focus area

COURSE OUTCOME:

1. Student will understand the methods of research
2. Student will be able to develop the Skill of field study and experimentation
3. Student will understand the research application in the field of Architectural Design
4. Student will understand about the collection of data and Analyse the data
5. Student will develop the skill of documentation of various Survey and Research
6. Student will be able to prepare documents, report writing and publish in journals

UNIT-I RESEARCH METHODS – PART -1

Importance, Purpose and Scope of Research methodology & field studies specific to the focus area. Understanding and Applying Qualitative, Analytical, Interpretative research in Architectural Design

UNIT-II RESEARCH METHODS – PART -2

Importance, Purpose and Scope of Research methodology & Field studies specific to the focus area. Understanding and Applying Quasi- Experimental, Experimental, Simulation and Modelling techniques in the focus area of Architectural Design.

UNIT-III FIELD STUDIES AND EXPERIMENT

Focus area and specialization specific Pilot Studies, Field Surveys and Collection of Samples - Physical, Architectural, Environmental, and Organizational

UNIT-IV FIELD STUDY ANALYSIS

Preparation and Analysis of Data Sheets and Questionnaires. Preparation and Analysis of Data Sheets and Questionnaires. Arriving at conclusions from the Research at Field Studies.

UNIT-V PROJECT REPORT

Arriving at conclusions from the Research at Field Studies. Report Writing and Publications.

SUGGESTED READINGS:

- 1.Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
 - 2.Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
 - 3.Gibbs, J.P., " Urban Research Methods", (rev.ed.) Von Nostrand. 1988.
 - 4.Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
 - 5.Khanzode, V.V., "Research Methodology -Techniques and Trends", APH Publishing. 1995.
- Books and Magazines/Journals specific to the focus area.

15MARS212	EXHIBITION AND SEMINAR - II							SEMESTER-II	
Marks	Internal	100	External			-	Total	100	Exam Hours
Instruction Hours /week		L		T	0	P/S	3	Credits	
									6
									2

COURSE OBJECTIVE:

- To comprehend the importance of Seminars
- To understand the methods of Exhibition
- To Understand the method of presentations in International Seminars
- To Understand the method of presentations in National Seminars
- To Undertake responsibilities to conduct a conference & Seminar
- To refer reputed journals/magazines and gain the skill & Importance of good presentation methods.

COURSE OUTCOME:

1. Student will be able to know the method of Seminar events
2. Student will understand the methods of Presentation in International Seminar
3. Student will understand the methods of Presentation in National Seminar
4. Student will be able to prepare and publish journal Articles
5. Student will be able to develop the skill of writing & Presentation in Seminars
6. Student will develop the Skill of Report Writing & Presentation in Exhibitions

UNIT-I to UNIT V

CONTENT

Organizing and participating in Technical Seminars, Exhibitions, Workshops, Conferences related to architecture and allied fields. Publishing papers and articles in reputed magazines and journals. Preparing, editing and publishing reports, dossiers, documents, magazines and portfolios of master's course work.

SUGGESTED READINGS:

1. Knight, A. and Ruddock, L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods" second edition, John Wiley & Sons. 2013.
3. Gibbs, J. P., "Urban Research Methods", (rev.ed.) Von Nostrand. 1988.
4. Booth, Wayne C., Gregroy G. Colomb, and Joseph M. Williams. 2008. The Craft of Research, 3rd edition. Chicago: University of Chicago Press.
5. Zeisel, J., "Inquiry by Design", Revised edition. New York: Norton, 2006.
1. 6. Joo-Hwa Bay and Boon- Lay ong, "Tropical Sustainable Architecture", Elsevier

15MARS213	ADVANCED DESIGN STUDIO – II								SEMESTER-II		
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	3	T	0	P/S	9	Credits		7	

COURSE OBJECTIVE:

- To learn the importance of and undertake the design process at advanced level t
- To learn the design aspects and considerations in large scale projects
- To understand the Urban Reformation and Renewal systems through Design
- To Categorize the Physiological and Psychological aspects in advanced level of Design
- I** • To understand the various design systems, guidelines and considerations as undertaken in the research and field studies and apply them in architectural design.
- To understand the future need for the city & design accordingly

COURSE OUTCOME:

1. Student will be able to design complex structures with advanced level planning principles
2. Student will be able to understand & design as per the Sustainability aspects
3. Student will be able to Design large scale projects
4. Student will understand the Physiological and Psychological aspects in advanced level of Design
5. Student will be able to give a wholesome product of design in all aspects
6. Student can give futuristic proposals for the urban Architecture.

UNIT-I to UNIT - V

CONTENT:

Design of advanced and complex built environments having strong linkages with the urban scale and focusing on architectural, spatial, landscape, environmental, structure, services and technology features.

Examples: Campus Design, Urban Centers, Mixed Use Development etc.

SUGGESTED READINGS:

1. Agkathidis, A., Hudert, M. and Schillig, G., "Form Defining Strategies: Experimenting Architectural Design", Wasmuth International. 2007.
2. Ching, F.D.K., "Architecture: Form, Space and Order", 3rd ed., John Wiley & Sons. 2007.
3. Morgan, C.L., "Jean Nouvel - The Elements of Architecture", Thames and Hudson. 1998.
4. Neufert, P., "Architects' Data", 3rd ed., Blackwell Science. 2000.

Any other books, documents and standards relevant to the focus area

15MARS311	DISSERTATION -1								SEMESTER-III		
Marks	Internal	160	External				240	Total	400	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	10	Credits		7	

COURSE OBJECTIVE:

- To Learn and show advanced understanding and application of the knowledge of Architectural design
- To Understand the Sustainability & housing in general or to any specific focus area through the culmination in a dissertation.
- I • To develop the skill of Unique research-based application through various Literature study
- To develop knowledge by own experimentation as per the chosen topic
- To do an in- depth study and analysis for a chosen topic of interest
- To present a Wholesome Technical Study report based on Experimentation and Research

COURSE OUTCOME:

1. Student will be able to identify the thrust area of research
2. Student will understand and develop his own dissertation topic with research -oriented study
3. Student will know the basis of experimentation, methods and applications
4. Student will understand the core ideas of Application design through the experimental research
5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach
6. Student will be able to provide innovative and practical solutions for the future architecture.

UNIT-I to UNIT - V

CONTENT:

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

SUGGESTED READINGS:

1. Knight, A. and Ruddock, L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
5. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2005.
6. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002.

I

.

.

15MARS411	DISSERTATION -II							SEMESTER-IV			
Marks	Internal	320	External				480	Total	800	Exam Hours	6
Instruction Hours /week		L	16	T	0	P/S	20	Credits		16	

COURSE OBJECTIVE:

- To Learn and show advanced understanding and application of the knowledge of Architectural design
- To Understand the Sustainability & housing in general or to any specific focus area through the culmination in a dissertation.
- To develop the skill of Unique research-based application through various Literature study
- To develop knowledge by own experimentation as per the chosen topic
- To do an in- depth study and analysis for a chosen topic of interest
- To present a Design report based on previous Experimentation and Research

COURSE OUTCOME:

1. Student will be able to identify the thrust area of research
2. Student will understand and develop his own dissertation topic with research - oriented study
3. Student will know the basis of experimentation, methods and applications
4. Student will understand the core ideas of Application design through the experimental research
5. Student will be able to analyse and synthesize a defined context with in-depth study and scientific approach
6. Student will be able to provide innovative and practical solutions for the future architecture by Design

UNIT-I to UNIT - V

CONTENT:

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

SUGGESTED READINGS:

1. Knight, A. and Ruddock, L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
5. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2005.
6. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002

LIST OF ELECTIVES		
FOCUS AREA: SUSTAINABLE ARCHITECTURE		
Elective 1	Introduction to Sustainable Architecture	15MARESS1
Elective2	Sustainable Trends and Theories	15MARESS2
Elective 3	Sustainable Design Strategies	15MARESS3
Elective 4	Sustainable Building Systems	15MARESS4
Elective 5	Building Performance Analysis	15MARESS5
FOCUS AREA: HOUSING DESIGN		
Elective 1	Introduction to Housing Design	15MARESH1
Elective2	Housing Policies and Schemes	15MARESH2
Elective 3	Sustainable Housing	15MARESH3
Elective 4	Community Participation in Housing	15MARESH4
Elective 5	Special Types of Housing	15MARESH5
FOCUS AREA: LANDSCAPE DESIGN		
Elective 1	Introduction to Landscape Design	15MARESL1
Elective2	Plants and Application	15MARESL2
Elective 3	Site Engineering	15MARESL3
Elective 4	Planting Design	15MARESL4
Elective 5	Advanced Landscape Theories	15MARESL5
FOCUS AREA: MEDICAL ARCHITECTURE		
Elective 1	Introduction to Medical Architecture	15MARESM1
Elective2	Medical Systems and Typologies	15MARESM2
Elective 3	Hospital Standards	15MARESM3
Elective 4	Management of Healthcare Facilities	15MARESM4
Elective 5	Special Types of Healthcare	15MARESM5
FOCUS AREA: STRUCTURES IN ARCHITECTURE		
Elective 1	Advanced Concrete Technology	15MARESA1
Elective2	Advanced Structural Analysis I	15MARESA2
Elective 3	Advanced Structural Analysis II	15MARESA3
Elective 4	Design of Concrete Structures	15MARESA4
Elective 5	Steel Structures	15MARESA5
FOCUS AREA: RETAIL AND EXHIBITION DESIGN		
Elective 1	Introduction to Retail and Exhibition Design	15MARESR1
Elective2	Visual Merchandising	15MARESR2
Elective 3	Animation for Design	15MARESR3
Elective 4	Exhibition Construction and Detailing	15MARESR4
Elective 5	Interactive Experience Design	15MARESR5

15MARESS1	INTRODUCTION TO SUSTAINABLE ARCHITECTURE							SEMESTER-I			
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To orient towards the United nations Sustainable Development goals
- To Understand the environmental impact of building as well as to safeguard the environment
- To Understand the Sustainable Design principles in Architecture
- To Understand the Climatic impacts due to urbanization and ways for mitigation.
- To Understand & work for the health & well- being of the building and its occupants.
- To Understand the broad guideline of various green Building Systems

COURSE OUTCOME:

1. Student will understand the fundamentals of sustainable concepts and applications
2. Student will understand the Site planning principles and its applications
3. Student will understand the climate and its impacts in indoor thermal comfort
4. Student will understand the energy usage ratio and the effective steps of conservation and utilization of energy.
5. Student will understand the Green building Rating Systems in a Broader context
6. Student will understand the Effective methods to propose green buildings through Case Studies

UNIT-I INTRODUCTION TO SUSTAINABILITY

Sustainable Design Concepts and Strategies - Energy and Environment in Architecture, Green building systems, Energy efficiency. Relevant Literature/Case studies.

UNIT-II SUSTAINABLE DESIGN PRINCIPLES

Sustainable Design Principles - Site planning, Resources, Built form, Climate responsiveness, Energy usage, Occupant behaviour and comfort. Relevant Literature/Case studies.

UNIT-III CLIMATE AND BUILT ENVIRONMENT

Climate and Built Form - Overview of Passive techniques for Day lighting, Ventilation, Solar Control and Thermal Comfort. Modelling methods and simulation for assessing building performance. Relevant Literature/Case studies.

UNIT-IV ENERGY AND ITS IMPACTS

Zero Energy and Zero Waste - Methods to achieve zero energy and zero waste in buildings, life cycle assessments and energy audits, renewable energy technologies, integrated energy design. Relevant Literature/Case studies and codes such as ECBC.

UNIT-V GREEN BUILDING SYSTEMS

Green buildings systems - GRIHA, LEED, BREEAM, GREEN STAR. Comparative Studies and analysis, relevance to India.

SUGGESTED READINGS:

- 1.Mili Majunder, Teri - Energy - Efficient Bldg in India - Thomson Press, New Delhi. 2001.
- 2.Arvind Krishnan & Others - Climate Responsive Architecture, Tata McGraw -Hill New Delhi. 2001.
- 3.Ralph M. Lebens - Passive Solar Architecture in Europe - 2, Architecture Press, London. 1983.
- 4.Charles. J. Kibert, 'Sustainable Construction' John Wiley and sons Inc, USA. 2004.
- 5.N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi. 2006
- 6.GRIHA manuals, TERI press
- 7.Norbert Lechner, "Heating, Cooling, Lighting", John wiley and sons
8. Mark Dekay and G.Z. Brown, "Sun, Wind and Light- Architectural Design Strategies", John Wiley and Sons
9. Szokolay, Koenigsberger, " Manual of Tropical Housing and building" 2014

15MARESS2	SUSTAINABLE TRENDS AND THEORIES								SEMESTER-II		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To Understand the various Sustainable Policies & mechanisms
- To Gain in-depth knowledge about vernacular & traditional practices
- To Gain knowledge about biomimicry and applications in building design
- To Gain Knowledge about Adaptive reuse & Urban regeneration
- To Understand about Resource Optimisation – Water Efficiency- Operational procedure
- To familiarize with the historic, contemporary and futuristic trends of sustainable building.

COURSE OUTCOME:

1. Student will be able to understand the policy level mechanisms and design process and product accordingly.
2. Student will understand the vernacular / traditional building types and its applications to the modern context by its systems and materials.
3. Student will understand to use the site in an optimum manner and know about the operational and maintenance practices.
4. Student will gain knowledge about biomimicry and its importance in sustainable design
5. Student will gain knowledge about futuristic design systems and new material applications.
6. Student will Understand about the Adaptive Reuse & urban Generation

UNIT-I POLICY AND REGULATORY MECHANISMS

Sustainable Design: Policies and regulatory mechanisms, Design practices

UNIT-II VERNACULAR AND TRADITIONAL PRACTICES

Sustainable Trends: Vernacular ways of sustainable building, Preservation of the regional and cultural identity, documentation and continuity of vernacular/traditional ways of building and detailing

UNIT-III RESOURCE OPTIMISATION

Sustainable Trends: Contemporary ideas and trends, Optimization Of site potential, Minimization of energy consumption, Protection and conservation of water resources, Use of environmentally friendly materials and products, Provision of a healthy and convenient indoor climate, Optimization of operational and maintenance practices

UNIT-IV DIGITAL APPLICATIONS AND FUTURISTIC APPROACH

Sustainable Trends: Futuristic thoughts and approaches, New materials and technologies, Application of digital technologies

UNIT-V ADAPTIVE REUSE AND URBAN REGENERATION

Sustainable Theories: Biomimicry, Adaptive Reuse, Urban regeneration

SUGGESTED READINGS:

1. Eco-Tech: Sustainable Architecture and High Technology by Slessor© - Thames and Hudson 1997
2. Sustainable Architecture: Low tech houses by Mostaedi (A) – Carles Broto 2002
3. Eco-design: A manual for Ecological Design by Yeang(K) – Wiley Academy 2006
4. O.H. Koenigsberger and others (2014), Manual of Tropical Housing and Building –Part I - Climate design, Orient Longman, Madras, India,
5. “Sun wind and light”- Mark Dekay, G. Z. Brown, Feb 2014

15MARESS3	SUSTAINABLE DESIGN STRATEGIES							SEMESTER-II	
Marks	Internal	80	External			120	Total	200	Exam Hours
Instruction Hours /week	L	2	T	0	P/S	4	Credits		4

COURSE OBJECTIVE:

- To understand the sustainable strategies and its principles in the design.
- To focus on passive means, reduction of active methods in building Function
- To gain a broad understanding of hybrid strategies and Mixed mode building
- To Understand in depth the green building Rating Systems all over India & Abroad
- To Understand the Design Aspects of Daylighting techniques for large scale projects
- To Understand the Design Aspects of heating & Ventilation techniques for large scale projects

COURSE OUTCOME:

1. Student will be able to apply the Sustainable design strategies in architecture, Design and environment
2. Student will be able to give design solutions of Thermal comfort for various climatic locations
3. Student will understand the application of Passive, Active and Hybrid Design strategies.
4. Student will become expertise in terms of green building aspects and applications.
5. Student will understand the in – depth Analysis of Daylighting
6. Student will understand the In- depth analysis of Ventilation technique.

UNIT-I DAYLIGHTING AND VENTILATION STRATEGIES

Sustainable Strategies - Day lighting -WWR – Daylight Factor, Daylight levels – ERC, SC, IRC, Visible light Transmittance – Code compliance – Indian Standards – Lighting Standards. Ventilation – Fenestrations- Methods and calculations – Orientation strategies- Wing walls – Permeable buildings – Stack- Chimney – Cross ventilation etc

UNIT-II SOLAR CONTROL AND SHADING STRATEGIES

Sustainable Strategies - Solar Control -Sun Path – Shading concepts – radiation control – Heat balance – thermal properties of materials- Heat Dissipation – Albedo effect etc. Thermal Comfort – ASHRAE standards, Adaptive comfort model, Operative temperature, Tropical Summer Index, Comfort indices – Shading methods for Indoor thermal Comfort etc

UNIT-III STRATEGIES ASSESMENT BY SIMULATION

Sustainable Strategies - Modelling methods and simulation for assessing building performance – Simulation software – Daylight, Irradiation, Mean radiant temperature calculations etc

UNIT-IV GREEN BUILDING SYSTEM AND RATING- APPLICATIONS

Sustainable Strategies - Green buildings systems such as GRIHA, LEED, ECBC, BREEAM, and GREEN STAR. - Rating systems and applications in Residential, Commercial and Industrial buildings etc

UNIT-V CASE STUDY AND COMPARITIVE STUDIES

Sustainable Strategies - Comparative Studies of the different Case studies of buildings with rating systems and their analysis with relevance to India.

SUGGESTED READINGS:

1. GRIHA, LEED, BREEAM and GREEN STAR manuals.
2. Mark deKay and G. Z. Brown, "Sun Wind and light – Architectural Design Strategies", John Wiley and sons, New York. 2013
3. Norbert Lechner, 'Heating, cooling and Lighting', 2011
4. Edward Allen, "How Buildings Work-The Natural Order of Architecture", Oxford University Press
5. Mili Majumder, Teri - Energy - Efficient Bldg in India - Thomson Press, New Delhi. 2001.
6. Arvind Krishnan & Others - Climate Responsive Architecture, Tata McGraw -Hill New Delhi. 2001.
1. Ralph M. Lebens - Passive Solar Architecture in Europe - 2, Architecture Press, London. 1983.

15MARESS4	SUSTAINABLE BUILDING SYSTEMS								SEMESTER-III		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To Understand the low Energy Building Concepts with case studies
- To Understand the Indoor Environmental Quality aspects through survey & Case studies
- To Gain understanding & knowledge about the green Materials
- To learn & provide a comfortable, healthy, and productive environment and landscape with minimal energy and better environmental impact.
- To Gain Understanding about the Smart technologies for the Energy management
- To Gain Understanding & Knowledge about the Energy & Cost Audit

COURSE OUTCOME:

1. Student will be able to gain knowledge and application of low energy building design
2. Student will understand the thermal quality standards and its importance in various countries
3. Student will understand the use of green materials and products for a sustainable future.
4. Student will be able to calculate the energy consumption features and the cost audits.
5. Student will be able to understand the integrated building management systems for a controlled environment.
6. Student will be able to understand the energy and cost audits

UNIT-I LOW ENERGY BUILDING

Sustainable Building - Low energy building design and operation. -types of energy – consumption- renewable/ non-renewable-Hybrid design strategies-

UNIT-II INDOOR ENVIRONMENTAL QUALITY

Indoor Environment - Quality and Standards, Indoor Air Quality-indoor thermal comfort- levels – activity analysis- carbon emissions etc

UNIT-III GREEN MATERIALS

Building Systems - Green Materials and green Products- Manufacture- reuse- reduce-recycled materials

UNIT-IV SMART TECHNOLOGIES

Building Systems – Smart Materials and systems- Integrated buildings- Energy saving – Automations

UNIT-V ENERGY AND COST AUDITS

Building Services - Energy and Cost audits.

SUGGESTED READINGS:

7. Mili Majunder, Teri - Energy - Efficient Bldg in India - Thomson Press, New Delhi. 2001.
8. Charles. J. Kibert, 'Sustainable Construction' John Wiley and sons Inc, USA. 2004.
1. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi. 2006

15MARESS5	BUILDING PERFORMANCE ANALYSIS								SEMESTER-III		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits			4

COURSE OBJECTIVE:

- To Understand the principles of Sustainable building through Simulation process
- To learn the simulation techniques with digital applications, and to get quantifiable results by usage of various building simulation analysis software.
- To Understand the Effective methods of Daylighting through Simulation
- To Understand the Effective methods of Reduction of Solar Radiation through Simulation
- To Understand the effects of Indoor thermal comfort through Simulation.
- To Understand the Energy performance Index of a Building

COURSE OUTCOME:

1. Student will understand the effects of indoor comfort through software simulation and analysis
2. Student will be able to achieve a quantitative result of thermal analysis by software simulations
3. Student will be able to effectively use the modelling tools and techniques
4. Student will be able to design a building with good thermal comfort with optimum design solutions
5. Student will be able to give quantitative results of Daylighting and Ventilation of a building
6. Student will be able to give an energy performance index of a building.

UNIT-I BUILDING PERFORMANCE-DATA FILES

Building Performance Analysis - Design Optimization and Visualization using Building Information Modelling. - use of Epw file – TMY data extraction – IMD files

UNIT-II DAYLIGHTING, IRRADIATION AND WIND ANALYSIS

Building Performance Analysis - Daylighting, Shading and Ventilation.

UNIT-III ENERGY ANALYSIS

Building Performance Analysis - Whole building energy analysis.

UNIT-IV MODELLING TOOLS

Building Performance Analysis - Modelling Tools and Techniques.

UNIT-V SIMULATION TOOLS

Building Performance Analysis - Simulation Tools and Techniques.

Suggested software: CLIMATE CONSULTANT, HEED, SBEED, OPAQUE, ECOTECH, SKETCHUP – OPEN STUDIO, OPTIVENT, ENERGY PLUS, DAYSIM -RADIANCE, COOLVENT, RHINO-GRASSHOPPER-LADY BUG, DIVA, DRAGONFLY, SEFAIRA, IES-VE, VELUX and recent software.

SUGGESTED READINGS:

7. Autodesk Manuals for BIM tools such as CAD, REVIT, ECOTECH
8. Rhino tutorials
9. Sefaira tutorials
10. Climate consultant Tutorials
11. IES tutorials
12. Computational fluid Dynamics – Tutorials

15MARESH1	INTRODUCTION TO HOUSING DESIGN							SEMESTER-I		
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4

COURSE OBJECTIVE:

- To Gain Knowledge about the Housing Typologies all over the world
- To Understand the principles of Community living & Neighbourhood
- To Understand the social, economic, environmental, and psychological implications of housing process and products.
- The goal is to familiarize with housing as a process and a product in the context of the individual, the family, and the community.
- To introduce various stakeholders involved in the housing scenario.
- To Understand about the Housing Finance

COURSE OUTCOME:

1. Student will be able to gain knowledge about housing typologies
2. Student will understand about the theories and concepts of community and Neighbourhood
3. Student will understand about the emerging trends in housing
4. Student will understand about the housing finance schemes and management
5. Student will understand the relation of housing and real estate management in the global and local scenario.
6. Student will Understand the Basis of Housing Demand all over the world

UNIT-I HOUSING TYPOLGY

Housing typologies - Identification of stakeholders, roles responsibilities of various stakeholders, classification of various typologies.

UNIT-II COMMUNITY AND NEIGHBOURHOOD

Community and neighborhood - Theories and concepts, Understanding the scale of housing.

UNIT-III CONTEMPORARY HOUSING

Architectural styles and preferences - Trends in contemporary housing types, greater role for the architect in housing.

UNIT-IV HOUSING FINANCE

Housing finance - Economic consideration and feasibility studies. Various housing financial institutions

UNIT-V HOUSING AND REAL ESTATE

Housing markets - Real estate scenario, Land availability & Acquisition, suburban and rural trends.

SUGGESTED READINGS:

1. Merrill, J.L. (Ed.). Introduction to Housing. Upper Saddle River, NJ:Pearson Prentice Hall. 2006
2. Joseph DeChiara, Julius Panero. Time-Saver Standards for Interior Design and Space Planning, McGraw-Hill Education, 2001
3. Robert E. Stevens, Philip K. Sherwood. How to prepare a feasibility study Prentice-Hall, 1982
4. Susan S. Fainstein, Scott Campbell, Readings in Planning Theory, Wiley, 2011
5. Doris Kohn, J. D. von Pischke, "Housing Finance in Emerging Markets: Connecting Low-Income Groups to Markets"Springer

15MARESH2	HOUSING POLICIES AND SCHEMES								SEMESTER-II		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To learn about the housing schemes and policies
- To learn about the Urban housing scenario
- To learn about the Rural housing scenario
- To explore about the stakeholders in the housing
- To gain knowledge about the Central government schemes
- To gain Knowledge about the State Government Schemes

COURSE OUTCOME:

1. Student will learn and gain knowledge the housing schemes and policies
2. Student will gain knowledge about the urban housing scenario
3. Student will gain knowledge about the rural housing scenario
4. Student will gain knowledge about the stakeholders in the housing
5. Student will gain knowledge about the systematic approach for the future housing demand.
6. Student will gain knowledge about the Schemes of Central & State government

UNIT-I HOUSING POLICY IN INDIA

Housing Policy in the India - Government policies on housing, Government Agencies in housing sector, Classification of housing Stock

UNIT-II CENTRAL GOVERNMENT SCHEMES

Central Government Schemes - Identification and review of schemes with housing component.

UNIT-III STATE GOVERNMENT SCHEMES

State government Schemes - Identification and review of schemes with housing component.

UNIT-IV URBAN HOUSING

Urban housing Scenario - Housing scenario, Housing typology, Housing Stock & shortage, Demand and supply, emerging trends.

UNIT-V RURAL HOUSING

Rural Housing Scenario - Housing scenario, Housing typology, Housing Stock & shortage, Demand and supply, emerging trends.

SUGGESTED READINGS:

- 1.National Urban Housing and habitat policy, 2007
- 2.<http://www.tnhb.gov.in/dept.aspx>
- 3.<http://mhupa.gov.in/policies/>
- 4.http://nhb.org.in/Urban_Housing/HousingjDolicies.php

15MARESH3	SUSTAINABLE HOUSING							SEMESTER-II	
Marks	Internal	80	External			120	Total	200	Exam Hours
Instruction Hours /week		L	2	T	0	P/S	4	Credits	4

COURSE OBJECTIVE:

- To Understand about the Site Analysis
- To gain Knowledge about Affordable housing
- To gain Knowledge about Resource Mapping
- To gain Knowledge about advanced level of Building services for housing
- To learn and understand the current interventions in housing sector and propose a sustainable approach towards the housing.
- To learn about High Performance Housing

COURSE OUTCOME:

1. Student will be able to understand the sustainable site planning with site inventory and analysis
2. Student will understand about Affordable housing techniques
3. Student will learn about cost effective techniques in housing.
4. Student will be able to understand the resource mapping
5. Student will be able to understand the advance level building services
6. Student will be able to understand & design high performance houses

UNIT-I SITE ANALYSIS

How Site and climate related issues affect the design parameters and decisions. -Site Inventory and Analysis- Location, Access- Circulation, Traffic, Climate, Sensory – Analysis

UNIT-II AFFORDABLE HOUSING

Exploring the social and economic choices, options and decision of housing, various technologies available.

UNIT-III RESOURCE MAPPING

Identifying the resources (construct techniques & technology, Manpower & Material) predominant in that area. Understanding the Availability and Cost implication of the resources.

UNIT-IV BUILDING SERVICES

An in depth understanding of building system, how houses work as a system.

UNIT- V HIGH PERFORMANCE HOUSING

Exploring the science and technology required to build high performance houses.

SUGGESTED READINGS:

1. Thomas Russ, Site Planning and Design Handbook, Second Edition, McGraw-Hill Education, 2009
2. Joseph De Chiara, Julius Panero Time-Saver Standards for Interior Design and Space Planning, McGraw-Hill Education, 2001.
3. Clayton Bennett Greening Your Home: Sustainable options for every system in your house McGraw-Hill Professional 2008
4. Global Green USA, "Blueprint for Greening Affordable Housing" Island Press. 2007
5. Jessica Kellner Housing Reclaimed: Sustainable Homes for Next to Nothing New Society

15MARESH4	COMMUNITY PARTICIPATION IN HOUSING								SEMESTER-IV		
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To gain knowledge about the Community participation in Housing
- To gain deep understanding about the Planning Aspects in Housing
- To gain knowledge about the planning process
- To Learn and determine the involvement end users in various stage of housing process across.
- To learn about the community participation for various typologies
- To learn about various best practices in community Housing Through Case studies

COURSE OUTCOME:

1. Student will be able to develop a model for both the end user and the service provider
2. Student will be able to involve in planning in design stages
3. Student will be able to understand the intricacies of Community participation in Housing
4. Student will be able to give design solution for the future community housing
5. Student will gain Knowledge about the best practices in Community housing

UNIT-I COMMUNITY PARTICIPATION PLANNING

Awareness and importance of Community participation, Planning and design stages - Zoning studies, spatial analysis, customs & cultural practices and user -based studies

UNIT-II PLANNING ASPECTS

People-based planning - Identifying & incorporating Aspiration, Needs & Affordability, incorporating special needs of the elderly and children, concept of better living. Degrees of customizations

UNIT-III PLANNING PROCESS

Familiarization with development and planning process of various agencies (Public, Private (Multifamily), Private (single family), Co-operative, NGO), view on community participation, organizational structure, Project and product brief, Identification of beneficiaries.

UNIT-IV COMMUNITY PARTICIPATION MODELS AND CASE STUDIES

Existing models of community participation across various typologies, best practices, Case studies.

UNIT-V TYPOLOGY

Developing models for community participation for various typologies and stages.

SUGGESTED READINGS:

- 1.Sylvia J.T. Jansen, Henny C.C.H. Coolen and Roland W. Goetgeluk, "The Measurement and Analysis of Housing Preference and Choice" Springer 2011
- 2.Andrew Beer, Debbie Faulkner, Chris Paris, Terry Clower - Housing transitions through the life course: Aspirations, needs and policy 2011
- 3.Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
- 4.Merrill, J.L. (Ed.). Introduction to Housing. Upper Saddle River, NJ:Pearson Prentice Hall. 2006
- 5.Juilenne Hanson, Decoding Homes and Houses Cambridge University Press 2003

15MARESH	SPECIAL TYPES OF HOUSING							SEMESTER-IV			
Marks	Internal	80	External				120	Total	200	Exam Hours	6
Instruction Hours /week		L	2	T	0	P/S	4	Credits		4	

COURSE OBJECTIVE:

- To gain Knowledge about the Vernacular housing in Chettinad Region
- To Gain knowledge about the Vernacular housing in Hill region
- To understand the Various techniques involved in the vernacular construction
- To understand about Disaster prone areas and methodologies for housing in those regions
- To learn about the influences of social, economic and environmental factors in housing
- Exploring housing typologies which tends to lean more on a aspect more than the rest.

COURSE OUTCOME:

1. Student will learn and understand the Vernacular Architecture of various regions of world
2. Student will learn and understand the Vernacular Architecture of various regions of India
3. Student will learn and understand the Vernacular Architecture of various regions of Tamilnadu
4. Student will learn about design aspects and historical methods of construction which can be adopted for a particular context
5. Student will learn and understand the types of housing in disaster prone areas
Student will be able to Propose the housing trend for the Future

UNIT-I VERNACULAR- CHETTINAD REGION

Vernacular Architecture - Typology 1 - Chettinad region - Social factor influencing Architectural features, Location characteristics, Climatic consideration.

UNIT-II VERNACULAR-HILL REGION

Vernacular Architecture - Typology 2 - Hill region - Social factor influencing Architectural features, Location characteristics, Climatic consideration.

UNIT-III VERNACULAR – DESERT REGION

Vernacular Architecture - Typology 3 - Desert region - Social factor influencing Architectural features, Location characteristics, Climatic consideration.

UNIT-IV HOUSING – DISASTER PRONE AREAS

Housing in Disaster prone areas - Classification of Disaster, Disaster Management Cycle, Housing interventions.

UNIT-V HOUSING – FUTURE CONCEPTS

Future concepts - Development trends, Product categories, material trends, People preferences

SUGGESTED READINGS:

1. Richard Hyde, Bioclimatic Housing: Innovative Designs for Warmer Climates, Earthscan
2. Willie Webber, Simos Yannas (ed.) Lessons from vernacular Architecture, Earthscan
3. Ilay Cooper, Traditional Buildings of India, Thames and Hudson, 1998
4. Monisha Bharadwaj, India Style, Bay Soma Publishing -2003

FACULTY OF PHARMACY

15PYU101

SEMESTER-I

HUMAN ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION– I 3H 3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.
- It also helps in understanding both homeostatic mechanisms.
- It also helps in understanding homeostatic imbalances of various systems of the body.
- Since a medicament, which is produced by the pharmacist, is used in various disease conditions to correct the abnormal functioning of the body systems.
- The basic knowledge of this subject is must for a student to understand how drugs act on various systems/organs in correcting the disease state of organs/systems.
- Thus it becomes a prerequisite subject for the pharmacy course.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the gross morphology, structure and functions of various organs of the human body.
2. Understand the various homeostatic mechanisms and their imbalances.
3. Identify the various tissues and organs of different systems of the human body.
4. Perform the haematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time, etc and also record blood pressure, ECG, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system.
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of the human body.

Course Content:**UNIT - I**

Introduction to anatomy and physiology and health education with basic terminology- Introduction to Cell physiology-Different type of cells-cell membrane physiology and development of Action potential- impulse transmission-cardiac and skeletal muscles Electrophysiology- Cell stimulation and neuronal functions-Tissues types and characteristics – epithelial –connective-muscular and nervous tissues- **Structure and function of joints and bones** - skeleton- types of joints and their disorders.

UNIT - II

Composition and functions of blood including their disorders- Blood grouping and its significance- the mechanism of coagulation-bleeding and clotting disorders- Formation of lymph and

its composition-Reticular endothelial system and its functions.

UNIT - III

Anatomy and physiology of cardiovascular system—heart- blood circulation – systemic –hepatic – Pulmonary- fetal and circle of Willis- cardiac cycle-heart rate-blood pressure and its regulation- ECG and heart sounds.

UNIT - IV

Gross anatomy of the G.I.T and its physiology with special reference to liver – pancreas and stomach – Digestion – absorption - movements of intestine and disorders of digestive system – constipation - diarrhea and vomiting.

UNIT - V

Anatomy of respiratory tract - mechanism of respiration lung volumes - transport of oxygen and carbon dioxide - Disorders like cyanosis- mountain sickness and Caisson's disease - Cough and sneezing reflex – Structure and functions of kidney and urinary tract – Physiology of urine formation and acid-base balance.

TEXT BOOKS:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Anne Waugh and Allison Grant	Ross and Wilson Anatomy and Physiology in Health and illness	Churchill Livingstone Elsevier-UK	2013

REFERENCES:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.C.Chatterjee	Human Physiology - Vol.-I & II	Medical Allied Agency-Calcutta	1997
2	Gerard J Tortora- Bryan Derrickson	Principles of Anatomy and Physiology	Wiley-USA	2014
3	Cinnamon Van Putte	Seeley's Fundamentals of Human Anatomy and Physiology	Tata Mc GrawHill-New Delhi	2009

WEBSITES:

- www.khanacademy.org
- www.biologycorner.com
- www.gwc.maricopa.edu

15PYU111

SEMESTER-I

**HUMAN ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION
LABORATORY – I****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.
- It also helps in understanding both homeostatic mechanisms.
- It also helps in understanding homeostatic imbalances of various systems of the body.
- Since a medicament, which is produced by the pharmacist, is used in various disease conditions to correct the abnormal functioning of the body systems
- The basic knowledge of this subject is must for a student to understand how drugs act on various systems/organs in correcting the disease state of organs/systems.
- Thus it becomes a prerequisite subject for the pharmacy course.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the gross morphology, structure and functions of various organs of the human body.
2. Understand the various homeostatic mechanisms and their imbalances
3. Identify the various tissues and organs of different systems of the human body.
4. Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time, etc and also record blood pressure, ECG, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of the human body.

Course content:

1. Guidelines in laboratory discipline
2. Introduction to microscope
3. The study of common objects
4. Hemocytometry
5. Estimation of Bleeding time
6. Estimation of Clotting Time
7. Determination of RBC
8. Determination of WBC
9. Estimation of hemoglobin content
10. Determination of ESR

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Anne Waugh and Allison Grant	Ross and Wilson Anatomy and Physiology in Health and illness	Churchill Livingstone Elsevier-UK	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.C.Chattterjee	Human Physiology - Vol.-I & I I	Medical Allied Agency-Calcutta	1997
2	Gerard J Tortora- Bryan Derrickson	Principles of Anatomy and Physiology	Wiley-USA	2014
3	Cinnamon Van Putte	Seeley's Fundamentals of Human Anatomy and Physiology	Tata Mc GrawHill-New Delhi	2009

WEBSITES:

- www.khanacademy.org
- www.biologycorner.com
- www.gwc.maricopa.edu

15PYU102

SEMESTER-I

PHARMACEUTICAL INORGANIC CHEMISTRY –I**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- Study about various role of inorganic compounds which having medicinal use.
- This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.
- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- This subject deals with general methods of preparation and reactions of some organic compounds.
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals.
2. Understand the medicinal and pharmaceutical importance of the inorganic compounds.
3. Write the molecular formula and balance chemical equations and understand the development of periodic table.
4. Understand the importance of quality control.
5. Discuss the nuclear reactions and radioactivity.
6. Elaborate the importance of topical agents.

Course Content:**UNIT – I**

Learning symbols and valency of elements –Writing molecular formula- balancing the equation Pharmacopoeia and monograph - Development of periodic table of the modern concept of atomic structure and its importance.

UNIT – II

Importance of quality control - sources and types of impurities in pharmaceutical substances - Test for purity – Swelling power in bentonite- acid is replacing capacity of antacid- presence of iodates and ferric ion - Limit test – Definition – importance- general procedure for limit test for chloride – sulphate – iron – arsenic - heavy metals and lead - Modified limit test for chloride and

sulphate in potassium permanganate- sodium bicarbonate and sodium salicylate - Modified limit test for chlorinated compounds in sodium benzoate.

UNIT – III

Nuclear reactions –radioactivity–nomenclature – units- detection and measurement of radioactivity- clinical applications and dosage – hazards- precautions and storage- biological effects of radiation - Radio pharmaceutical preparations and standards of radioactive material such as ^{131}I Iodine- ^{58}Co Cobalt - Radio opaque contrast medium-barium sulfates.

Method of preparation- assay- identification test-test for purity- storage conditions- official preparations and uses of inorganic compounds in the following categories:

UNIT – IV

Gastrointestinal agents and related compounds -Acidifiers - Dilute hydrochloric acid – Sodium phosphate – Ammonium chloride - Antacids –Classification- qualities of ideal antacid- side effects – advantages- combination therapy-acid neutralizing capacity-sodium bicarbonate-potassium citrate-aluminium hydroxide gel- dried aluminium hydroxide gel-aluminium phosphate-magnesium hydroxide-light and heavy magnesium trisilicate-lightandheavymagnesiumcarbonate-calciumcarbonate-magaldrate and bismuth carbonate -Adsorbents and protectives - Light kaolin-heavy kaolin and bismuth sub-carbonate –Saline cathartics - Magnesium hydroxide-magnesium sulphate-magnesium carbonate and Sodium phosphate.

UNIT – V

Topical Agents - Protective - Talc-zinc oxide-calamine-zinc stearate-titanium dioxide – kaolin-silicon polymers and Dimethicone - Astringents - Alum- zinc sulfate and zinc chloride - Antimicrobials –Hydrogen peroxide-potassium permanganate-chlorinated lime-iodine-boric acid-silver nitrate-sodium stilbo gluconate –povidone – iodine-selenium sulfide and zinc undecenoate.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V.N Rajasekaran	Text Book of pharmaceutical Inorganic Chemistry	Sun Publications	2005

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr.B.G.Nagavi	Pharmaceutical Inorganic chemistry	S.Chand	2007
2	Surendra N. Pandeya	A text book Inorganic medicinal chemistry	Sg Publisher	2011

3	Anand & Chatwal	Inorganic Pharmaceutical Chemistry	Himalaya Pub. House	2010
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	1996

WEBSITES:

- www.slideshare.com
- www.ucdavis.com
- www.chem.tamu.edu

15PYU112

SEMESTER-I

PHARMACEUTICAL INORGANIC CHEMISTRY LABORATORY-I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100
External Semester Exam: 3 Hours**Course Objectives:**

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- Study about various role of inorganic compounds which having medicinal use.
- This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.
- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- This subject deals with general methods of preparation and reactions of some organic compounds.
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. Understand the medicinal and pharmaceutical importance of the inorganic compounds
3. Write the molecular formula and balance chemical equations and understand the development of periodic table.
4. Understand the importance of quality control.
5. Discuss the nuclear reactions and radioactivity.
6. Elaborate the importance of topical agents.

Course Content:

Limit test for Chloride

1. Limit test for Sulphate
2. Limit test for Iron
3. Preparation of Barium sulphate
4. Preparation of Magnesium sulphate
5. Preparation of Boric acid
6. Test for acid neutralizing capacity of Aluminium hydroxide gel
7. Test for adsorption power in heavy kaolin
8. Systematic qualitative analysis for unknown inorganic mixture (four experiments)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V.N Rajasekaran	Text Book of pharmaceutical Inorganic Chemistry	Sun Publications	2005

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	1996

WEBSITES:

- www.slideshare.com
- www.ucdavis.com
- www.chem.tamu.edu

15PYU103

SEMESTER-I

PHARMACEUTICAL ORGANIC CHEMISTRY –I**3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry.
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds.
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will Explain molecular orbital theory.

1. Understand the strain theories.
2. Describe effect of substituents on the reaction.
3. Elaborate the different mechanisms of reaction.
4. Account for the structure, stability, orientation, reaction and its mechanism of Benzene.
5. Explain different Reaction Intermediates & their application in reaction mechanism.
6. How to name the organic compounds?
7. Explain different reaction involve in the formation of aromatic compounds.

Course Content:**UNIT – I**

Molecular orbital theory- wave equations- molecular orbitals – bonding- anti-bonding orbitals- unshared pair of electrons and hybrid orbitals -Intra-molecular and inter-molecular forces- their effect on solubility-boiling point-melting point-covalent bond-polarity of bond-polarity of molecule-dipole moment- bond dissociation energy- energy of activation- solubility of ionic solutes and non ionic solutes.

UNIT – II

Inductive effect- electromeric effect- mesomeric effect-resonance effect –resonance – tautomerism–conjugation –hyper conjugation-types of bond fission- electrophiles and nucleophiles – IUPAC nomenclature of organic compounds.

UNIT – III

Mechanism of halogenations of alkanes- sp^3 Hybridization in alkanes- stabilities of alkenes- sp^2 Hybridization in alkenes-thermodynamics and kinetics of their actions of methane with a halogen-

Saytzeff's rule-free radical and electrophilic addition on C=C bond- Markownikoff's rule-Peroxide effect – Ozonolysis – mechanism of Diel's - Alder reaction and addition reaction of conjugated dienes.

UNIT – IV

Bayer's strain theory-Limitations of Bayer's strain theory- Coulson and Moffitt's modification- Sachse Mohr's theory (Theory of strainless rings).

UNIT – V

Derivation of structure of benzene-Kekule structure- heat of hydrogenation and stability- C-C bond length in benzene-Resonance structure of benzene-orbital picture-aromatic character-Huckel's rule-Mechanism of electrophilic and nucleophilic aromatic substitution –reaction –Theory of effect of substituent on reactivity and orientation- Preparation and reactions of benzene including Friedel crafts alkylation and acylation.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arun Bahl and B.S Bhal	Advanced Organic Chemistry	S. Chand	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.I. Elliel.	Stereo Chemistry of Organic Compounds	Wiley Eds	1988
2	Cramand Hammered	Organic chemistry	Pine Hendrickson	2005
3	Jerry March	Advanced Organic Chemistry: Reactions, Mechanisms, and Structure	Wiley: New York, NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU113

SEMESTER-I

PHARMACEUTICAL ORGANIC CHEMISTRY LABORATORY-I**3H****3C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Explain molecular orbital theory.
2. Understand the strain theories.
3. Describe effect of substituents on the reaction.
4. Elaborate the different mechanisms of reaction.
5. Account for the structure, stability, orientation, reaction and its mechanism of Benzene.
6. Explain different Reaction Intermediates & their application in reaction mechanism.
7. How to name the organic compounds.
8. Explain different reaction involve in the formation of aromatic compounds.

Course Content:

1. Preparation of Salicyclic acid
2. Preparation of Benzamide
3. Preparation of Iodoform
4. Preparation of Phenyl Benzoate
5. Preparation of Dibenzilidene acetone
6. Assay of organic compounds involving acidimetry, alkalimetry (at least 02).
7. Melting point of any synthesized compound
8. Stereo models
9. Systematic qualitative analysis of organic compounds including preparation of derivative (not less than 4 compounds with different functional groups).

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arthur I Vogel	Practical Organic Chemistry by vogel	Dorling Kindersley	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.I. Eliel.	Stereo Chemistry of Organic Compounds	Wiley Eds	1988
2	Cramand Hammered	Organic chemistry	Pine Hendrickson	2005
3	Jerry March	Advanced Organic Chemistry: Reactions, Mechanisms, and Structure	Wiley: New York, NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU104**SEMESTER-I****PHARMACOGNOSY AND PHYTO CHEMISTRY –I****3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the cultivation and production of crude drugs and their usefulness.
- This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- Know the techniques in the cultivation and production of crude drugs.
- To know the crude drugs, their uses and chemical nature.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand basic concepts of Pharmacognosy and their usefulness.
2. Know the History, Present status, Future scope, Development of Pharmacognosy.
3. Understand the classification of crude drugs.
4. Demonstrate the principles and advances in the cultivation and production of drugs.
5. Understand the Different methods of adulteration of crude drugs and evaluation methods.
6. Explain the detailed study of crude drugs like source, cultivation, collection, preparation, storage, diagnostic characters (Macroscopic & Microscopic techniques applied) constituents, chemical tests, substitutes, adulterants & uses.

Course Content:**UNIT – I**

Definition-History-Present status-Future scope-Development of Pharmacognosy.

UNIT – II

Alphabetical –Biological –Chemical –Pharmacological –Taxonomical- Chemotaxonomical and Serotaxonomical classification of crude drugs.

UNIT – III

General principles of cultivation & collection of vegetable drugs of commercial - Significance from wild & cultivated source-Advantage and disadvantages of cultivation-Soil and soil fertility-Factors influencing cultivation of medicinal plants –Processing – storage-and preservation of crude drugs-Study of natural pesticides.

UNIT – IV

Different methods of **adulteration of crude drugs** & their detection by evaluation methods – Introduction – morphological – Microscopical – physical – chemical- biological and spectral analysis of herbal drugs.

UNIT – V

Detailed study of crude drugs with emphasis on source- cultivation- collection- preparation-storage- diagnostic characters (Macroscopic & Microscopic techniques applied) – constituents-chemical tests– substitutes- adulterants & uses of: **Carbohydrates** and their derived products: Agar- Gum Acacia- Gum tragacanth – Honey – Isapgol – pectin – Starch-Tannins: Gambier- Black Catechu – Gall –Myrobalan- Pale catechu and Tannic acid –**Lipids** -Castor oil- Shark liver oil- Wool fat – Beeswax-Neem oil- Cod liver oil and Bran oil –Proteins –Gelatin -Spirullina and soya -**Volatile oils** Mentha – Coriander – Cinnamon – Cassia – Caraway – Dill – Clove – Fennel – Nutmeg – Cardamom- Lemon grass oil – Eucalyptus – Sandalwood- Palmarosa and Citronella–**Saponins** – Liquorice – Ginseng – Dioscorea -**Cardio active sterols** – Digitalis-Squill and Strophanthus – **Steroid**al -Kurchi- Solasodine -**Alkaloidal amines** -Ephedra and Colchicum –**Glycoalkaloids** – Solanum species.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kokate C.K- Purohit A.P- Gokhale S.B	Text book of Pharmacognosy	Niraliprakashan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trease and Evans	Pharmacognosy	W.B Sauders	2002
2	James Robbers- Marilyn K. Speedice and Varro E.- Tyler	Pharmacognosy and Pharmaco biotechnology	Williams and Wilkins	1996
3	TE Wallis	Textbook of Pharmacognosy	CBS publishers and Distributors- New Delhi	2005

WEBSITES:

- www.autorstream.com
- www.e Pharmacognosy.com
- www.science20.com

PHARMACOGNOSY AND PHYTO CHEMISTRY LABORATORY –I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the cultivation and production of crude drugs and their usefulness.
- This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- Know the techniques in the cultivation and production of crude drugs.
- To know the crude drugs, their uses and chemical nature.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the name of crude drugs.
2. Identify the crude drugs by morphological characters.
3. Perform the staining, sectioning of crude drugs.
4. Perform the staining and view the powder characters of crude drugs.
5. Demonstrate macroscopical characters for unorganized crude drugs.
6. Demonstrate chemical tests to identify unorganized crude drugs.

Course Content:

1. Identification of crude drugs listed in theory (entire condition) by Morphological characters.
2. Microscopical studies of some selected drugs:
 - a. Datura – Digitalis – Cinnamon – Clove – Ephedra – Liquorice – Fennel- Coriander.
3. Microscopical studies of some selected powdered drugs of single component or mixture of two components:
 - a. Datura –Cinnamon – Digitalis –Ipecac – Clove – Fennel- Coriander.
4. Identification of unorganized drugs by Morphological characters and chemical tests.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.B.Gokale and C.K kokate	Practical Pharmacognosy	Vallabh prakasan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Khandelwal KR	Practical pharmacognosy	Niraliprakasan	2005

WEBSITES:

- www.autorstream.com
- www.e pharmacognosy.com
- www.science20.com

15PYU105

SEMESTER-I

BIOSTATISTICS & COMPUTER APPLICATIONS-I**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the computer basics.
- To learn the statistical method of analysis that can apply in the development and use of therapeutic drug.
- This subject deals with the introduction Database, Database Management system.
- This subject deals with the Computer application in clinical studies and use of databases.
- To switch the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.
- To organize, summarize, and display quantitative data.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Able to organize, summarize, and display quantitative data.
2. Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals
3. Know the various types of application of computers in pharmacy.
4. Know the various types of data bases.
5. Know the various applications of data bases in pharmacy.
6. Swith the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.

Course Content:**UNIT – I**

Application of biostatics in medicine and pharmacy - collection of data - classification and tabulation of statistical data- diagrammatic and graphical representation - measure of central tendency - Mean – Median- mode – geometric Mean.

UNIT – II

Purpose of sampling- methods of sampling- test significance-Null hypothesis and alternative hypothesis- standard errors-one tailed test and two tailed test-T test.

UNIT – III

Correlation analysis- application of correlation analysis- types of correlation-Scatter diagram- karl pearson's correlation coefficient- spearman's rank correlation coefficient.

UNIT – IV

Computer application - Basic computer components of organization- classification of computers-

binary number system conversion- types of memory device - network topology - types of computer networks- internet search engine- computer input and output device – multimedia- MS office package- advantages and application.

UNIT – V

Types of computer software and application - types of operating systems - statistical software tools- DBMS and RDDMS- data abstraction- E- R diagram concept- Client server process- network layers- HTML web pages.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hunt Nand Shelly J	Computers and common sense	Prentice – Hall of India, New Delhi.	1998

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Popst and Perrum	Computer aided drug design	Academic Press, New York	2007
2	Writh	Systematic programming an introduction	Prentice hall Englewood Cliff's New Jersey	2006
3	S.C Gupta	Fudamentals of statistics	Pushpa banarje	2000

WEBSITES:

- www.biostat.jhsph.edu
- www.stat.ufl.edu
- www.uwf.edu

15PYU115

SEMESTER-I

BIOSTATISTICS & COMPUTER APPLICATIONS LABORATORY-I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the computer basics.
- To learn the statistical method of analysis that can apply in the development and use of therapeutic drug.
- This subject deals with the introduction Database, Database Management system.
- This subject deals with the Computer application in clinical studies and use of databases.
- To switch the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.
- To organize, summarize, and display quantitative data.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Able to organize, summarize, and display quantitative data.
2. Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals
3. Know the various types of application of computers in pharmacy.
4. Know the various types of data bases.
5. Know the various applications of data bases in pharmacy.
6. Switch the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.

Course Content:

1. Computer operating systems like MS DOS etc
2. Simple program in C
3. MS office (MS-Word, MS-Excel, M S- power point).

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Johnathan Lightfoot, chris Beckett	Microsoft office 2010 In simple steps	Kogent learning solutions	2011

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Margret Levine Young	Complete reference internet	Osborne/ McGraw-Hill	2007

WEBSITES:

- www.biostat.jhsph.edu
- www.stat.ufl.edu
- www.uwf.edu

15PYU201

SEMESTER-II

HUMAN ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION-II 3H 3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.
- It also helps in understanding both homeostatic mechanisms.
- It also helps in understanding homeostatic imbalances of various systems of the body.
- Since a medicament, which is produced by the pharmacist, is used in various disease conditions to correct the abnormal functioning of the body systems
- The basic knowledge of this subject is must for a student to understand how drugs act on various systems/organs in correcting the disease state of organs/systems.
- Thus it becomes a prerequisite subject for the pharmacy course.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the gross morphology, structure and functions of various organs of the human body.
2. Understand the various homeostatic mechanisms and their imbalances
3. Identify the various tissues and organs of different systems of the human body.
4. Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time, etc and also record blood pressure, ECG, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of the human body.

Course Content:**UNIT – I**

Endocrine system- Basic anatomy and physiology of pituitary – thyroid – parathyroid-adrenal and pancreatic hormones and disorders of these glands.

UNIT – II

Reproductive system- Structure and functions of male and female reproductive systems -Sex hormones- physiology of menstruation- coitus and fertilization -Spermatogenesis and oogenesis- pregnancy and parturition- oral contraceptives.

UNIT – III

Central Nervous system- Structure and functions of brain and spinal cord –Functions of cerebrum– cerebellum- vital centers of medulla oblongata- cerebral ventricles- cranial nerves and their functions - Reflex arc- cerebrospinal fluid and its functions- meningitis.

UNIT – IV

Autonomic nervous system – Anatomy - physiology and divisions of ANS - Motor and sensory pathways.

UNIT – V

Sense organs- Physiology of vision- audition-olfaction- taste and skin -**Health education and Nutrition-** Concepts of health and disease- Disease causing agents and prevention of disease - Balanced diet-deficiency disorders of various nutrients-their prevention and treatment - **Communicable disease-** The causative agents-modes of transmission and prevention of chicken pox– measles – diphtheria- tuberculosis –malaria – poliomyelitis –filariasis –rabies – tetanus- STD and AIDS - Vaccination schedule - Emergency treatment of shock–snakebite–burns– poisoning- fractures and resuscitation methods -**First Aid.**

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Anne Waugh and Allison Grant	Ross and Wilson Anatomy and Physiology in Health and illness	Churchill Livingstone Elsevier-UK	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.C.Chatterjee	Human Physiology - Vol.–I & II	Medical Allied Agency-Calcutta	1997
2	Gerard J Tortora- Bryan Derrickson	Principles of Anatomy and Physiology	Wiley-USA	2014
3	Cinnamon Van Putte	Seeley's Fundamentals of Human Anatomy and Physiology	Tata Mc GrawHill-New Delhi	2009

WEBSITES:

- www.khanacademy.org
- www.biologycorner.com
- www.gwc.maricopa.edu

15PYU211

SEMESTER-II

**HUMAN ANATOMY, PHYSIOLOGY AND HEALTH EDUCATION
LABORATORY – II****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body.
- It also helps in understanding both homeostatic mechanisms.
- It also helps in understanding homeostatic imbalances of various systems of the body.
- Since a medicament, which is produced by the pharmacist, is used in various disease conditions to correct the abnormal functioning of the body systems
- The basic knowledge of this subject is must for a student to understand how drugs act on various systems/organs in correcting the disease state of organs/systems.
- Thus it becomes a prerequisite subject for the pharmacy course.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the gross morphology, structure and functions of various organs of the human body.
2. Understand the various homeostatic mechanisms and their imbalances
3. Identify the various tissues and organs of different systems of the human body.
4. Perform the hematological tests like blood cell counts, hemoglobin estimation, bleeding/clotting time, etc and also record blood pressure, ECG, heart rate, pulse and respiratory volume.
5. Appreciate coordinated working pattern of different organs of each system
6. Appreciate the interlinked mechanisms in the maintenance of normal functioning (homeostasis) of the human body.

Course content

1. Determination of blood count
2. Determination of differential leukocyte count
3. Recording of systematic arterial blood pressure
4. Determination of heart rate
5. Identification of tissues
6. Identification of bones
7. Experimental models
8. Health education

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Godkar P.B and Godkar D.P	Textbook of Medical Laboratory Technology	Bhalani Publishing House, Mumbai	2007

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mukherjee, K.L	Medical Laboratory Technology	Tata McGraw Hill Publishing Company Ltd. New Delhi	2010

WEBSITES:

- www.khanacademy.org
- www.biologycorner.com
- www.gwc.maricopa.edu

15PYU202

SEMESTER-II

PHARMACEUTICAL INORGANIC CHEMISTRY –II**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- Study about various role of inorganic compounds which having medicinal use.
- This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.
- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- This subject deals with general methods of preparation and reactions of some organic compounds.
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. Understand the medicinal and pharmaceutical importance of the inorganic compounds
3. Write the molecular formula and balance chemical equations and understand the development of periodic table.
4. Understand the importance of quality control.
5. Discuss the nuclear reactions and radioactivity.
6. Elaborate the importance of topical agents.

Course Content**UNIT-I**

Anti-caries Agents - Role of fluorides as anti-caries agents-sodium fluoride –**Dentifrices**-Calcium carbonate - dibasic calcium phosphate-strontium chloride- zincs chloride -**Medicinal Gases** – Oxygen- carbon dioxide – helium- nitrogen and nitrous oxide.

UNIT -II

Major Intra and extra cellular electrolytes- Physiological role of chloride – phosphate – bicarbonate –sodium– potassium-calcium and magnesium-Electrolytes used for replacement therapy - Sodium chloride-potassium chloride-calcium chloride- calcium gluconate- calcium lactate-di basic calcium phosphate- tri basic calcium phosphate -Physiological acid-base balance and its importance – Electrolytes used in the acid –base therapy –Sodium acetate-potassium acetate-sodium bicarbonate-

potassium bicarbonate-sodium citrate-sodium lactate-ammonium chloride – Electrolyte combination therapy- compound sodium chloride solution- sodium chloride injection and oral rehydration salt.

UNIT – III

Essential and Trace ions – Definition - physiological role of iron - copper – zinc – chromium– manganese – molybdenum – selenium-sulphur and iodine – Ferrous fumarate- ferrous gluconate-ferrous sulphate- iron and ammonium citrate -**Official formulation** –Iron dextran injection- strong iodine solution.

UNIT – IV

Pharmaceutical Aids- Sodium bisulphate- sodium metabisulphite –sulphur dioxide –bentonite-magnesium stearate – zinc stearate- aluminium sulphate- sodium carboxymethyl cellulose-sodium formaldehyde sulfoxylate- purified water- water for injection and sterile water for injection.

UNIT – V

Miscellaneous- Sclerosing agents- Hypertonic saline- sodium tetra decyl sulphate– Expectorants – Potassium citrate and potassium iodide – Sedative – Potassium bromide –Antidotes –Sodium nitrite-sodium thiosulphate and charcoal - Respiratory stimulant - Ammonium carbonate.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V.N Rajasekaran	Text Book of pharmaceutical Inorganic Chemistry	Sun Publications	2005

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr.B.G.Nagavi	Pharmaceutical Inorganic chemistry	S.Chand	2007
2	Surendra N. Pandeya	A text book Inorganic medicinal chemistry	Sg Publisher	2011
3	Anand & Chatwal	Inorganic Pharmaceutical Chemistry	Himalaya Pub. House	2010
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	1996

WEBSITES:

- www.slideshare.com
- www.ucdavis.com
- www.chem.tamu.edu

15PYU212

SEMESTER-II

PHARMACEUTICAL INORGANIC CHEMISTRY LABORATORY-I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- Study about various role of inorganic compounds which having medicinal use.
- This course deals with the fundamentals of analytical chemistry and principles of electrochemical analysis of drugs.
- This subject deals with the monographs of inorganic drugs and pharmaceuticals.
- This subject deals with general methods of preparation and reactions of some organic compounds.
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the sources of impurities and methods to determine the impurities in inorganic drugs and pharmaceuticals
2. Understand the medicinal and pharmaceutical importance of the inorganic compounds
3. Write the molecular formula and balance chemical equations and understand the development of periodic table.
4. Understand the importance of quality control.
5. Discuss the nuclear reactions and radioactivity.
6. Elaborate the importance of topical agents.

Course Content:

1. Modified limit test for chloride in KMnO_4
2. Modified limit test for Sulphate in KMnO_4
3. Modified limit test for chloride in NaHCO_3
4. Modified limit test for Sulphate in NaHCO_3
5. Preparation of Calcium Carbonate
6. Preparation of Zinc Oxide
7. Preparation of Potassium citrate
8. Test for Swelling power of bentonite
9. Test for Presence of iodate in potassium iodide

10. Systematic qualitative salt analysis (4 compounds)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	A. H. Beckett and J. B. Stenlake	Practical Pharmaceutical Chemistry Vol-I & II	Harcourt Brace College Publishers, London	1998

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Dr.B.G.Nagavi	Pharmaceutical Inorganic chemistry	S.Chand	2007
2	Surendra N. Pandeya	A text book Inorganic medicinal chemistry	Sg Publisher	2011
3	Anand & Chatwal	Inorganic Pharmaceutical Chemistry	Himalaya Pub. House	2010
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	1996

WEBSITES:

- www.slideshare.com
- www.ucdavis.com
- www.chem.tamu.edu

15PYU203

SEMESTER-II

PHARMACEUTICAL ORGANIC CHEMISTRY –II**3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes:

On successful completion of the course the student will

1. Emphasize the synthesis, reactions and uses of Polyaromatic compounds and its derivatives.
2. Describe the structure, nomenclature, preparation and reaction of alkyl/aryl halides.
3. Discuss the physical and chemical properties of alcohol, ether, epoxide and amines.
4. Explain the preparation and test for purity and use of organic compounds.
5. Analyze the reactive intermediates in a reaction.
6. How to name the organic compounds.
7. Explain different reaction involve in the formation of aromatic compounds.

Course Content:**UNIT – I**

Preparation and properties of polyaromatic compounds–Naphthalene –anthracene –phenanthrene –phenylmethane- triphenylmethane and diphenylethane –Preparation- test for purity and medicinal uses of dicophane –gammexene – saccharin- methyl salicylate –phenindione – ethyl biscoumacetate –vanillin –urethane –carbromal- amphetamine and acetanilide.

UNIT – II

General structure – nomenclature- preparation and reaction mechanism of alkyl and aryl halides - (Mechanism of SN₁-SN₂, E1 and E2).

UNIT – III

Alcohols – ethers – epoxides- amines (basicity of amines- influence of substituent on basic property) –aldehydes- ketones- carboxylic acids and functional derivatives of carboxylic acids.

UNIT – IV

Preparation-test for purity and medicinal uses of Chloroform–Iodoform–Mephenesin- Citric acid- Lactic acid- Benzoic acid-Sodium lauryl sulphate and Glycol.

UNIT – V

Reactive intermediates- Carbocations– Carbanions – Carbenes- Free radicals – generation- relative stability- fate and applications - Properties of Alpha (α) and Beta (β) unsaturated carbonyl compounds – Preparation and synthetic utility of aceto-acetic ester-malonic ester- Grignard reagent and diazonium salts.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arun Bahl and B.S Bhal	Advanced Organic Chemistry	S.Chand	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.I. Elliel.	Stereo Chemistry of Organic Compounds	Wiley Eds	1988
2	Cramand Hammered	Organic chemistry	Pine Hendrickson	2005
3	Jerry March	Advanced Organic Chemistry: Reactions, Mechanisms, and Structure	Wiley: New York, NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU213

SEMESTER-II

PHARMACEUTICAL ORGANIC CHEMISTRY LABORATORY-II**3H****3C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes(CO's):

On successful completion of the course the student will

1. Determine of melting point and boiling point of organic compounds including mixed melting point technology.
2. Prepare of organic compounds.
3. Systematically qualitative analysis of salt.
4. Account for the structure, stability, orientation, reaction and its mechanism of Benzene.
5. Explain different Reaction Intermediates & their application in reaction mechanism.
6. How to name the organic compounds.
7. Explain different reaction involve in the formation of aromatic compounds.

Course Content:

1. Determination of melting point and boiling point of organic compounds including mixed melting point technology (3 compounds)
2. Preparation of organic compounds (5 compounds)
3. Systematic Qualitative Salt analysis (4 compounds)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arthur I Vogel	Practical Organic Chemistry by Vogel	Dorling Kindersley	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	E.I. Eliel.	Stereo Chemistry of Organic Compounds	Wiley Eds	1988
2	Cram and Hammond	Organic chemistry	Pine Hendrickson	2005
3	Jerry March	Advanced Organic Chemistry: Reactions, Mechanisms, and Structure	Wiley: New York, NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU204

SEMESTER-II

PHARMACOGNOSY AND PHYTO CHEMISTRY –II 3H 3C

Instruction hours/ week: L: 3 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the cultivation and production of crude drugs and their usefulness.
- This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- Know the techniques in the cultivation and production of crude drugs.
- To know the crude drugs, their uses and chemical nature.

Course Outcomes (CO's) :

On successful completion of the course the student will

1. Explain the detailed study of crude drugs like source, cultivation, collection, preparation, storage, diagnostic characters (Macroscopic & Microscopic techniques) constituents, chemical tests, substitutes, adulterants & uses.
2. Understand the drugs coming under alkaloids and terpenoids.
3. Know the Tumor inhibitors.
4. Explain the Anti-hepatotoxic and oral hypoglycemic agents.
5. Understand Plant fibers used as surgical dressing.
6. Explain the Pharmaceutical aids.

Course Content:**UNIT – I**

Detailed study of crude drugs with emphasis on source – cultivation – collection – preparation – storage- diagnostic characters (Macroscopic & Microscopic techniques applicable) – constituents- chemical tests – substitutes- adulterants & uses of- **Anthraquinone cathartics** –Aloes –Senna- Rhubarb and Cascara -**Pyridine and Piperidine alkaloids** – Areca and Lobelia - **Tropane alkaloids** – Belladonna –Hyoscyamus –Datura –Cocoa -**Quinoline and Isoquinoline alkaloids** –Cinchona- Ipecac and Opium **Indole alkaloids** –Ergot –Rauwolfia –Nuxvomica –Physostigmine –**Imidazole** -Pilocarpus.

UNIT – II

Purines -Tea-Coffee –**Resins** –Colophony –Cannabis –Capsicum- Balsam of Tolu – Benzoin-Balsam of Peru –Asafoetida- Turmeric and Ginger –**Quinazolidine alkaloids** –Adathoda **Terpenes** -Neem-Artemesia.**Others** –Gentian- Saffron –Ashwagandha.

UNIT – III

Tumor inhibitors –Taxol- Vinca and Podophyllum.

UNIT – IV

Anti-hepatotoxic and oral hypoglycemic agents Phyllanthus niruri- Eclipta Alba-Gymnema sylvestre.

UNIT – V

Plant fibers used as surgical dressing –Cotton – Silk – Wool – Nylon – Rayon- Alginate dressing- Gelatin Sponge- Oxidized cellulose - Sutures and ligatures - **Pharmaceutical aid** - Talc- Kaolin- Bentonite and Natural colours.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kokate C.K- Purohit A.P- Gokhale S.B	Text book of Pharmacognosy	Niraliprakashan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trease and Evans	Pharmacognosy	W.B Sauders	2002
2	James Robbers- Marilyn K. Speedice and Varro E.- Tyler	Pharmacognosy and Pharma cobiotechnology	Williams and Wilkins	1996
3	TE Wallis	Textbook of Pharmacognosy	CBS publishers and Distributors- New Delhi	2005

WEBSITES:

- **www.autorstream.com**
- **www.e Pharmacognosy.com**
- **www.science20.com**

15PYU214

SEMESTER-II

PHARMACOGNOSY AND PHYTO CHEMISTRY LABORATORY-II 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the cultivation and production of crude drugs and their usefulness.
- This subject has been introduced for the pharmacy course in order to make the student aware of medicinal uses of various naturally occurring drugs its history, sources, distribution, method of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- Know the techniques in the cultivation and production of crude drugs.
- To know the crude drugs, their uses and chemical nature.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Perform the staining, sectioning of crude drugs
2. Perform the staining and view the powder characters of crude drugs.
3. Demonstrate the microscopical measurements of cells and cell contents.
4. Perform the leaf constants.
5. Demonstrate Lycopodium spore method.
6. Perform chemical tests to identify pharmaceutically important Phytoconstituents.

Course Content:

1. Microscopical studies of some selected drugs:
Senna –Vinca – Cinchona –Nuxvomica –Ephedra –Rauwolfia –Ipecac –Ginger –Neem-Phyllanthus
2. Microscopical studies of some selected powdered drugs of single component or mixture of two components:
Cinchona- Senna–Rauwolfia –Ipecac –Nuxvomica –Rhubarb –Neem –Phyllanthus- Ginger
3. Quantitative microscopy:
 - ❖ Microscopical measurements of cells and cell contents: Starch grains, calcium oxalate crystals and phloem fibres.

- ❖ Determination of leaf constants i.e., stomatal index, stomatal number, vein islet number, vein termination number and palisade ratio.
- ❖ Lycopodium spore method.

4. To do simple chemical tests to identify the pharmaceutically important phytoconstituents based on the theory.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.B.Gokale and C.K kokate	Practical Pharmacognosy	Vallabh prakasan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trease and Evans	Pharmacognosy	W.B Sauders	2002
2	James Robbers-Marilyn K. Speedice and Varro E.- Tyler	Pharmacognosy and Pharmacobotechnology	Williams and Wilkins	1996
3	TE Wallis	Textbook of Pharmacognosy	CBS publishers and Distributors-New Delhi	2005

WEBSITES:

- www.autorstream.com
- www.e pharmacognosy.com
- www.science20.com

15PYU205

SEMESTER-II

BIostatISTICS & COMPUTER APPLICATIONS-II**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- To learn and understand the computer basics.
- To learn the statistical method of analysis that can apply in the development and use of therapeutic drug.
- This subject deals with the introduction Database, Database Management system.
- This subject deals with the Computer application in clinical studies and use of databases.
- To switch the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.
- To organize, summarize, and display quantitative data.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Able to organize, summarize, and display quantitative data.
2. Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals
3. Know the various types of application of computers in pharmacy.
4. Know the various types of data bases.
5. Know the various applications of data bases in pharmacy.
6. Swith the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.

Course Content:**UNIT – I****Biostatistics** – Dispersion - Theory of sampling -Statistical inference.**UNIT – II**

Regression and correlation -Probabilities.

UNIT – III**Computer Packages-** MS Office -MS Word-MS Excel MS Power Point - Advantages and use.**UNIT – IV****Introduction to Computer Networks** – Definition - LAN- WAN – Advantages – Internet-Worldwide Web.

UNIT – V

Computer Graphics – Definition – display devices – graphical input and output devices – multimedia–definition and application.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Hunt Nand Shelly J	Computers and common sense	Prentice – Hall of India, New Delhi.	1998

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Popst and Perrum	Computer aided drug design	Academic Press, New York	2007
2	Writh	Systematic programming an introduction	Prentice hall Englewood Cliff's New Jersey	2006
3	S.C Gupta	Fudamentals of statistics	Pushpa banarje	2000

WEBSITES:

- www.biostat.jhsph.edu
- www.stat.ufl.edu
- www.uwf.edu

15PYU215

SEMESTER-II

BIOSTATISTICS & COMPUTER APPLICATIONS LABORATORY-I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100
External Semester Exam: 3 Hours**Course Objectives:**

- To learn and understand the computer basics.
- To learn the statistical method of analysis that can apply in the development and use of therapeutic drug.
- This subject deals with the introduction Database, Database Management system.
- This subject deals with the Computer application in clinical studies and use of databases.
- To switch the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.
- To organize, summarize, and display quantitative data.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Able to organize, summarize, and display quantitative data.
2. Comfortable with statistical methods for calculating summary estimates, measures of variability, and confidence intervals
3. Know the various types of application of computers in pharmacy.
4. Know the various types of data bases.
5. Know the various applications of data bases in pharmacy.
6. With the introduction Database, Database Management system, Computer application in clinical studies and use of data bases.

Course Content:

1. Computer operating systems like MS DOS, etc.
2. Simple program in C.
3. MS Office (MS-Word, MS-Excel, MS-Access, MS-Powerpoint).

TEXT BOOKS:

S.No	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Johnathan Lightfoot, chris Beckett	Microsoft office 2010 In simple steps	Kogent learning solutions	2011

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Popst and Perrum	Computer aided drug design	Academic Press, New York	2007
2	Writh	Systematic programming an introduction	Prentice hall Englewood Cliff's New Jersey	2006
3	S.C Gupta	Fudamentals of statistics	Pushpa banarje	2000

WEBSITES:

- www.biostat.jhsph.edu
- www.stat.ufl.edu
- www.uwf.edu

15PYU301

SEMESTER-III

PHYSICAL PHARMACEUTICS-I**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Physical pharmaceutics is a fundamental course that leads to proper understanding of subsequent courses in Pharmaceutics.
- It integrates knowledge of mathematics, physics and chemistry and applies them to the pharmaceutical dosage form development.
- It focuses on the theories behind the phenomena needed for dosage form design.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions, etc.
- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations.
- Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Exploit the historical background of pharmacy industry.
2. Recognize about various Pharmacopoeias like IP, BP, USP
3. Acquire the basics of physical pharmaceutics.
4. Interpret about diffusion, dissolution and particle properties.
5. Demonstrate the applications of micromeritics in pharmaceutical industry.
6. Enable the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions.

Course Content:**UNIT-I**

Historical back ground and development of profession of pharmacy industry and organization - Pharmacy as a career – Pharmacopoeias - Introduction to IP – BP - USP and extra pharmacopoeia - Salient features of Indian Pharmacopoeia.

UNIT-II

Diffusion – definition – Fick's law - steady state diffusion – principles of diffusion involved in biological systems - **Dissolution** – definition – rate of dissolution – theories of dissolution - factors affecting rate of dissolution - Noyes Whitney equation.

UNIT-III

Colloids– definition – types of colloids – preparation of colloids – purification - dialysis – electrodialysis – ultrafiltration – stabilization of colloids – solubilization – optical properties – electrical properties –kinetic properties.

UNIT-IV

Coarse dispersion– definition - **Suspension** – definition – preparation – settling of suspension – physical stability – evaluation of suspension - **Emulsion** – definition – types of emulsion – theories involved –instabilities of emulsion – microemulsion – multiple emulsions.

UNIT-V

Micromeritics– definition – particle shape and size distribution – methods of determining particle size – microscopic method –sieve method – sedimentation technique – particle volume measurement – coulter counter method - shape - surface area and derived properties of powders.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Manavalan and Ramasamy	Physical Pharmaceutics	Pharmamed Press	2015
2.	S.P.Agarwal and Rajesh Khanna	Physical Pharmacy	CBS Publishers	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
2	Lachmann	Theory and practice of Industrial pharmacy	Churchill Livingston	2002
3	M.E. Aulton	Pharmaceutics- The Science & Dosage Form Design	Churchill Livingstone	2001
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005
6	Carter S.J	Cooper and Gunn's- Dispensing for Pharmaceutical students	CBS publishers	2000

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU311

SEMESTER-III

PHYSICAL PHARMACEUTICS LABORATORY- I

3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Physical pharmaceutics is a fundamental course that leads to proper understanding of subsequent courses in Pharmaceutics.
- It integrates knowledge of mathematics, physics and chemistry and applies them to the pharmaceutical dosage form development.
- It focuses on the theories behind the phenomena needed for dosage form design.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions, etc.
- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations.
- Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the physicochemical parameters of a drug
2. Identify methods to enhance solubility of a new drug moiety
3. Discover the importance of stability in pharmaceutical preparations
4. Demonstrate the powder properties and effect of Glidants in powder flow
5. Interpret about diffusion, dissolution and particle properties.
6. Demonstrate the applications of micromeritics in pharmaceutical industry
7. Enable the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions

Course content:

1. Determination of particle size and particle size distribution using microscope.
2. Determination of particle size distribution using sieve method.
3. Determination of powder properties,
 - a) Density
 - b) Porosity
4. Determination of powder properties,
 - a) Compressibility
 - b) Angle of repose
5. Determination of effect of glidants or lubricants on angle of repose.
6. Preparation of emulsion.
7. Determination of globule size of emulsions

8. Preparation of various types of suspensions
9. Determination of suspension sedimentation parameters.
10. Experiment on preparation of colloids.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.V.S.Subram anyam- J. Thimmasettee	Laboratory manual of physical pharmaceutics	CVS	2001
2	C.Vijayaragha van	A Practical Handbook Of Physical Pharmaceutics	New Century Book House	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Eugene-Parott	Experimental pharmaceutics	New Delhi	2000
2	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU302

SEMESTER-III

ADVANCED PHARMACEUTICAL ORGANIC CHEMISTRY-I**4H****4C**

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes:

On successful completion of the course the student will

1. Write the structure, name, type of isomerism of the organic compound.
2. Write the reaction, name the reaction and understand orientation of reactions.
3. Understand the stereo chemical aspects of organic compounds and reactions
4. Account for the stability/reactivity/orientation
5. Emphasize the synthesis, reactions and uses of Heterocyclic compounds
6. Know aspects of organic compounds and reactions.

Course Content:**UNIT I**

Polynuclear hydrocarbons –Synthesis - reactions and medicinal uses of following derivatives
Naphthalene – Phenanthrene - Anthracene - Diphenylmethane and Triphenylmethane.

UNIT II

Reactions of synthetic importance: Catalytic hydrogenation - metal hydride reduction - Clemmensen reduction - MeerweinPonndorfVerley reduction - Birch reduction - Wolff kishner reduction.

UNIT III

Study of name reaction with its mechanism: Beckmanns rearrangement, Claisen-Schmidt Condensation- Oppenauer-oxidation- Dakin reaction- cannizaro reaction- crossed cannizaro reaction- Aldol condensation.

UNIT IV

Detailed Study of Heterocyclic Compounds Including Its Synthesis and Medicinal Uses - Classification and nomenclature of Heterocyclic compounds- Pyrrole- Furan- Thiophene - Relative aromaticity, reactivity, Basicity of pyrrole- Pyrazole- Imidazole- Oxazole- Thiazole.

UNIT V

Detailed Study of Heterocyclic Compounds Including Its Synthesis and Medicinal Uses - Pyridine and its basicity- Quinoline- Isoquinoline- Acridine- Indole- phenothiazine- azepines and Diazepines- Pyrimidine- Purine.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Morrison and Boyd	Organic Chemistry	Prentice Hall	1992

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.L. Finar	Organic Chemistry by Vol. I & II	Pearson	1956
2	ArunBahl and B.SBhal	Advanced Organic Chemistry	S.Chand	2012
3	Jerry March	Advanced Organic Chemistry: Reactions- Mechanisms- and Structure	Wiley: New York- NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU312

SEMESTER-III

ADVANCED PHARMACEUTICAL ORGANIC CHEMISTRY 3H 2C
LABORATORY- I

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100
External Semester Exam: 3 Hours**Course Objectives:**

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Quantitatively analyze the organic compounds
2. Determine the qualitative parameters of oil.
3. Prepare homocyclic compounds using basic reactions.
4. Write the structure, name, type of isomerism of the organic compound.
5. Write the reaction, name the reaction and understand orientation of reactions.
6. Understand the stereo chemical aspects of organic compounds and reactions

Course Content:**I. Quantitative determination of following classes of organic compound**

1. Alcohol by acetylation method.
2. Carbonyl compound by hydroxyl amine hydro chloride method.
3. Carboxylic acid by acid base method.
4. Ester by hydrolysis method.

II. Determination of following oil values

1. Acid value.
2. Saponification value.

III. Preparation of homocyclic compounds.

1. Benzanilide/Phenyl benzoate/Acetanilide from Aniline/ Phenol
/Aniline by acylation reaction. (any two)
- 5- Nitro salicylic acid/Meta di nitro benzene from Salicylic acid / Nitro benzene by nitration reaction. (any two)

IV. Preparation of heterocyclic compounds.

1. Benzimidazole from ortho phenylene diamine.
2. 2,3–diphenyl quinoxaline from benzil

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Morrison and Boyd	Organic Chemistry	Prentice Hall	1992

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.L. Finar	Organic Chemistry by Vol. I & II	Pearson	1956
2	ArunBahl and B.SBhal	Advanced Organic Chemistry	S.Chand	2012
3	Jerry March	Advanced Organic Chemistry: Reactions- Mechanisms- and Structure	Wiley: New York- NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU303

SEMESTER-III

BIOCHEMISTRY & BIOMOLECULES - I**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells.
- The scope of the subject is providing biochemical facts and the principles.
- It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.
- To understand metabolism of nutrient molecules in physiological and pathological conditions.
- To understand the mechanism of drug action and fundamental changes occur in diseases.
- Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand cell and transport across membrane.
2. Explain the types and importance of biomolecules and bioenergetics
3. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
4. Elaborate the biological oxidation emphasizing electron transport chain and oxidative phosphorylation.
5. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
6. Understand the principles of organ functions tests and their clinical significances.

Course Content:**UNIT I**

Introduction to biochemistry - Cell organelles and its biochemical functions - Transport process across the cell membranes.

UNIT II

Bioenergetics - Concept of free energy - determination of free energy from equilibrium constant - Redox potential - **Energy rich compounds** – Definition - classification and Production and biological significance of ATP and cyclic AMP.

UNIT III

Enzymes - Definition – Nomenclature - IUB classification - Properties of enzymes - Factor affecting enzyme activity - Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) - Enzyme inhibitors with examples - Mechanism of enzyme action and theories of enzyme action eg. Allosteric enzymes - Enzyme induction and repression- Isoenzymes and their diagnostic applications - Therapeutic and diagnostic applications of enzymes - Coenzymes –Structure and biochemical role.

UNIT IV

Biological oxidation - Enzymes and co-enzymes involved in Biological oxidation - Electron transport chain (its mechanism and role) - Oxidative phosphorylation (its mechanism) and substrate level phosphorylation - Inhibitors ETC and Uncouplers or inhibition of oxidative phosphorylation.

UNIT V

Carbohydrate metabolism–Definition – classification - chemistry and biological role of carbohydrates - Glycolysis – energetics and significance - Citric acid cycle – energetic - amphibolic nature -anaplerosis and significance - HMP shunt and its significance - Glycogen metabolism (Glycogenolysis and glycogenesis) and its regulation - Gluconeogenesis and its significance - Various shuttle systems and its significance - glycerol – phosphate & malate –aspartate -Uronic acid pathway and its significance - Hormonal regulation of carbohydrate metabolism - Disorders of Carbohydrate metabolism - Diabetes mellitus - glycogen storage diseases.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. Satyanarayan and U.Chakrapani	Biochemistry	Elsevier Health Sciences	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Robert K. Murry, Daryl K. Granner and Victor W. Rodwell	Harper's Biochemistry	McGraw-Hill Medical	2006

2	Stryer	Biochemistry	Pine Hendrickson	2005
3	Deb	Textbook of Biochemistry	Wiley: New York, NY	1992

WEBSITES:

- biochemistryquestions.wordpress.com
- www.mbmb.siu.edu
- www.medicalbiochemistry.org

15PYU313

SEMESTER-III

BIOCHEMISTRY & BIOMOLECULES LABORATORY– I 3H 3C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells.
- The scope of the subject is providing biochemical facts and the principles.
- It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.
- To understand metabolism of nutrient molecules in physiological and pathological conditions.
- To understand the mechanism of drug action and fundamental changes occur in diseases.
- Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Explain molecular orbital theory.
2. Understand the strain theories.
3. Describe effect of substituents on the reaction.
4. Qualitatively analyze the biomolecules.
5. Quantitatively analyze biochemical parameters and their importance in diagnosis of disease.
6. Qualitatively analyze the urine for normal and abnormal constituents.

Course Content:

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of Proteins
3. Determination of Serum Glutamate Oxaloacetate Transaminase
4. Determination of Serum Glutamate Pyruvate Transaminase
5. Determination of blood and urine sugar to assess metabolic function

6. Determination of serum calcium
7. Qualitative analysis of urine for normal constituents
8. Qualitative analysis of urine for abnormal constituents
9. Determination of serum total proteins
10. Determination of blood Creatinine
11. Determination of urine Creatinine
12. Determination of blood urea

TEXT BOOKS:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.C. Gupta and S. Bhargavan	Practical Biochemistry	CBS Publishers & Distributors Pvt. Ltd	2010

REFERENCES:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pattabiraman and Sitaram Acharya	Laboratory manual of Biochemistry	AITBS Publishers	1994

WEBSITES:

- biochemistryquestions.wordpress.com
- www.mbmb.siu.edu
- www.medicalbiochemistry.org

15PYU304

SEMESTER-III

TITRIMETRIC METHODS OF PHARMACEUTICAL ANALYSIS 3H 3C

Instruction hours/ week: L: 3 T: 0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Titrimetric analysis deals with complete understanding of the various titration methods.
- The scope of the present course is to know the quality, quantity and purity of pharmaceutical products and chemicals.
- Know and understand the various apparatus used in pharmaceutical analysis and their calibrations.
- This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
- Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals.
- Know the analysis of the inorganic pharmaceuticals their applications.

Course Outcomes (CO's):

On successful completion of the course the student will

1. To know the quality control and their importance
2. To know the apparatus used in analysis
3. To know the calibration of volumetric apparatus
4. To know the different types of titrations like neutralization, non- aqueous, complexometric, gravimetric, precipitation and reduction oxidation titrations.
5. To know the concept of titrations
6. To know indicators used in various titration methods.

Course Content:**UNIT- I**

Introduction - Importance of quality control- computation of analytical results- significant figure- concept of error – precision – accuracy- standard deviation- normal distribution curve- calibration of volumetric apparatus- titration - concepts and different types of titration.

UNIT- II

Acid-base titrations - Acid-base concepts, Henderson–Hasselbalch equation, theory of indicators, neutralization curves- **Non aqueous titration** -Introduction- Solvents for Non- Aqueous Titrations- Indicators for Non- Aqueous Titrations-Titrations of Weak Base.

UNIT- III

Precipitation titrations -Principles of precipitation titrations- factors affecting solubility of precipitate- Argentimetric titration including, Mohr's method, Volhard's method, Fajan's method and Gay Lussac method - **Complexometric titration** -principle of complexometric titration- types of titrations-endpoint determination-masking and demasking agents.

UNIT- IV

Oxidation Reduction titrations - concept of oxidation reduction titrations-redox reactions-theory of redox titrations-Oxidation reduction curves- Iodometry and Iodimetry- Titrations involving ceric ammonium sulphate and potassium permanganate - **Diazotization titration**- principle-application.

UNIT-V

Gravimetric analysis - Basic concepts - precipitation techniques - various steps involved in gravimetric analysis - **Miscellaneous methods of analysis**- Kjeldahl methods- oxygen flask combustion method-**gasometry**- assay of oxygen, carbon dioxide, nitrous oxide.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Parimoo	Pharmaceutical Analysis	CBS Publisher & Distributors P Ltd;	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	V. Alexysev	Quantitative analysis	University Press of the Pacific	2000
2	Skoog West and James Holler.	Fundamentals of Analytical Chemistry	Cengage Learning India	2013
3	G.H. Jeffery J, Bassett J. Mendham R.C. Denney	Vogel's Textbook of Quantitative Chemical Analysis	John Wiley & Sons Inc	1989

4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
---	-------------------------------------	----------------------	--	------

WEBSITES:

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU314

SEMESTER-III

TITRIMETRIC METHODS OF PHARMACEUTICAL ANALYSIS**LABORATORY – I****3H****2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Titrimetric analysis deals with complete understanding of the various titration methods.
- The scope of the present course is to know the quality, quantity and purity of pharmaceutical products and chemicals.
- Know and understand the various apparatus used in pharmaceutical analysis and their calibrations.
- This course mainly deals with fundamentals of Analytical chemistry and also the study of inorganic pharmaceuticals regarding their monographs and also the course deals with basic knowledge of analysis of various pharmaceuticals.
- Understand the principles and procedures of analysis of drugs and also regarding the application of inorganic pharmaceuticals;
- Know the analysis of the inorganic pharmaceuticals their applications.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the quality control and their importance
2. Understand the apparatus used in analysis
3. Perform the calibration of volumetric apparatus
4. Describe the different types of titrations like neutralization, non- aqueous, complexometric, gravimetric, precipitation and reduction oxidation titrations.
5. Discuss the concept of titrations
6. Standardize the analytical weights and calibrate volumetric apparatus

Course Content:

1. Standardization of analytical weights and calibrating of volumetric apparatus
2. Assay of citric acid by alkalimetry
3. Assay of ammonium chloride by alkalimetry
4. Assay of sodium hydroxide by acidimetry
5. Standardization of perchloric acid

6. Assay of copper sulphate by iodometry
7. Assay of calcium gluconate by complexometry
8. Assay of magnesium sulphate by complexometry
9. Assay of hydrogen peroxide by permanganometry
10. Assay of potassium iodide by potassium iodate titration
11. Assay of ferrous sulphate by ceriometry
12. Assay of silver nitrate by precipitation titration

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	A.H. Beckett and J.B. Stenlake	Practical Pharmaceutical Chemistry	Bloomsbury Academic	2001

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	1996

WEBSITES:

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU305

SEMESTER-III

PHARMACEUTICAL TECHNOLOGY-I**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This course is designed to impart a fundamental knowledge on the art and science of various machines and their handling in pharmaceutical industry.
- This course focuses on various topics like unit operations, material handling, pharma plant construction, corrosion, industrial pollution etc.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of pharmaceutical equipments.
- To carry out various test to prevent environmental pollution.
- To appreciate and comprehend significance of plant lay out design for optimum use of resources.
- To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Exploit various unit operations used in Pharmaceutical Industries.
2. Understand the material handling techniques.
3. Appreciate and comprehend significance of plant lay out design for optimum use of resources.
4. Perform various processes involved in pharmaceutical manufacturing process.
5. Appreciate the various preventive methods used for corrosion control in Pharmaceutical Industries.
6. Carry out various tests to prevent environmental pollution.

Course Content:**UNIT I**

Materials of Pharmaceutical Plant Construction - General study of composition – corrosion – resistance - properties and applications of the materials of construction with special reference to stainless steel and glass.

UNIT II

Industrial Hazards and Safety Precautions –Mechanical – Chemical – Electrical - Fire and Dust hazards - Industrial dermatitis - Accident records - **Fluid Flow** -Types of flow - Reynold's number –

Viscosity - Concepts of boundary layer - Basic equation of fluid flow – Valves – Pumps - Flow meters - Manometers and Measurement of flow and pressure.

UNIT III

Filtration and Centrifugation -Theory of filtration - filter aids - filter media - industrial filters including filter press - rotary press - rotary filter - edge filter - Factors affecting filtration - mathematical problems on filtration – optimum- cleaning cycle in batch filters - Principles of centrifugation - industrial centrifugal filters & centrifugal sedimenters.

UNIT IV

Crystallization - Characters of crystals like purity - size - shape - geometry - habit, forms, size and factors affecting them - Solubility curves and calculation of yields - Material and heat balances around Swenson Walker crystalliser - Super saturation theory - its limitations - nucleation mechanism and crystal growth - Study of various types of crystallisers - Caking of crystals and its prevention and numerical problems on yields.

UNIT V

Dehumidification and Humidity Control -Basic concepts – definition - wet bulb and adiabatic saturation temperatures - psychometric chart and measurement of humidity - application of humidity measurement in pharmacy -Equipments for dehumidification operations.

TEXT BOOKS:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.V.S.Subrahmanyam et al	Pharmaceutical Engineering principles and practices	Vallabh prakashan	2002

REFERENCES:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lachman	Theory and practice of Industrial Pharmacy	Lea & Febiger	1986
2	MaCabe WL and Smith J.C.	Unit operations of Chemical Engineering	McGraw-Hill Education	2004
3	Walter J. Badger.	Introduction to Chemical Engineering	McGraw-Hill Education	1955

4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU401

PHYSICAL PHARMACEUTICS - II**SEMESTER-IV****3H 3C**

Instruction hours/ week: L: 3 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Physical pharmaceutics is a fundamental course that leads to proper understanding of subsequent courses in Pharmaceutics.
- It integrates knowledge of mathematics, physics and chemistry and applies them to the pharmaceutical dosage form development.
- It focuses on the theories behind the phenomena needed for dosage form design.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions, etc.
- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations.
- Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the physicochemical parameters of a drug
2. Identify methods to enhance solubility of a new drug moiety
3. Discover the importance of stability in pharmaceutical preparations
4. Demonstrate the powder properties and effect of Glidants in powder flow
5. Interpret about diffusion, dissolution and particle properties.
6. Demonstrate the applications of micromeritics in pharmaceutical industry
7. Enable the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions

Course Content:**UNIT-I**

Kinetics – definition – rate and order of reaction – zero order reactions – first order reactions – second order reactions – determination of orders – factors influencing rate of reaction – decomposition and stabilization study of medicinal agents – accelerated stability studies.

UNIT-II

Interfacial phenomenon – definition – measurement of surface and interfacial tension - surface active agent – hydrophilic lipophilic balance – spreading coefficient – theory of micelle formation – factors influencing critical micelle concentration – electrical properties at interface.

UNIT-III

Rheology – definition – Newtonian and non Newtonian system - flow characteristics – thixotropy – determination of rheological properties – capillary viscometer – falling and rising body apparatus – rotational viscometers – application of rheology in pharmacy.

UNIT-IV

pH, buffer and isotonic solutions - definition – buffer action - pH determination – applications – buffer equation – buffer capacity – factors affecting buffer capacity – buffers in pharmaceutical - biological systems and buffered isotonic solutions.

UNIT-V

Complexation – definition – types of complexes – metal complexes – inorganic complexes – chelates – olefin complexes – aromatic complexes – organic molecular complexes - inclusion complexes – methods of analysis of complexes - Protein binding – definition – binding equilibria.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Manavalan and Ramasamy	Physical Pharmaceutics	Pharmamed Press	2015
2.	S.P.Agarwal and Rajesh Khanna	Physical Pharmacy	CBS Publishers	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
2	Lachmann	Theory and practice of Industrial pharmacy	Churchill Livingstone	2002
3	M.E. Aulton	Pharmaceutics- The Science & Dosage Form Design	Churchill Livingstone	2001
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005

6	Carter S.J	Cooper and Gunn's- Dispensing for Pharmaceutical students	CBS publishers	2000
---	------------	--	----------------	------

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU411

SEMESTER-IV

PHYSICAL PHARMACEUTICS LABORATORY-II**3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Physical pharmaceutics is a fundamental course that leads to proper understanding of subsequent courses in Pharmaceutics.
- It integrates knowledge of mathematics, physics and chemistry and applies them to the pharmaceutical dosage form development.
- It focuses on the theories behind the phenomena needed for dosage form design.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions, etc.
- The course deals with the various physical and physicochemical properties, and principles involved in dosage forms/formulations.
- Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the physicochemical parameters of a drug.
2. Identify methods to enhance solubility of a new drug moiety.
3. Discover the importance of stability in pharmaceutical preparations.
4. Demonstrate the powder properties and effect of Glidants in powder flow.
5. Interpret about diffusion, dissolution and particle properties.
6. Demonstrate the applications of micromeritics in pharmaceutical industry.
7. Enable the pharmacist to make rational decisions on scientific basis concerning the art and technology of solutions, suspensions, emulsions.

Course content:

1. Determination of half life of pseudo first order reaction.
2. Determination of rate constant and order of reaction.
3. Determination of surface tension.
4. Determination of CMC of surfactant.
5. Determination of HLB value
6. Study of rheological properties of various systems using viscometer.
7. Preparation of pharmaceutical buffers.

8. Determination of buffer capacity.
9. Determination of partition coefficient of benzoic acid in benzene and distilled water.
10. Accelerated stability studies.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.V.S.Subramanyam- J. Thimmasetty	Laboratory manual of physical pharmaceuticals	CVS	2001
2	C.Vijayaraghavan	A Practical Handbook of Physical Pharmaceutics	New Century Book House	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
2	Lachmann	Theory and practice of Industrial pharmacy	Churchill Livingstone	2002
3	M.E. Aulton	Pharmaceutics- The Science & Dosage Form Design	Churchill Livingstone	2001
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005
6	Carter S.J	Cooper and Gunn's- Dispensing for Pharmaceutical students	CBS publishers	2000

WEBSITES:

➤ www.picscheme.org

- www.ijper.org
- www.pharmpress.org

15PYU402

SEMESTER-IV

**ADVANCED PHARMACEUTICAL ORGANIC
CHEMISTRY-II****4H 4C**

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Study the isomerism of the organic compound
2. Understand the stereo chemical aspects of organic compounds and reactions
3. To study the three dimensional structural formulae of certain compounds.
4. Account for the stability/reactivity/orientation
5. Emphasize the synthesis, reactions and uses of Heterocyclic compounds
6. Know aspects of organic compounds and reactions.

Course Content:**UNIT I**

Study about stereochemistry - Optical isomerism - Optical activity – enantiomerism – diastereoisomerism - meso compounds - Elements of symmetry – chiral – achiral- molecules - DL system of nomenclature of optical isomers - sequence rules - RS system of nomenclature of optical isomers.

UNIT II

Optical isomerism - Reactions of chiral molecules - Racemic modification - resolution of racemic mixture -Asymmetric synthesis – partial – absolute.

UNIT III

Geometrical isomerism - Nomenclature of geometrical isomers (Cis Trans- EZ- Syn Anti system)- Methods of determination of configuration of geometrical isomers- Conformational isomerism in alkanes Cyclopentane - Cyclohexane.

UNIT IV

Stereo isomerism in biphenyl compounds (Atropisomerism) - conditions for optical activity - Stereospecific and stereoselective reactions.

UNIT V

Fats and Oils - Fatty acids – Reactions – Hydrolysis – hydrogenation - saponification and rancidity-of oils - drying oils - **Analytical constants** – Acid value - saponification value - ester value - iodine value - acetyl value - Reichert Meissl (RM) value –significance and principle involved in the determination.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Morrison and Boyd	Organic Chemistry	Prentice Hall	1992

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	I.L. Finar.	Organic Chemistry by Vol. I & II	Pearson	1956
2	Cramand Hammered	Organic chemistry	Pine Hendrickson	2005
3	Jerry March	Advanced Organic Chemistry: Reactions- Mechanisms- and Structure	Wiley: New York- NY	1992

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU412

SEMESTER-IV

**ADVANCED PHARMACEUTICAL ORGANIC
CHEMISTRY LABORATORY -II**

3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Illuminate relevance & significance of Organic Chemistry to Pharmaceutical Sciences.
- Review and study fundamentals of Organic Chemistry in identifying and synthesizing organic compounds essentially employed as drugs and pharmaceuticals.
- Clarify basic principles concepts of organic chemistry
- Explain basic functional groups & IUPAC Nomenclature of Organic Compounds.
- Some important physical properties of organic compounds;
- Methods of preparation, test for purity, principle involved in the assay, important medicinal uses of some important organic compounds.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Study the isomerism of the organic compound
2. Understand the stereo chemical aspects of organic compounds and reactions
3. To study the three dimensional structural formulae of certain compounds.
4. Account for the stability/reactivity/orientation
5. Emphasize the synthesis, reactions and uses of Heterocyclic compounds
6. Know aspects of organic compounds and reactions.

Course Content:

- I. Quantitative determination of following classes of organic compounds (2 compounds)
- II .Determination of following oil values (2 compounds)
- III. Preparation of homocyclic compounds.(2 compounds)
- IV. Preparation of heterocyclic compounds. (4 compounds)
- V. Partition coefficient. (2 compounds)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mann and Saunders	Practical Organic Chemistry	Longman	1960

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Arthur I. Vogel	Vogel's text book of Practical Organic Chemistry	Pearson	1996

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU403

SEMESTER-IV

BIOCHEMISTRY & BIOMOLECULES – II 3H 3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells.
- The scope of the subject is providing biochemical facts and the principles.
- It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.
- To understand metabolism of nutrient molecules in physiological and pathological conditions.
- To understand the mechanism of drug action and fundamental changes occur in diseases.
- Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Course Outcomes:

On successful completion of the course the student will

1. Understand cell and transport across membrane.
2. Explain the types and importance of biomolecules and bioenergetics
3. Understand the catalytic role of enzymes- importance of enzyme inhibitors in design of new drugs- therapeutic and diagnostic applications of enzymes.
4. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
5. Understand the genetic organization of mammalian genome- functions of DNA and RNA in protein synthesis.
6. Understand the principles of organ functions tests and their clinical significances

Course Content:**UNIT I**

Lipid metabolism – Definition – classification- chemistry and biological role of lipids- β -Oxidation of saturated (Palmitic acid) and unsaturated fatty acids(linolenic acid)-Ketone bodies metabolism (Ketogenesis and ketolysis) ketosis and ketoacidosis d - *De novo* -Biosynthesis of fatty acids

(Palmitic acid)-Metabolism of cholesterol (Biosynthesis and degradation)-Biosynthesis and significance of Phospholipids- Disorders of lipid metabolism – Hypercholesterolemia-atherosclerosis and fatty liver.

UNIT II

Amino acid metabolism – Definition- classification and biological role of amino acids - General reactions of amino acid metabolism - Transamination- deamination & decarboxylation-Urea cycle and its metabolic disorders-Metabolism of sulfur containing amino acids their metabolic disorders- Catabolism of tyrosine – tryptophan- phenylalanine and their metabolic disorders- Synthesis and significance of biological substances – creatine – histamine- 5-hydroxy- Tryptophan (5-HT) – dopamine – noradrenaline – adrenaline-Metabolism of Heme and its disorders Porphyria-as-hyperbilirubinemia and jaundice.

UNIT III

Nucleic acid metabolism – Definition- chemistry and biological role of nucleosides - nucleotides - Biosynthesis of purine and pyrimidine nucleotides-Catabolism of purine and pyrimidine nucleotides - Disorders of nucleotide metabolism - Gout disease.

UNIT IV

Replication and Protein synthesis -Organization of mammalian genome-Structure of DNA and significance as genetic material– RNA – structure- types and significance in protein synthesis-DNA replication- types and details on semi conservative model-Mutation and consequences of mutation-DNA Damage and repair mechanism-Transcription or RNA synthesis-Genetic code-Translation or Protein synthesis and its regulation and inhibition.

UNIT V

Clinical biochemistry-Role of the kidney - routine performed Laboratory tests - serum creatinine-creatinine clearance- serum urea and serum uric acid- Liver functions – Metabolic – synthetic-excretion & detoxification - Tests to evaluate the liver function- Composition and significance of lipoproteins - Lipid profile tests.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. Satyanarayan and U.Chakrapani	Biochemistry	Elsevier Health Sciences	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Robert K. Murry, Daryl K. Granner and Victor W. Rodwell	Harper's Biochemistry	McGraw-Hill Medical	2006
2	Stryer	Biochemistry	Pine Hendrickson	2005
3	Deb	Textbook of Biochemistry	Wiley: New York- NY	1992

WEBSITES:

- biochemistryquestions.wordpress.com
- www.mbmb.siu.edu
- www.medicalbiochemistry.org

15PYU413**SEMESTER-IV****BIOCHEMISTRY & BIOMOLECULES LABORATORY– II****3H****3C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells.
- The scope of the subject is providing biochemical facts and the principles.
- It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.
- To understand metabolism of nutrient molecules in physiological and pathological conditions.
- To understand the mechanism of drug action and fundamental changes occur in diseases.
- Clinical chemistry deals with the study of chemical aspects of human life in health and illness and the application of chemical laboratory methods to diagnosis, control of treatment, and prevention of diseases.

Course Outcomes:

On successful completion of the course the student will

1. Explain molecular orbital theory.
2. Understand the strain theories.
3. Describe effect of substituents on the reaction.
4. Qualitatively analyze the biomolecules.
5. Quantitatively analyze biochemical parameters and their importance in diagnosis of disease.
6. Qualitatively analyze the urine for normal and abnormal constituents.

Course Content:

1. Determination of serum cholesterol
2. Determination of serum triglycerides
3. Determination of Salivary amylase activity
4. Study the effect of pH on salivary amylase activity.
5. Study the effect of Temperature on Salivary amylase activity.
6. Study the effect of substrate concentration on salivary amylase activity.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.C. Gupta and S. Bhargavan	Practical Biochemistry	CBS Publishers & Distributors Pvt. Ltd	2010

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pattabiraman and Sitaram Acharya	Laboratory manual of Biochemistry	AITBS Publishers	1994

WEBSITES:

- biochemistryquestions.wordpress.com
- www.mbmb.siu.edu
- www.medicalbiochemistry.org

15PYU404**SEMESTER-IV****PHARMACY PRACTICE AND PATHOPHYSIOLOGY 4H 4C**

Instruction hours/ week: L: 3 T: 1 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This course is designed to impart basic knowledge and skills that are required for the practice of pharmacy in both hospital and community settings.
- To develop practical clinical skills that will enable the student to enhance the quality of life of patients and advance pharmaceutical care in the community setting.
- To understand prescription handling, dispensing of dosage forms and calculation of dosage forms.
- Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.
- This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms.
- Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Course Outcomes:

On successful completion of the course the student will

1. Understand the various drug distribution system- BMI & BP
2. Handle the prescriptions.
3. Manage community pharmacies.
4. Understand the elements of pharmaceutical care and provide comprehensive patient care services
5. Understand the concept and practice of the quality use of medicines.
6. Summarize the therapeutic approach for management of various diseases including reference to the latest available evidence.

Course Content:**UNIT I**

Prescription -Parts of prescription- handling of prescription- source of errors in prescription- care required in dispensing procedures including labeling of dispensed products..

UNIT II

Pharmaceutical calculations -Latin terms used in prescription – posology- factors determining doses of drug- calculation of doses for infants- adults and elderly patients - enlarging and reducing recipes- percentage solutions –allegation - alcohol dilution- proof spirit- isotonic solutions.

UNIT III

Dosage form -introduction - classifications of dosage forms - **Principles involved and procedures adopted in dispensing** -Typical prescription like mixtures – emulsions – powders – pastilles – lozenges – pills – lotions – liniments – inhalations – mouthwashes – gargles – douches – paints- sprays and tablet triturates.

UNIT IV

Basic principles of cell injury and adaptation -Causes of cellular injury- Pathogenesis and morphology of cell injury - Intercellular alterations in lipids- proteins and carbohydrates- cellular adaptation- atrophy and hypertrophy.

UNIT V

Basic mechanism involved in the process of inflammation and repair - alteration in vascular permeability and blood flow- migration of WBC's- acute and chronic inflammation and mediators of inflammation - Brief outline of the process of repair.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.J. Carter.	Cooper and Gunn's Dispensing for Pharmaceutical students	CBS publishers	2000

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	University of the Sciences in Philadelphia	Remington's Pharmaceutical Sciences	LWW	2005
2	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
3	William E. Hassan	Hospital Pharmacy	Lea & Febiger	1974
4	The Indian Pharmacopoeia	Indian Pharmacopoeia	Press of IPC under Ministry of Health	2007

	Commission		& Family Welfare, Govt. of India	
5	Goodman and Gilman	The Pharmacological basis of therapeutics	Mc Grill	2008

WEBSITES:

- www.jpp.sagepub.com
- www.jrpp.net
- www.pharmacypractice.com

15PYU414

SEMESTER-IV

**PHARMACY PRACTICE AND PATHOPHYSIOLOGY
LABORATORY****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This course is designed to impart basic knowledge and skills that are required for the practice of pharmacy in both hospital and community settings.
- To develop practical clinical skills that will enable the student to enhance the quality of life of patients and advance pharmaceutical care in the community setting.
- To understand prescription handling, dispensing of dosage forms and calculation of dosage forms.
- Pathophysiology is the study of causes of diseases and reactions of the body to such disease producing causes.
- This course is designed to impart a thorough knowledge of the relevant aspects of pathology of various conditions with reference to its pharmacological applications, and understanding of basic pathophysiological mechanisms.
- Hence it will not only help to study the syllabus of pathology, but also to get baseline knowledge required to practice medicine safely, confidently, rationally and effectively.

Course Outcomes:

On successful completion of the course the student will

1. Understand the various drug distribution system- BMI & BP
2. Handle the prescriptions.
3. Manage community pharmacies.
4. Understand the elements of pharmaceutical care and provide comprehensive patient care services
5. Understand the concept and practice of the quality use of medicines.
6. Summarize the therapeutic approach for management of various diseases including reference to the latest available evidence.

Course Content:

1. Dispensing of prescription falling under the following categories:
 - Syrups
 - Mixtures

- Elixirs
- Emulsions
- Powders
- Mouthwashes
- Gargles
- Lotions

2. Dispensing procedures involving pharmaceutical calculation, dosage calculation for paediatric.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Guyton A- Hall J.E.	Textbook of Medical Physiology- WB Saunders Company.	Saunders	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Joseph DiPiro- Robert L. Talbert	Pharmacotherapy: A Pathophysiological Approach	McGraw-Hill Education	2014
2	The Indian Pharmacopoei a Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES:

- www.jpp.sagepub.com
- www.jrpp.net
- www.pharmacypractice.com

15PYU405

SEMESTER-IV

PHARMACEUTICAL TECHNOLOGY-II**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This course is designed to impart a fundamental knowledge on the art and science of various machines and their handling in pharmaceutical industry.
- This course focuses on various topics like unit operations, material handling, pharma plant construction, corrosion, industrial pollution etc.
- Enables the pharmacist to make rational decisions on scientific basis concerning the art and technology of pharmaceutical equipments.
- To carry out various test to prevent environmental pollution.
- To appreciate and comprehend significance of plant lay out design for optimum use of resources.
- To appreciate the various preventive methods used for corrosion control in Pharmaceutical industries.

Course Outcomes (CO's):

On successful completion of the course the student will

1. To know various unit operations used in Pharmaceutical Industries.
2. To understand the material handling techniques.
3. To perform various processes involved in pharmaceutical manufacturing process.
4. To carry out various tests to prevent environmental pollution.
5. To appreciate and comprehend significance of plant lay out design for optimum use of resources.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical Industries

Course Content:**UNIT I**

Evaporation -basic concepts of phase equilibria – factors affecting evaporation – evaporators – film evaporators – single effect and multiple effect evaporators - **Heat transfer** - source of heat – mechanism of heat flow – steam as heating source.

UNIT II

Distillation -Raoult'slaw - phase diagrams- volatility - simple steam flash distillation - principles of rectification - method for calculation of number of theoretical plates - Azeotropic and extractive

distillation.

UNIT III

Drying - Moisture content - mechanism of drying - rate of drying - time of drying - calculations - classification - types of dryers - dryers used in pharmaceutical industries - special drying methods - mathematical problems on drying.

UNIT IV

Size reduction and Size separation -Definition - objective of size reduction - factors affecting size reduction - laws governing energy and power requirement of mills - including ball mill - hammer mill - fluid energy mill.

UNIT V

Mixing - definition - solid-solid mixing – mixing process steps – classification of equipments for solid mixing - solid-liquid mixing - mechanism of liquid mixing – mixing vessels or tanks - liquid-liquid mixing – equipments used in mixing.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.V.S.Subrahmanyam et al	Pharmaceutical Engineering principles and practices	Vallabh prakashan	2002

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lachman	Theory and practice of Industrial Pharmacy	Lea & Febiger	1986
2	MaCabe WL and Smith J.C.	Unit operations of Chemical Engineering	McGraw-Hill Education	2004
3	Walter J. Badger.	Introduction to Chemical Engineering	McGraw-Hill Education	1955
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005

WEBSITES

- **www.picscheme.org**
- **www.ijper.org**
- **www.pharmpress.org**

15PYU501

ADVANCED PHARMACOGNOSY – I**SEMESTER-V****3H 3C**

Instruction hours/ week: L: 3 T:0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The department is to acquaint the students with the basic knowledge of the natural products.
- Students engaged in pharmacy and in other health professionals should know the role of natural products in discovery of drugs and their use and application in eradicating ailments.
- The students are given sufficient knowledge to be able to describe the modern methods of extraction and purification of crude drugs.
- To learn and understand the techniques involved in the herbal drug-cosmetic preparation and their Standardization.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- To know the techniques in the cultivation and production of crude drugs.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Explain the basic principles of extraction and various modern extraction techniques.
2. Understand the biogenesis of secondary metabolites.
3. Elaborate the plant based industries and institutions involved in work on medicinal and aromatic plants in India.
4. Demonstrate the Industrial production and estimation of Phytoconstituents.
5. Perform the Herbal formulation and standardization.
6. Explain the Nutraceuticals.

Course Content:**UNIT I**

Modern methods of extraction- application of latest techniques like Spectroscopy, types and applications– various types and applications of chromatography, and electrophoresis in the isolation-purification and identification of crude drugs.

UNIT II

Introduction to plant biochemistry with special reference to basic metabolic pathways - Introduction to biogenesis of secondary metabolites like Atropine –Ergotamine-Morphine

and Steroidal glycosides -Study of utilization of radioactive isotopes in the investigation of Biogenetic studies.

UNIT III

A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India - Introduction – classification of medicinal plant based industry – production and utilization of medicinal plants and their products in India –manufacturers of herbal formulations manufacturers of standardized herbal extracts, phytoconstituents and essential oils – list of government institution involved in the development of plant based industrial technology.

UNIT IV

Industrial production and estimation of the following phytoconstituents –production – estimations–uses of Forskolin –Sennoside– Artemisinin – Diosgenin-Tropane alkaloids – Curcumin –Rutin –Phyllanthin –Asiaticoside-Andrographolides and Gymnemic acid.

UNIT V

Herbal formulation development and standardization –Preparation-stability testing of Herbal extracts and formulations- **Role of Herbs in Cosmetics** – Hair care preparation–Henna–Amla-Hibiscus – **Skin Care preparation**- Aloe vera–Turmeric-Sandalwood – **Nutraceuticals**

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kokate C.K- Purohit A.P- Gokhale S.B	Text book of Pharmacognosy	Nirali prakasan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trease and Evans	Pharmacognosy	W.B Sauders	2002
2	James Robbers- Marilyn K. Speedice and Varro E.- Tyler	Pharmacognosy and Pharmacobiotechnology	Williams and Wilkins	1996
3	TE Wallis	Textbook of Pharmacognosy	CBS publishers and Distributors-	2005

			New Delhi	
4	K.N.Kalia	Industrial Pharmacognosy	CBS publishers and Distributors- New Delhi	2005
5	The Indian Pharmacopoeia Commission		Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES:

- www.authorstream.com
- www.eparmacognosy.com
- www.science20.com

15PYU511**ADVANCED PHARMACOGNOSY LABORATORY – I****SEMESTER-V****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The department is to acquaint the students with the basic knowledge of the natural products.
- Students engaged in pharmacy and in other health professionals should know the role of natural products in discovery of drugs and their use and application in eradicating ailments.
- The students are given sufficient knowledge to be able to describe the modern methods of extraction and purification of crude drugs.
- To learn and understand the techniques involved in the herbal drug-cosmetic preparation and their Standardization.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- To know the techniques in the cultivation and production of crude drugs.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Describe the isolation of the Phytoconstituents.
2. Prepare the hair care preparation.
3. Prepare the skin care the preparation.
4. Demonstrate the Amino acid by ascending chromatography.
5. Perform the Thin layer chromatography of Curcumin.
6. Understand the isolation and formulation procedure.

Course content:

1. Caffeine – from tea dust
2. Quinine – from Cinchona bark
3. Citric acid – from Lemon.
4. Casein – from Milk.
5. Starch – from Potato
6. Pectin – from Orange peel
7. Curcumin from turmeric
8. Hair care preparation
 - I. Amla
 - II. Hibiscus
9. Skin Care preparation
 - I. Aloe vera

10. Determination of Aminoacid by Ascending chromatography
Thin layer chromatography of curcumin

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S.B.Gokale and C.K kokate	Practical Pharmacognosy	Vallabh prakasan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Khandelwal KR	Practical pharmacognosy	Nirali prakashan	2005

WEBSITES:

- www.authorstream.com
- www.eparmacognosy.com
- www.science20.com

15PYU502**PHARMACEUTICAL BIOTECHNOLOGY – I****SEMESTER-V****3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100
External Semester Exam: 3 Hours**Course Objectives:**

- This paper has been designed to provide the advanced knowledge to the Pharmacy students in valuable areas of advanced Biotechnology.
- To play a crucial role in determining its future use and applications in medicine- drug discovery and in pharmaceutical industry.
- It also emphasize the study of microbiological and biotechnological processes.
- To know modern technology aspects to useful products and to correct the alternative ways to prevent the occurrence and the treatment of disease related to microorganisms and techniques.
- To understand methods of identification- cultivation and preservation of various microorganisms.
- To understand Genetic engineering applications in relation to production of pharmaceuticals.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the importance of immunological reactions and preparations of immunological products.
2. Do sterilization of various equipments/products and bacterial sensitivity testing against antibiotics and disinfectants.
3. Know the anatomy, identification, growth factors and sterilization of microorganisms;
4. Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
5. Do estimation of RNA and DNA and there by identifying the source;
6. Do cultivation and identification of the microorganisms in the laboratory;
7. Do identification of diseases by performing the diagnostic tests; and
8. Appreciate the behavior of motility and behavioral characteristics of microorganisms.

Course Content:**UNIT I**

Introduction to Microbiology- Scope of Microbiology- Microbes of Medicinal interest- study of mode of Transmission & treatment of Microbial diseases like Cholera – Typhoid – Tuberculosis – Diphtheria – Tetanus- Syphilis & AIDS –Classification- Morphology and fine structure Bacteria –

Fungi- Viruses -Methods of isolation and identification of bacteria - staining techniques and biochemical reactions - Total & viable counting techniques of bacteria - Growth and cultivation- Their Nutritional requirements -Media-differential enriched selective - Maintenance of lab culture.

UNIT II

Detail study of different methods of sterilization including their merits and Demerits-Detailed study of sterility testing of different pharmaceutical preparations – Disinfectant - study of disinfectant. Factors affecting their action and evaluation of bactericidal & Bacteriostatic -Principles and methods of different microbiological assays including sensitivity testing with references to ciprofloxacin-streptomycin & vitamin B -12.

UNIT III

Genetic organization of Eukaryotes and Prokaryotes - Microbial genetics including transformation – transduction – conjugation- plasmids and transposons - Introduction to Microbial biotransformation- Biotransformation of steroids and production of single cell protein.

UNIT IV

Molecular Biology and Engineering -Study of cloning vectors- restricted endonucleases and DNA ligase -Application of rDNA technology and genetic engineering in the products- **Interferon Vaccines**- hepatitis- B –**Hormones**- Insulin.

UNIT V

Access to Molecular Biology Data Bases-Nucleic Acid Sequences – Genomes- Protein Sequence and Structures – Entrez- Sequence Retrieval System (SRS) - Protein Identification Resource (PIR) - Sequence Alignment- Software's (BLAST- FASTA- CLUSTAL-W)-Construction of Phylogenetic Tree -Protein Structure Prediction- Applications of Bioinformatics.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ananthanarayan and Paniker	Text Book of Microbiology	Orient black swam	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pelzer- Krieg and Chan	Microbiology	ABE books	1986
2	John A Wiley	Prescott's Microbiology	Prescott's	2011
3	R.Y. Stainer	General Microbiology	Mac million	1952

WEBSITES:

- www.microbiology.org
- www.microworld.org
- www.neomed.edu

15PYU512

SEMESTER-V

PHARMACEUTICAL BIOTECHNOLOGY LABORATORY-I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This paper has been designed to provide the advanced knowledge to the Pharmacy students in valuable areas of advanced Biotechnology.
- To play a crucial role in determining its future use and applications in medicine- drug discovery and in pharmaceutical industry.
- It also emphasize the study of microbiological and biotechnological processes.
- To know modern technology aspects to useful products and to correct the alternative ways to prevent the occurrence and the treatment of disease related to microorganisms and techniques.
- To understand methods of identification- cultivation and preservation of various microorganisms.
- To understand Genetic engineering applications in relation to production of pharmaceuticals.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the importance of immunological reactions and preparations of immunological products.
2. Do sterilization of various equipments/products and bacterial sensitivity testing against antibiotics and disinfectants.
3. Know the anatomy, identification, growth factors and sterilization of microorganisms;
4. Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
5. Do estimation of RNA and DNA and there by identifying the source;
6. Do cultivation and identification of the microorganisms in the laboratory;
7. Do identification of diseases by performing the diagnostic tests; and
8. Appreciate the behavior of motility and behavioral characteristics of microorganisms.

Course Content:**Microbiology**

1. Study of apparatus used in experimental microbiology.
2. Sterilization techniques – Glasswares- media- Room.
3. Preparation and sterilization of Media.
4. Isolation techniques– Streak plate- Pour plate
5. Staining techniques- Simple staining Gram's staining- Acid fast staining-
6. Spore staining- flagella staining - Capsule staining.

7. Total and viable count of Microorganisms.
8. Motility of the microorganism by Hanging drop method.
9. Sterility testing for Pharmaceutical products.
10. Microbiological assay of antibiotics.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	James G. Cappuchino	Microbiology – A laboratory manual	Pearson	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mackie and McCartney	Practical Medical Microbiology	Elsevier	1996

WEBSITES:

- www.microbiology.org
- www.microworld.org
- www.neomed.edu

15PYU503

SEMESTER-V

CHEMISTRY OF NATURAL PRODUCTS**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds.
- It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin.
- To know the modern extraction techniques- characterization and identification of the herbal drugs.
- To know the different types of natural compounds and their chemistry and medicinal importance
- Importance of natural compounds as a lead molecules for new drug discovery.
- The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially.

Course Outcomes (CO's):

On successful completion of the course the student will

1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.
2. To understand the preparation and development of herbal formulation.
3. To understand the herbal drug interactions.
4. To carryout isolation and identification of phytoconstituents.
5. Know the modern extraction techniques- characterization and identification of the herbal drugs.
6. Know the different types of natural compounds and their chemistry and medicinal importance

Course Content:**UNIT I****Terpenoids** – Classification - chemistry and uses of citral – menthol – thymol – camphor - alpha-terpineol and alpha-pinene**UNIT II****Alkaloids** – Classification - chemistry and pharmacological activity of Atropine and related compounds – Papaverine – Ephedrine**UNIT III****Glycosides** - Basic ring system - nomenclature and stereochemistry of steroid nucleus - Chemistry of Digitoxin – Digoxin – Lanatosides - Diosgenin and Sennosides.

UNIT IV

Vitamins - Chemistry - medicinal and pharmaceutical uses of vitamin A- D- E- K- B₁ - B₂ - B₆ - B₁₂ and Folic acid – **Flavonoids** - Classification and chemistry of hesperidine

UNIT V

Purines - A brief account of chemistry and structural elucidation of uric acid - interrelation between caffeine - theophylline and theobromine.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Agarwal	Chemistry of Natural Products- I and Vol I & II.	Krishan Prakashan	2014

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Chatwal	Chemistry of Natural Products- Vol I & II.	Himalaya Publishing House	2010
2	I.L. Finar	Organic Chemistry Vol I and II	Pearson Education;	2002
3	Nakanishi Gggolo	Natural Product Chemistry	University Science Books-U.S	1991

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU513

SEMESTER-V

CHEMISTRY OF NATURAL PRODUCTS LABORATORY 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to provide detail knowledge about chemistry of medicinal compounds from natural origin and general methods of structural elucidation of such compounds.
- It also emphasizes on isolation, purification and characterization of medicinal compounds from natural origin.
- To know the modern extraction techniques- characterization and identification of the herbal drugs.
- To know the different types of natural compounds and their chemistry and medicinal importance
- Importance of natural compounds as a lead molecules for new drug discovery.
- The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially.

Course Outcomes:

On successful completion of the course the student will

1. To know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents.
2. To understand the preparation and development of herbal formulation.
3. To understand the herbal drug interactions.
4. To carryout isolation and identification of phytoconstituents.
5. Know the modern extraction techniques- characterization and identification of the herbal drugs.
6. Know the different types of natural compounds and their chemistry and medicinal importance

Course Content:

1. Isolation of active principles from natural sources including volatile oils, terpenoids etc (6).
2. Estimation of number of functional groups in organic compounds (3 compounds)
3. Chromatographic techniques. (3 compounds)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Prof. R.R Wadekar and Prof. M.C Kuchekar	Pharmacognosy and Phytochemistry II	Everest Publishing House;	2006

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Peech and M.V.Tracey	Modern Methods Of Plant Analysis- 7volume Sets	Springer/bsp Books	2006

WEBSITES:

- www.pdfbit.com
- www.chem.ucla.edu
- www.chemistrylectures.com

15PYU504

SEMESTER-V

PHARMACOLOGY & THERAPEUTICS –I 3H 3C

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes(CO's):

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/subcellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:**UNIT I**

General Pharmacology - Introduction to Pharmacology- Definition and various branches of pharmacology – **Pharmacodynamics**-Principles and mechanisms of drug action -Classification of receptors-Signal transduction mechanisms of ligand gated ion channels-G Protein–coupled receptors-Kinase linked receptors and receptors that regulate transcription factors –Drug receptors interactions-combined effects of drugs and factors modifying drug action.

UNIT II

Pharmacokinetics- Detail study of various factors influencing drug absorption- distribution- metabolism and excretion - **Pharmacogenetics**-Adverse drug reactions – Discovery and development of new drugs-Preclinical and clinical studies.

UNIT III

Pharmacology of Peripheral Nervous System – Organization and function of ANS-Neurohumoral transmission – Parasympathomimetics –Parasympatholytics-Sympathomimetics and Sympatholytics.

UNIT IV

Pharmacology of Peripheral Nervous System-Neuromuscular blocking agents and skeletal muscle relaxants (peripheral)-Local anesthetic agents-Drugs used in Myasthenia Gravis.

UNIT V

Drugs acting on Urinary System-Diuretics and anti-diuretics.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K.D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Satoskar R.S and Bhandarkar S.D.	Pharmacology and Pharmacotherapeutics	Popular Prakasan	2009
2	Mycek M.J-Gelnet S.B and Perper M.M.	Lippincott's illustrated Reviews-Pharmacology	Harvery	1992
3	Lawrence L brunton	Goodman and Gilman's- The Pharmacological basis of therapeutics	CBS Publishers- Delhi.	2011

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU514

SEMESTER-V

PHARMACOLOGY & THERAPEUTICS LABORATORY – I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/subcellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:

1. Commonly used Apparatus/instruments in experimental pharmacology.
2. Commonly used laboratory animals and their handling.
3. Maintenance of laboratory animals- regulations of animal use and Ethical requirements according to CPCSEA.
4. Some common laboratory techniques: Blood withdrawal –plasma and serum separation-
5. Anesthetics used for animal studies-procedures for rendering animal unconscious and chemical euthanasia.

6. Study of different routes of drugs administration in mice/rats.
7. To study the effect of hepatic microsomal enzyme inhibitors and inducers on the Phenobarbitone sleeping time in mice.
8. Experiments on Central nervous system: Recording of spontaneous motor activity- stereotype activity -anti-catatonic activity-analgesic activity-anti convulsant
9. Local anesthetic activity of drugs by suitable animal model.
10. Effect of autonomic drugs on rabbit's eye.
11. Diuretic activity of drugs in rats.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M. N. Ghosh.	Fundamentals of Experimental Pharmacology	Hilton and company	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kulkarni.S.K. Easton.	Handbook of Experimental Pharmacology	Elsevier	2006

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU505**BIOPHARMACEUTICS & PHARMACOKINETICS****SEMESTER-V****3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the absorption, distribution, metabolism and excretion of drugs and to overcome various incompatibilities.
- This subject places emphasis on the dependence of drug absorption on the physical and chemical nature of drug substances, the effect of dosage form in which it is designed.
- To understand the factors related to the physiologic and pathologic conditions of the subjects to which it is administered.
- This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arising there in.
- To know the drug molecule gets absorbed, distributed, metabolized and excreted.
- To know pharmacokinetic parameters.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know various incompatibilities and to overcome incompatibilities.
2. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
3. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
4. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
5. Understand various pharmacokinetic parameters, their significance & applications.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical Industries.
7. Understand various physicochemical properties of drug molecules in the designing the dosage forms.

Course Content:**UNIT-I**

Bio pharmaceutics - definition – introduction- **Absorption** – definition – rate of drug absorption after administration - drug concentration in blood - biological factors in drug absorption - physico-chemical factors - dosage form consideration for gastrointestinal absorption.

UNIT-II

Distribution of drugs - definition - distribution in blood and other fluids - **Biotransformation of drugs** - definition - Phase I and Phase II reactions - Factors affecting biotransformation.

UNIT-III

Excretion of drugs - definition - renal excretion of drugs – glomerular filtration – tubular secretion – tubular reabsorption - factors affecting renal excretion – dialysis and haemoperfusion - non- renal routes of drug excretion.

UNIT-IV

Pharmacokinetics - Compartment models- a brief study of parameters like biological half life - apparent volumes of distribution - renal clearance - total body clearance – absorption - elimination rate constants and significance of the data.

UNIT-V

Bioavailability and bio-equivalency testing - Definitions - dosage forms - dissolution rate and bio-equivalency testing – biopharmaceutical classification system - **Incompatibilities** -definition – physical – chemical - therapeutic incompatibility – reason and correction of incompatibility – role of pharmacist in overcoming incompatibilities.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. M. Brahmanekar and Sunil B.Jaiswal-	Bio pharmaceuticals and Pharmacokinetics- A Treatise	Vallabh Prakashan Pitampura- Delhi	2011

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lieberman and Lachman.	Pharmaceutical dosage forms: Disperse systems Vol-1-Vol-2- Vol-3	Informa healthcare	2008
2	Milo Gibaldi.	Biopharmaceuticals and Clinical Pharmacokinetics	Lea and febiger	1991

3	Leon Shargel and Andrew B.C.YU	Applied biopharmaceutics and pharmacokinetics-	Appleton & Lange	2004
4	Robert. E. Notari. B	Biopharmaceutics and Pharmacokinetics.	CBS publisher	2010

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU515

SEMESTER-V

BIOPHARMACEUTICS & PHARMACOKINETICS LABORATORY 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the absorption, distribution, metabolism and excretion of drugs and to overcome various incompatibilities.
- This subject places emphasis on the dependence of drug absorption on the physical and chemical nature of drug substances, the effect of dosage form in which it is designed.
- To understand the factors related to the physiologic and pathologic conditions of the subjects to which it is administered.
- This subject is designed to impart knowledge and skills of Biopharmaceutics and pharmacokinetics and their applications in pharmaceutical development, design of dose and dosage regimen and in solving the problems arising there in.
- To know the drug molecule gets absorbed, distributed, metabolized and excreted.
- To know pharmacokinetic parameters.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know various incompatibilities and to overcome incompatibilities.
2. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance.
3. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination.
4. To understand the concepts of bioavailability and bioequivalence of drug products and their significance.
5. Understand various pharmacokinetic parameters, their significance & applications.
6. To appreciate the various preventive methods used for corrosion control in Pharmaceutical Industries.
7. Understand various physicochemical properties of drug molecules in the designing the dosage forms.

Course Content:

1. Determination of pseudo first order kinetics and half life.
2. Determination of second order kinetics.
3. Dissolution studies of any marketed drug.
4. Improvement of dissolution characteristics of slightly soluble drugs.

5. Protein binding studies of a highly protein bound drug and poorly protein bound drug.
6. Calculation of k_a , k_e ,
7. Calculation of $t_{1/2}$, C_{max} .
8. Calculation of bioavailability from urinary excretion data for drugs.
9. Calculation of bioavailability from systemic circulation data for drugs.
10. Calculation of AUC and bioequivalence from the given data for drugs.

TEXT BOOKS:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	D. M. Brahmankar and Sunil B.Jaiswal-	Bio pharmaceuticals and Pharmacokinetics- A Treatise	Vallabh Prakashan Pitampura- Delhi	2011

REFERENCES:

S. No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Remington	The science and practice of pharmacy- 20th edition Pharmaceutical Science	Lippincott williamson	2000

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU601

SEMESTER-VI

ADVANCED PHARMACOGNOSY – II**3H****3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The department is to acquaint the students with the basic knowledge of the natural products.
- Students engaged in pharmacy and in other health professionals should know the role of natural products in discovery of drugs and their use and application in eradicating ailments.
- The students are given sufficient knowledge to be able to describe the modern methods of extraction and purification of crude drugs.
- To learn and understand the techniques involved in the herbal drug-cosmetic preparation and their Standardization.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- To know the techniques in the cultivation and production of crude drugs.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the preparation and development of herbal drugs as per GMP guidelines.
2. Explain the plant toxins and their adverse drug reactions.
3. Understand the different types of plant tissue culture.
4. Perform the isolation and purification of enzymes.
5. Understand the preparations and standardization of ayurvedic formulations.
6. Elaborate the Herbal-Drug interaction, Edible Vaccine.

Course Content:**UNIT I**

WHO Guidelines for the assessment of Herbal Medicine and Cosmetics – introduction – standardization involving ash and extractives values – foreign matter – volatile matter – moisture content determination – evaluation – classification of evaluation methods of herbal medicine and cosmetics.

UNIT II

Basic principles involved in the alternative system of medicine viz–Ayurveda–Siddha–Unani and Homeopathy– Preparation and standardization of Ayurvedic formulations – Aristas –Asawas – Ghutika– Churna–Leha and Bhasma.

UNIT III

Plant Toxins and adverse drug reactions – Natural allergens–Hallucinogens- Teratogens - Industrial production and pharmaceutical application of phytoconstituents such as – Sennosides - Cardiac glycosides - Vinca alkaloids - Quinoline alkaloids – Menthol - Citric acid – Podophyllotoxin – Diosgenin - Solasodine, and Tropane alkaloids.

UNIT IV

Plant tissue culture -Historical development- nutritional requirements -growth and their maintenance-applications of plant tissue culture and types of cultures related to cell suspension culture-callus culture-hairy root culture and protoplast culture.

UNIT V

Enzyme Biotechnology - Introduction-general methods of isolation-purification and application of immobilized enzymes – Biological sources-methods of preparation-chemical nature and uses of - Papain-Pepsin- Trypsin- Pancreatin– Asparaginase- urokinase –Herbal-Drug interaction -Edible Vaccine.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kokate C-K- Purohit A-P- Gokhale S-B	Text book of Pharmacognosy	Nirali prakasan	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Trease and Evans	Pharmacognosy	W-B Saunders	2002
2	James Robbers- Marilyn K- Speedice and Varro E-- Tyler	Pharmacognosy and Pharmacobiotechnology	Williams and Wilkins	1996
3	TE Wallis	Textbook of Pharmacognosy	CBS publishers and Distributors- New Delhi	2005
4	A.N.Kalia	Textbook of industrial Pharmacognosy	CBS publishers and Distributors- New Delhi	2005

4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
---	-------------------------------------	----------------------	--	------

WEBSITES:

- www.autorstream.com
- www.e Pharmacognosy.com
- www.science20.com

15PYU611**ADVANCED PHARMACOGNOSY LABORATORY – II****SEMESTER-VI****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The department is to acquaint the students with the basic knowledge of the natural products.
- Students engaged in pharmacy and in other health professionals should know the role of natural products in discovery of drugs and their use and application in eradicating ailments.
- The students are given sufficient knowledge to be able to describe the modern methods of extraction and purification of crude drugs.
- To learn and understand the techniques involved in the herbal drug-cosmetic preparation and their Standardization.
- The subject involves the fundamentals of Pharmacognosy like scope, classification of crude drugs, their identification and evaluation, phytochemicals present in them and their medicinal properties.
- To know the techniques in the cultivation and production of crude drugs.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Describe the isolation of the Phytoconstituents.
2. Prepare the hair care preparation.
3. Prepare the skin care the preparation.
4. Demonstrate the Amino acid by ascending chromatography.
5. Perform the Thin layer chromatography of Curcumin.
6. Understand the isolation and formulation procedure.

Course content:

1. Preparation and standardization of Herbal medicine
 - I. Turmeric
 - II. Garlic
2. Preparation and standardization of Herbal cosmetics
 - I. Shampoos
 - II. Creams
 - III. Lipsticks
3. Preparation and standardization of Ayurvedic formulation leghya
4. Demonstration experiment on plant tissue culture
5. Extraction of volatile oils
 - I. Menthol oil
 - II. Coriander oil
 - III. Fennel oil

6. Isolation of a plant enzyme

- I. Papain
- II. Pepsin

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	C.K. Kokate.	Practical Pharmacognosy- III edition-	Nirali prakashan	2011

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Vinod. D. Rangari	Pharmacognosy and Phytochemistry I edition- vol- I &II	Carrier publications	2009

WEBSITES:

- www.authorstream.com
- www.e Pharmacognosy.com
- www.science20.com

15PYU602

PHARMACEUTICAL BIOTECHNOLOGY – II**SEMESTER-VI****3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This paper has been designed to provide the advanced knowledge to the Pharmacy students in valuable areas of advanced Biotechnology.
- To play a crucial role in determining its future use and applications in medicine- drug discovery and in pharmaceutical industry.
- It also emphasize the study of microbiological and biotechnological processes.
- To know modern technology aspects to useful products and to correct the alternative ways to prevent the occurrence and the treatment of disease related to microorganisms and techniques.
- To understand methods of identification- cultivation and preservation of various microorganisms.
- To understand Genetic engineering applications in relation to production of pharmaceuticals.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the importance of immunological reactions and preparations of immunological products.
2. Do sterilization of various equipments/products and bacterial sensitivity testing against antibiotics and disinfectants.
3. Know the anatomy, identification, growth factors and sterilization of microorganisms;
4. Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
5. Do estimation of RNA and DNA and there by identifying the source;
6. Do cultivation and identification of the microorganisms in the laboratory;
7. Do identification of diseases by performing the diagnostic tests; and
8. Appreciate the behavior of motility and behavioral characteristics of microorganisms.

Course Content:**UNIT I**

Bio process technology- Introduction to fermentation technology- study- design and operation of Fermenter -Bioprocess of the following metabolites – Alcohol- Citric acid- Penicillin - Vitamin B12- and Glutamic acid.

UNIT II

Enzyme biotechnology – Introduction- classification and uses -Techniques of immobilization - Application- biosensors and their application.

UNIT III

Immunology and Immune Biotechnology– Introduction- types of Immunity- antigen and haptens- antibodies – antigen- antibody reactions- complementary systems- structure and function of MHC- antigen recognition and presentation – hypersensitivity- Hypersensitivity response-immuno stimulation and suppression and Auto immune disorders –**Immunization** - Definition – types – preparation- standardization and application of official vaccines – containerization- storage conditions and stability of official vaccines -Hybridoma technology.

UNIT IV

Monoclonal antibodies - Introduction- Techniques of production and purification of monoclonal antibodies- Application of monoclonal antibodies -Immuno blotting techniques such ELISA- Western Blot- Southern Blot- Northern blot.

UNIT V

Animal Biotechnology - Introduction to animal tissue culture – characters- general procedure for the maintenance of cell culture- Nutritional requirements- Primary and established cell culture and application of animal tissue culture.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ananthanarayan and Paniker--	Text Book of Microbiology	Orient black swam	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Pelzer- Krieg and Chan	Microbiology	ABE books	1986
2	John A Wiley	Prescott's Microbiology	Prescott's	2011
3	R-Y- Stainer	General Microbiology	Mac millan	1952

WEBSITES:

- www.msbiotech.edu
- www.biotechinstitute.org
- www.biospace.org

15PYU612

SEMESTER-VI

PHARMACEUTICAL BIOTECHNOLOGY LABORATORY-II 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This paper has been designed to provide the advanced knowledge to the Pharmacy students in valuable areas of advanced Biotechnology.
- To play a crucial role in determining its future use and applications in medicine- drug discovery and in pharmaceutical industry.
- It also emphasize the study of microbiological and biotechnological processes.
- To know modern technology aspects to useful products and to correct the alternative ways to prevent the occurrence and the treatment of disease related to microorganisms and techniques.
- To understand methods of identification- cultivation and preservation of various microorganisms.
- To understand Genetic engineering applications in relation to production of pharmaceuticals.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the importance of immunological reactions and preparations of immunological products.
2. Do sterilization of various equipments/products and bacterial sensitivity testing against antibiotics and disinfectants.
3. Know the anatomy, identification, growth factors and sterilization of microorganisms;
4. Know the mode of transmission of disease causing microorganism, symptoms of disease, and treatment aspect;
5. Do estimation of RNA and DNA and there by identifying the source;
6. Do cultivation and identification of the microorganisms in the laboratory;
7. Do identification of diseases by performing the diagnostic tests; and
8. Appreciate the behavior of motility and behavioral characteristics of microorganisms.

Course Content:

1. Production of alcohol and wine by fermentation process.
2. Immobilization techniques – Whole cells- Enzymes
3. Solid media inoculation – streak plate, pour plate.
4. Motility study by hanging drop method.
5. Staining preparation – negative staining.
6. Microbiological assay – well plate method.
7. Biochemical test
8. Determination of minimum inhibitory concentration.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	James G-Cappuchino	Microbiology – A laboratory manual	Pearson	2013

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Mackie and McCartney	Practical Medical Microbiology	Elsevier	1996

WEBSITES:

- www.msbiotech.edu
- www.biotechinstitute.org
- www.biospace.org

15PYU603

SEMESTER-VI

MEDICINAL CHEMISTRY- I

3H

3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

Study of classification - mechanism of action (biochemical and molecular basis) - structure activity relationship including stereo chemical aspects - physiochemical properties and synthesis of selected drugs (only drugs marked with asterisk) on the following categories of drugs.

UNIT I

Drugs acting on Autonomic Nervous System- Neurotransmitters- Sympathomimetic agents-SAR of Sympathomimetic agents-Direct acting-Nor-epinephrine- Epinephrine- Phenylephrine*- Dopamine- Methyldopa- Clonidine*- Salbutamol*- Oxymetazoline and Xylometazoline-**Indirect acting agents:** Hydroxyamphetamine **Adrenergic Antagonists- Alpha adrenergic blockers-**Tolazoline*- Phentolamine*- **-Beta adrenergic blockers:** SAR of beta blockers- Propranolol*- **Cholinergic neurotransmitters-**Biosynthesis and catabolism of acetylcholine-Cholinergic receptors system (muscarinic & nicotinic) and their distribution-**Parasympathomimetic agents-SAR of Parasympathomimetic agents-Direct acting agents:** Acetylcholine- Carbachol*- Pilocarpine- **Indirect acting/Cholinesterase inhibitors (Reversible & Irreversible):** Physostigmine- Neostigmine- Pyridostigmine*- Isofluorophate- **Cholinesterase reactivators:** Pralidoxime chloride- **Cholinergic Blocking agents- SAR of cholinolytic agents-**Solanaceous alkaloids and analogues- -

Ipratropium bromide*. **Synthetic cholinergic blocking agents:** Dicyclomine hydrochloride*- Biperidine hydrochloride- Procyclidine hydrochloride*- Tridihexethyl chloride- **-Ganglionic blocking agents**-Trimethaphan camsylate- mecamlamine-**Neuromuscular blocking agents:** Metocurine Iodide- pancuronium bromide- **Local Anesthetics-** SAR of Local anaesthetics-**Benzoic Acid derivatives**-Cocaine- **Amino Benzoic acid derivatives** Benzocaine*- Butamben- Procaine*- Butacaine- Propoxycaine- Tetracaine- Benoxinate-**Lidocain/Anilide derivatives-** Lignocaine*- Mepivacaine- Prilocaine- Etidocaine- **Miscellaneous-** Dibucaine*

UNIT II

Drugs acting on Central Nervous System - General anesthetics - Inhalation anesthetics- Halothane*- Methoxyflurane*- **Dissociative anesthetics -** Ketamine hydrochloride*- **Sedatives and Hypnotics – Benzodiazepines -**SAR of Benzodiazepines- Chlordiazepoxide*- Diazepam **Barbiturates -**SAR of barbiturates- Barbitol*- Phenobarbital – Mephobarbital –Amobarbital – Butobarbital – Pentobarbital – Secobarbital –**Miscellaneous - Amides & imides –** Glutethimide - **Alcohol & their carbamate derivatives –** Meprobamate-**Aldehyde & their derivatives -** Triclofos sodium*- Paraldehyde.

Skeletal Muscle relaxants – Methocarbamol – **Antipsychotics – Phenothiazines -** SAR of Phenothiazines - Chlorpromazine hydrochloride*- Prochlorperazine maleate*- Trifluoperazine hydrochloride- **Chlorprothixene–** Thiothixene- Loxapine succinate – Clozapine- **Fluorobutero-phenones –** Haloperidol – Droperidol – Risperidone- **Beta amino ketones –**MolindoneHcl– **Benzamides–** Sulpieride.

UNIT III

Drugs acting on Central Nervous System - Anticonvulsants -SAR of Anticonvulsants - mechanism of anticonvulsant action **Hydantoins -**Phenytoin*- Mephenytoin – Ethotoin - **Oxazolindione diones -**Trimethadione*- Paramethadione – **Succinimides –**Phensuximide- Ethosuximide* - **Urea and monoacylureas-** Carbamazepine* - **Benzodiazepines-** Clonazepam**Miscellaneous –**Primidone- Valproic acid* - **CNS stimulants – Analeptics-** Nikethamide*- Caffeine – Theophylline – Theobromine- **Psychomotor stimulants –**Amphetamine- Dextroamphetamine sulphate*- Methamphetamine – Chorphentermine- **MAO inhibitors-** Phenelzine sulphate – Isocarboxazid – Tranlycypromine- Pargyline hydrochloride- **Tricyclic anti-depressants -** Amitriptyline hydrochloride*- Nortriptyline- Imipramine hydrochloride*

UNIT IV

Drugs acting on Cardiovascular System- Anti-anginal- Vasodilators -Amyl nitrite- Nitroglycerin*- Pentaerythritol tetranitrate- Isosorbide dinitrite*- Dipyridamole - **Calcium channel blockers –**Verapamil- Bepridil hydrochloride- Diltiazem hydrochloride – Nifedipine – Amlodipine – Felodipine – Nicardipine – Nimodipine – **Cardiotonics –**Digoxin – Digitoxin - Deslanoside - **Anti-arrhythmic Drugs-** Quinidine sulphate- Procainamide hydrochloride- Disopyramide phosphate*- Phenytoin sodium- Lidocaine hydrochloride- Tocainide hydrochloride Mexiletine hydrochloride- Lorcaïnide hydrochloride- amiodarone and Sotalol - **Anti-hypertensive Agents–** timolol – Captopril – Lisinopril – Enalapril- Benazepril hydrochloride- Quinapril hydrochloride - Methyldopate

hydrochloride* - Clonidine hydrochloride- Guanethidine monosulphate*- Guanabenz acetate- Sodium nitroprusside – Diazoxide – Minoxidil – Reserpine- Hydralazine hydrochloride.

UNIT V

Drugs acting on Cardiovascular System - Diuretics-Carbonic anhydrase inhibitors - Acetazolamide*- Methazolamide – Dichlorphenamide - Thiazides-Chlorthiazide*- Hydrochlorothiazide*- Hydroflumethiazide – Cyclothiazide-Loop diuretics -Furosemide*- Bumetanide- Ethacrynic acid - Potassium sparing Diuretics– spironolactone – Triamterene- Amiloride*- Miscellaneous –Mannitol- and Theophylline-Anti-hyperlipidemic agents – Clofibrate – lovastatin - cholestamine and cholestipol - Coagulant & Anticoagulants – menodione – acetomenadione - Warferin*- phenindione - Oral hypoglycemic agents – tolbutamide – metformin – glipizide – pioglitazone – acarbose - Thyroid & Antithyroid - L-Thyroxine - L-Thyronine – Propylthiouracil - Methimazole.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William Foye	Foye's Principles of Medicinal Chemistry- 5th edition-	LWW	2002

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Wilson and Gisvold's	Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry-	11th edition	2003
2	Burger	Burger's Medicinal Chemistry Vol I to IV	Wiley	2010
3	K-D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

WEBSITES:

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU613**SEMESTER-VI****MEDICINAL CHEMISTRY LABORATORY– I 3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100
External Semester Exam: 3 Hours**Course Objectives:**

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

- I. Preparation of medicinally important compounds or intermediates required for synthesis of drugs (5 compounds)
- II. Monograph analysis of selected drugs from course content (2 compounds)
- III. Assay of Selected drugs from course content prescribed as per I-P or B-P (2 compounds)

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	A-I-Vogel	Text book of practical organic chemistry	Dorling Kindersely	2008

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ashutoshkar	Ashutoshkar's Medicinal Chemistry	New Age International	2007

WEBSITES:

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU604

SEMESTER-VI

PHARMACOLOGY & THERAPEUTICS –I 3H 3C

Instruction hours/ week: L: 3 T: 1 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:**UNIT I**

Pharmacology of Central Nervous System – Neurohumoral transmission in the CNS with special emphasis on pharmacology of various neurotransmitters like histamine-serotonin –dopamine– gaba-

glutamate and glycine- **general anesthetics**- alcohol and disulfiram- sedatives-hypnotics and centrally acting muscle relaxants.

UNIT II

Pharmacology of Central Nervous System - Psychopharmacological agents–Anti psychotics– antidepressants- anti-anxiety agents-anti-manics and hallucinogens-**Anti-epileptic drugs**- Drugs used in Parkinsonism and Alzheimer's disease-**Narcotic analgesics and antagonists**-CNS stimulants and Nootropics- Drug addiction-drug abuse-tolerance and dependence.

UNIT III

Pharmacology of Cardiovascular System - Introduction to hemodynamic and Electrophysiology of heart- **Anti-hypertensive drugs**-**Anti-anginal drugs**-**Anti-arrhythmic drugs**.

UNIT IV

Drugs acting on Cardiovascular System – Drugs used in congestive heart failure- **Anti-hyperlipidemic drugs** –Haematinics- anticoagulants and haemostatic agents- Fibrinolytics and antiplatelet drugs- Blood and plasma volume expanders.

UNIT V

Drugs acting on Respiratory System -anti-asthmatic drugs- Anti-tussives and expectorants- Respiratory stimulants – Mucolytics and nasal decongestants.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K-D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Satoskar R-S and Bhandarkar S-D	Pharmacology and Pharmacotherapeutics	Popular Prakashan	2009
2	Mycek M-J- Gelnet S-B and	Lippincott's illustrated Reviews-Pharmacology	Harvery	1992

	Perper M-M			
3	Lawrence L brunton	Goodman and Gilman's- The Pharmacological basis of therapeutics	CBS Publishers- Delhi-	2011

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU614

SEMESTER-VI

PHARMACOLOGY & THERAPEUTICS –I LABORATORY**3H****2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:

1. Recording of spontaneous motor and anti-inflammatory activity.
2. Evaluation of skeletal muscle relaxant activity of drugs in animals.
3. Recording of analgesic and anti-convulsant activity.
4. Statistical calculations in experimental pharmacology such as Students-t-test.
5. Statistical calculations in experimental pharmacology such as ANOVA.
6. Study of different routes of drugs administration in mice.

7. Study of different routes of drugs administration in rat.
8. To study the effect of hepatic microsomal enzyme inhibitors in mice.
9. To study the effect of hepatic microsomal enzyme inducers on the Phenobarbitone sleeping time in mice.
10. Local anesthetic activity of drugs by suitable animal model.
11. Effect of autonomic drugs on rabbit's eye.
12. Diuretic activity of drugs in rats.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M-N-Ghosh	Fundamentals of Experimental Pharmacology	Hilton and company	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kulkarni-S-K- Easton	Handbook of Experimental Pharmacology	Elsevier	2006

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU605

SEMESTER-VI

**PHARMACEUTICAL JURISPRUDENCE
AND DRUG BUSINESS MANAGEMENT 3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The subject deals with several important legislations related to the profession of pharmacy in India.
- The Drugs and Cosmetics Act- along with its amendments is the core of this course- Other acts- which are covered- include the Pharmacy Act- dangerous drugs- medicinal and toilet preparation Act etc- Besides this the new drug policy- professional ethics- DPCO- patent and design Act will be discussed.
- This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc.
- It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.
- The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry.
- The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know and understand the Pharmaceutical legislations and their implications in the development and marketing .
2. Understand and follow the code of ethics during the pharmaceutical practice.
3. Know and understand various Indian pharmaceutical acts and laws.
4. Know about the process of drug discovery and developments.
5. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals.
6. Know the regulatory approval process and their registration in Indian and international markets.

Course Content:**UNIT I**

Definition and scope of Forensic Pharmacy- Pharmacist's role in drug treatment- drug usage and pharmacist as a member of health care team.

UNIT II

Pharmaceutical legislation in India - Historical development of Pharmaceutical education in India and its present status- Professional ethics in Pharmacy practice- legal and ethical responsibilities of Pharmacists.

UNIT III

Concept of Management-Administrative management (Planning- Organizing- Staffing- Directing and Controlling)- Entrepreneurship Development and Operative Management- (Personnel- Materials- Production- Financial Marketing- Time/Space Margin / Morale).

UNIT IV

Pharmaceutical marketing– Functions – buying – selling – transportation – storage – finance – insurance – feedback – information- channels of distribution – wholesale- retail departmental store- multiple shops and mail order business.

UNIT-V

Salesman ship -Principles of sales promotion – advertising- ethics of sales merchandising – literature – detailing – recruitment – training- evaluation and compensation to the pharmacist.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	N-K- Jain	A text book of Forensic Pharmacy	Vallbh Prakashan	2011

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	B-M- Mithal	Text book of Forensic Pharmacy	Vallabh Prakashan- Delhi	2010
2	-	Narcotic drugs and psychotropic substances act	Govt- of India publications	2014
3	M-L- Mehra	Hand book of drug law	<u>Universal Book Traders, Delhi</u>	2002

WEBSITES:

- www.pvbooks.in
- www.pharmacy.nz
- www.schoolsoup.in

15PYU606**HOSPITAL AND CLINICAL PHARMACY****SEMESTER-VI****3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This course is designed to impart basic knowledge and skills that are required for the practice of pharmacy in both hospital and community settings.
- Conduct sufficiently thorough and accurate patient assessments
- Explain and properly dispense commonly used medications, formulations, and drug products.
- Identify and assess drug related problems relative to specific patient cases.
- The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.
- The purpose of this course is to introduce to students a number of health issues and their challenges.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the various drug distribution system
2. Handle the prescriptions and manage community pharmacies
3. Understand the elements of pharmaceutical care and provide comprehensive patient care services
4. Understand the concept and practice of the quality use of medicines
5. Summarize the therapeutic approach for management of various diseases including Reference to the latest available evidence.
6. Evaluate alternative ways of solving problems related to health and pharmaceutical issues.

Course Content:**UNIT-I****Organisation and structure** -Organisation of a hospital- hospital pharmacy- Responsibilities of a hospital pharmacist- Pharmacy and Therapeutic committee- Budget preparation and Implementation.**UNIT-II****Hospital formulary** – Contents- drug profile- preparation and revision of hospital formulary.**UNIT-III****Purchase-Distribution and inventory control of drugs in hospitals** - Purchasing Procedures - Dispensing of drugs to outpatients and inpatients - Types of distribution of drugs and charging policies in Hospital- Dispensing of Controlled drugs.

UNIT-IV

Central sterile supply unit and their management -Types of materials for sterilization- packing of materials prior to sterilization- sterilization equipments and supply of sterile materials.

UNIT-V

Drug information services-Drug information centre- sources of information on drugs- disease treatment schedules- procurement of information- computerized services (e-g- MEDLINE)- retrieval of information.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	S-H- Merchant and J-S- Qadry	A textbook of Hospital Pharmacy	Mc Graw hill New Delhi	2004

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Malcom	Clinical Pharmacokinetics concepts and Application	Lippincotts Williams and wilcoms	2007
2	G- Parthasarathy- Karin Nyfort- Hansen- Milap C- Nahara	A text book of clinical Pharmacy Practice- Essential concepts and skills	Orient Black swam	2004
3	Sartaray Hiage	Textbook of Biopharmaceutics and Clinical Pharmacokinetics	CRC Book House	2014

WEBSITES:

- www.jpp.sagepub.com
- www.jrpp.net
- www.pharmacypractice.com

15PYU701

SEMESTER-VII

FORMULATIVE & INDUSTRIAL PHARMACY –I

3H 3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- This gives a knowledge of preformulation studies and stability studies
- Different machinery used for various steps in manufacture of various dosage forms. Formulation and evaluation of dosage forms and their advantages over other dosage forms.
- This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market.
- To know the various pharmaceutical dosage forms and their manufacturing techniques.
- To know various considerations in development of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms.
3. Formulate solid and novel drug delivery system .
4. Know evaluation of pharmaceutical dosage forms.
5. To understand the criteria for selection of drugs and polymers for the development of Novel drug delivery systems, their formulation and evaluation
6. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course Content:**UNIT I**

Preformulation studies-Study of physical properties of drugs like physical form- particle size – shape – density – wetting- dielectric constant – solubility –dissolution - organoleptic property and their effect on formulation- stability and bioavailability.

UNIT II

Stability studies -Study of chemical properties of drugs like hydrolysis – oxidation – reduction – racemisation – polymerization - their influence on formulation and stability of products-Stabilization and stability testing protocol for various pharmaceutical products.

UNIT III

Liquid Dosage forms – Introduction - types of additives used in formulations – vehicles – stabilizers – preservatives - suspending agents - emulsifying agents – solubiliser – colours – flavours – manufacturing - packaging and evaluation of clear liquids - **Semisolid dosage form** - definition – types – general formulation - evaluation and packaging of semisolids.

UNIT IV

Cosmeticology and cosmetic preparation - Fundamentals of cosmetic science - Structure and functions of skin and hair – Formulation – Evaluation - packaging of cosmetics for skin – hair - dentifrices and manicure preparations - nail polish – lipsticks - eye lashes - baby care products - **Pharmaceutical Aerosols** – Definition – propellants - general formulation – manufacturing - packaging methods - pharmaceutical applications and evaluation.

UNIT V

Sterile pharmaceutical products -Formulation – requirements - evaluation of injectable solutions - suspensions and sterile powders - containers and closures - Total parenteral nutrition (TPN) & IV additives -**Ophthalmic preparations** – Requirements – formulation - methods of preparation - containers and evaluation.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Liberman and Lachman.	Pharmaceutical dosage forms- Disperse systems Vol-1-Vol-2- Vol-3	Informa healthcare	2008

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Banker and Gilberts	Modern pharmaceutics	Marcel dekker	2002
2	Liberman and Lachman.	Pharmaceutical dosage forms- parenteral medication Vol-1 & Vol-2	Informa healthcare	2008
3	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
4	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007
5	Remington	Science and Practice of Pharmacy	Philadelphia	2005

WEBSITES

- **www.picscheme.org**
- **www.ijper.org**
- **www.pharmpress.org**

15PYU711

SEMESTER-VII

FORMULATIVE & INDUSTRIAL PHARMACY LABORATORY –I 3H 2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- This gives a knowledge of preformulation studies and stability studies
- Different machinery used for various steps in manufacture of various dosage forms. Formulation and evaluation of dosage forms and their advantages over other dosage forms.
- This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market.
- To know the various pharmaceutical dosage forms and their manufacturing techniques.
- To know various considerations in development of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms.
3. Formulate solid and novel drug delivery system.
4. Know evaluation of pharmaceutical dosage forms.
5. To understand the criteria for selection of drugs and polymers for the development of
6. Novel drug delivery systems, their formulation and evaluation
7. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:**Preformulation studies**

1. Determination of flowability of powder by assessing compressibility index
2. Determination of flow property by assessing angle of repose.
3. Determination of effect of glidants
4. Determination of effect of different concentration of glidants.
5. Evaluation of liquid dosage forms.
6. Evaluation of semi solid dosage form.

Cosmetic preparations

7. Formulation of face powder.
8. Formulation of shampoo.

9. Formulation of lipstick.
10. Manufacture of parenterals.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Lieberman & Lachman	Theory And Practice Of Industrial Pharmacy	Lea and febiger	1986

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Remington	The science and practice of pharmacy- 20th edition Pharmaceutical Science	Lippincott Williamson	2000
2	The Indian Pharmacopoei a Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU702

SEMESTER-VII

INSTRUMENTAL METHODS OF PHARMACEUTICAL ANALYSIS – I 4H 4C

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart a fundamental knowledge on the testing of drugs by various instrumental methods of analysis.
- This focuses on various modern instruments that are used for testing the purity of drugs in various dosage forms.
- course also gives knowledge about modern instruments that are used for drug testing like NMR- IR- Mass- HPLC- HPTLC etc.
- This course deals with the fundamentals of analytical chemistry and principles of electro chemical analysis of drugs.
- To know the principle and applications of instrumentation
- To understand the components and working of various analytical instruments.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the principle and applications of instrumentation
2. Understand the components and working of various analytical instruments.
3. Understand the different modern techniques of drug analysis.
4. Appreciate the advantages of instrumental methods of drug analysis.
5. Understand the principles of volumetric and electro chemical analysis.
6. Carry out various volumetric and electro chemical titrations.
7. Develop analytical skills.

Course Content:**UNIT I**

UV/Visible spectroscopy-Theory of atomic and molecular spectra- Electronic transitions- Beer and Lambert's law- Derivation and deviations- Applications of Beer law to single and multi component systems – Chromophores – Auxochromes- Spectral shifts- Solvent effect on absorption spectra - Instrumentation - Sources of radiation- wavelength selectors- sample cells – Detectors- Barrier layer cell- Photo tube- Photomultiplier tube- Silicon Photodiode -Applications - Spectrophotometric titrations- Measurement of equilibrium constant and rate constant -**Fluorimetry** – Theory- Concepts of singlet- doublet and triplet electronic states- internal and external conversions- factors affecting fluorescence – quenching - Instrumentation and applications.

UNIT II

IR spectroscopy – Introduction- Fundamental modes of vibrations in poly atomic molecules - Sample handling- Instrumentation - Sources of radiation- wavelength selectors- sample cells- Detectors – Golay cell- Bolometer – Thermocouple – Thermister- Pyrroelectric detector - Structure – frequency correlation with examples.

UNIT III

Atomic absorption spectroscopy –Introduction- Theory- instrumentation- and applications-**Flame emission spectroscopy** – Introduction – Theory – Instrumentation-Interferences and applications-**Nephelometry and Turbidimetry** – Theory- Instrumentation and applications.

UNIT IV

NMR Spectroscopy - Principles- Instrumentation and applications.

UNIT V

Mass Spectroscopy - Principles- Fragmentation- Instrumentation- applications - Introduction to MALDI and ICPMS.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Y.R. Sharma.	Organic Spectroscopy	S.chand	2010

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K.A. Connors	Textbook of Pharmaceutical Analysis	Wiley-Interscience	1982
2	Gurdeep Chatwal	Instrumental methods of analysis	Mrs. Meena Pandey Himlaya Publishing house	1979
3	William Kemp	Spectroscopy	Palgrave Mc million	2008

WEBSITES

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU712

SEMESTER-VII

INSTRUMENTAL METHODS OF PHARMACEUTICAL ANALYSIS
LABORATORY – I**3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart a fundamental knowledge on the testing of drugs by various instrumental methods of analysis.
- This focuses on various modern instruments that are used for testing the purity of drugs in various dosage forms.
- course also gives knowledge about modern instruments that are used for drug testing like NMR- IR- Mass- HPLC- HPTLC etc.
- This course deals with the fundamentals of analytical chemistry and principles of electro chemical analysis of drugs.
- To know the principle and applications of instrumentation
- To understand the components and working of various analytical instruments.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the principle and applications of instrumentation
2. Understand the components and working of various analytical instruments.
3. Understand the different modern techniques of drug analysis.
4. Appreciate the advantages of instrumental methods of drug analysis.
5. Understand the principles of volumetric and electro chemical analysis.
6. Carry out various volumetric and electro chemical titrations.
7. Develop analytical skills.

Course Content:

1. Chromatographic analysis of some pharmaceutical products.
2. Exercises involving
 - a. Nephelo-turbidimeter
 - b. colorimeter
 - c. spectrophotometer
 - d. flamephotometer
3. Infra Red spectra peak identification for different functional groups.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Beckett and Stenlake	Practical Pharmaceutical Analysis	A & C Black	1988

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.M. Silverstein- John Wiley and Sons Inc.	Spectrometric identification of organic compounds	Heyden & sons Ltd	1969

WEBSITES

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU703

SEMESTER-VII

MEDICINAL CHEMISTRY- II**4H****4C**

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

Study of classification - mechanism of action (biochemical and molecular basis) - structure activity relationship including stereo chemical aspects - physicochemical properties and synthesis of selected drugs (only drugs marked with asterisk) on the following categories of drugs.

UNIT I

Introduction to Drug Design- Principles of Drug Design-Various approaches used in drug design- Physicochemical parameters used in quantitative structure activity relationship (QSAR) such as partition coefficient- Hammett's electronic parameter- Taft's steric parameter and Hansch analysis- **Pharmacophore and docking technique**- **Prodrugs**- Basic concepts and application of prodrugs design -**Combinatorial Chemistry**- Concept and applications of combinatorial chemistry- solid phase and solution phase synthesis.

UNIT II

Anti-infective agents- Local anti-infective agents-Ethyl alcohol- Isopropyl alcohol – Formaldehyde-Sodium glutaraldehyde solution- Liquefied phenol- Hexachlorophene*- Eugenol-

Hexyl resorcinol Anthralin- Hydrous benzoylperoxide- Halazone*- Benzalkonium chloride Methylbenzethonium chloride*- Cetylpyridinium chloride- Chlorhexidinegluconate*- Gentianviolet- Methylene blue – Thiomersal- Methyl paraben and Sodium benzoate - **Antifungal agents- Antifungal antibiotics-** Amphotericin-B – Nystatin- Natamycin and Griseofulvin- **Synthetic Antifungal agents** –Clotrimazole- Econazole nitrate – Butoconazole- Oxiconazole nitrate – Tioconazole- Miconazole*- Ketoconazole – Terconazole – Itraconazole – Fluconazole- Naftifine hydrochloride- Tolnaftate*- Cyclopiroxolamine.

UNIT III

Anti-infective agents- Urinary tract anti-infective agents–Quinolones- SAR of quinolones- Nalidixic Acid*- Cinoxacin – Norfloxacin – Enoxacin – Ciprofloxacin – Ofloxacin- Lomefloxacin – Sparfloxacin – **Miscellaneous** –Furazolidine- Nitrofurantoin* and Methanamine-**Antitubercular Agents- Synthetic anti tubercular agents-** INH*- Ethionamide – ethambutol – Pyrazinamide- Para amino salicylic acid*-**Anti tubercular antibiotics** –Rifampicin – Rifabutin- Cycloserine* and sterile Capreomycin sulphate-**Anti-protozoal Agents-** Metronidazole*- Diloxanide*- Iodoquinol- Pentamidine Isethionate – Atovaquone – Eflornithine-**Anthelmintics-** Piperazine salts*- Diethylcarbamazine citrate*- Thiabendazole*- Mebendazole*- Albendazole – Niclosamide – Oxamniquine- Praziquantel and Ivermectin- **Anti-scabious and Anti-pedicular Agents-** Benzyl Benzoate*- Lindane* (Gamaxene)- Crothamiton* and Permethrin.

UNIT IV

Anti-infective agents-Antimalarials- Etiology of malaria- SAR-**Quinolines-** Quinine sulphate- Chloroquine phosphate*- Hydroxy chloroquine sulphate- Amodiaquine hydrochloride*- Primaquine phosphate- Quinacrine hydrochloride – Mefloquine- **Biguanides and dihydro triazines-**Cycloguanil pamoate – Proguanil-**Miscellaneous** –Pyrimethamine- Trimethoprim and Sulfadoxine.

UNIT V

Antibiotics-Historical background – Nomenclature – stereochemistry- Structure activity relationship- chemical degradation classification and important products of the following classes-**β-Lactam antibiotics** –Penicillin – Cephalosporins- β- Lactamase inhibitors – Monobactams-**Aminoglycosides** –Streptomycin – Neomycin- **Tetracyclines** –Tetracycline – Chlortetracycline – Minocycline – Doxycycline **Macrolide-** Erythromycin and Azithromycin –**Miscellaneous-** Chloramphenicol*- Clindamycin.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William Foye	Foye's Principles of Medicinal Chemistry- 5th edition.	LWW	2002

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Wilson and Gisvold's	Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry-	11th edition	2003
2	Burger	Burger's Medicinal Chemistry Vol I to IV	Wiley	2010
3	K.D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

WEBSITES

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU713

SEMESTER-VII

MEDICINAL CHEMISTRY LABORATORY– I

3H

2C

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

- I. Preparation of medicinally important compounds or intermediates required for synthesis of drugs (5 compounds)
- II. Monograph analysis of selected drugs from course content. (2 compounds)
- III. Assay of Selected drugs from course content prescribed as per I.P or B.P. (5 compounds)

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	A.I.Vogel	Text book of practical organic chemistry	Dorling Kindersely	2008

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ashutoshkar	Ashutoshkar's Medicinal Chemistry	New Age International	2007

WEBSITES:

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU704

SEMESTER-VII

PHARMACOLOGY & THERAPEUTICS –III 3H 3C

Instruction hours/ week: L: 3 T: 0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Locate and isolate different organs/tissues from the laboratory animals used in pharmacological experiments
2. Demonstrate the various receptor actions using isolated tissue preparation
3. Appreciate correlation of pharmacology with related medical sciences
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:**UNIT I**

Pharmacology of Endocrine System-Basic concepts in endocrine pharmacology- Hypothalamic and pituitary hormones-Thyroid hormones and anti thyroid drugs – Parathormone- Calcitonin and Vitamin-D.

UNIT II

Insulin- Oral Hypoglycemic agents and glucagon-ACTH and corticosteroids-Androgens and Anabolic steroids – Estrogens- progesterone and oral contraceptives-**Drugs acting on the uterus.**

UNIT III

Pharmacology of Drugs acting on the Gastrointestinal Tract –Antacids- anti-secretary and anti ulcer drugs- Laxatives and anti-diarrheal drugs- Appetite stimulants and suppressants-Digestants and carminatives-Emetics and anti-emetics.

UNIT IV

Bioassay-Principles and methods of bioassay - Bioassay of insulin- oxytocin-vasopressin- ACTH- histamine and 5-HT.

UNIT V

Immunopharmacology-Immunostimulants and immunosuppressants.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rang M.P- Dale M.M- Reter J.M	Rang M.P- Dale M.M- Reter J.M- Pharmacology	Elsevier	2012

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig C.R. and Stitzel R.R-	Craig C.R. and Stitzel R.R- Modern Pharmacology	LWW	2003
2	Lawrence L brunton	GoodmanandGilman's- ThePharmacologicalbasis oftherapeutics	CBS Publishers- Delhi.	2011
3	K.D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

WEBSITES

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU714

SEMESTER-VII

PHARMACOLOGY & THERAPEUTICS –III LABORATORY**3H****2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:

1. Introduction to *in-vitro* pharmacology and physiological salt solutions.
2. To record CRC of acetylcholine by using suitable muscle preparations.
3. To record the CRC of 5HT on rat fundus preparation.
4. To record CRC of Nor adrenaline on rat anococcygeus muscle

5. Estimation of bioavailability parameters viz AUC from blood sample.
6. Estimation of bioavailability parameters viz T_{max} from blood sample.
7. Estimation of bioavailability parameters viz K_{el} from blood sample.
8. Estimation of bioavailability parameters viz AUC from urine sample.
9. Estimation of bioavailability parameters viz T_{max} from urine sample.
10. Estimation of bioavailability parameters viz K_{el} from urine sample.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.N.Ghosh.	Fundamentals of Experimental Pharmacology	Hilton and company	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kulkarni.S.K. Easton	Handbook of Experimental Pharmacology	Elsevier	2006

WEBSITES:

- www.libguides.utep.edu
- www-pharmacology2000-com
- www.pharmacologycorner.com

SOCIAL & BEHAVIOURAL SCIENCE**3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Social Pharmacy and Behavioral Science course will prepare the young pharmacy student to fit into the social role as Pharmacist. Interaction of pharmacist with doctors- nurses- dentists- physiotherapists and other health workers is to develop team spirit in pharmacist.
- Rational drug use and essential drugs concepts can be realized with meaningful interaction of pharmacists with other health care providers.
- At the end of this course the student will get the soft skills set to work cohesively with the team as a team player and will add value to the pharmaceutical business.
- This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.
- In the changing scenario of pharmacy practice in India, for successful practice of Hospital Pharmacy, the students are required to learn various skills like drug distribution, drug information, and therapeutic drug monitoring for improved patient care.
- In community pharmacy, students will be learning various skills such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Understand the behavioral needs for a Pharmacist to function effectively in the areas of pharmaceutical Operation
2. Communicate effectively (Verbal and Non Verbal)
3. Effectively Manage the team as a team player
4. Manage the time effectively
5. Develop Leadership Qualities and Essentials
6. Know pharmaceutical care services

Course Content:**UNIT I****Social Pharmacy and Behavioral Science**-The Concept and context of social pharmacy**UNIT II****Pharmacy Profession**-Introduction to profession of Pharmacy-Pattern of entry and employment in pharmacy-Employment position and job responsibilities of a pharmacist-Role of pharmacist in health

care-Pharmacy ethics.

UNIT III

Professionalization of community pharmacy- Introduction – professional status of community pharmacy- Patients medication records and pharmacist's extended role-Health screening services in community pharmacy.

UNIT IV

Role of hospital pharmacist in a hospital– Introduction– Manufacturing – purchasing- inventory management- distribution and promoting the rational view of medicine-Definition and concept of clinical pharmacy.

UNIT V

Time Management-Value of Time- How to Track the action items-Goal setting-Using SMART Objective concept– Goals – Tasks- Sub Tasks-Resource Management- Mile Stone- Mapping and Gantt chart application.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Harding Jeoffrey	Social Pharmacy – Innovation & development	Pharmaceutical Press- London	1994

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	World Health Organization	Use of Essential Drugs	WHO expert committee	1997
2	Darrin Salle	Inspired- Organized & Effective	Darrin Salle	2012
3	Ken Blanchard	The One Minute Manager Meets- The Monkey	Quill	1991

WEBSITES

- www.publichealth.org
- www.web.arizona.org
- www.umass.org

15PYU801**SEMESTER-VIII****FORMULATIVE & INDUSTRIAL PHARMACY –II 3H 3C**

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- This gives a knowledge of preformulation studies and stability studies
- Different machinery used for various steps in manufacture of various dosage forms. Formulation and evaluation of dosage forms and their advantages over other dosage forms.
- This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market.
- To know the various pharmaceutical dosage forms and their manufacturing techniques.
- To know various considerations in development of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms.
3. Formulate solid and novel drug delivery system .
4. Know evaluation of pharmaceutical dosage forms.
5. To understand the criteria for selection of drugs and polymers for the development of
6. Novel drug delivery systems, their formulation and evaluation
7. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course Content:**UNIT I**

Tablets-Classification of different types of tablets- tablet excipients- granulation technology on large scale by various techniques- different types of tablet compression machinery and equipment employed-processing problems of tablets and evaluation of tablets.

UNIT II

Capsules -definition -advantages and disadvantages of capsule - material for production of hard gelatine capsules - size of capsules - method of capsule filling. Soft gelatin capsule, capsule shell – manufacturing - quality control – stability testing.

UNIT III

Micro-encapsulation - Types of microcapsules - importance of micro encapsulation in pharmacy - micro encapsulation by Co-acervation phase separation - multi-orifice centrifugation - spray drying - spray congealing – polymerisation - air suspension technique - pan coating and other techniques - Evaluation of microcapsules.

UNIT IV

Novel Drug delivery systems– definition - advantages - disadvantages -Transdermal delivery systems- Osmotic drug delivery systems – Liposomes–microsomes – Nanoparticles – applications in pharmaceutical field .

UNIT V

Prolonged action pharmaceuticals -benefits – limitations – oral products terminology –types and construction of products – evaluation – applications in pharmaceutical field.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Liberman & Lachman	Theory And Practice Of Industrial Pharmacy	Lea and febiger	1986

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1.	Remington	The science and practice of pharmacy- 20th edition Pharmaceutical Science	Lippincott williamson	2000
2.	Leon Shargel and Andrew B.C.YU	Applied biopharmaceutics and pharmacokinetics-	Appleton & Lange	2004
3.	H.C. Ansel	Pharmaceutical Dosage form and Drug delivery system	New Delhi	2000
4.	The Indian Pharmacopoeia Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES:

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU811**SEMESTER-VIII****FORMULATIVE & INDUSTRIAL PHARMACY LABORATORY –II 3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.
- This gives a knowledge of preformulation studies and stability studies
- Different machinery used for various steps in manufacture of various dosage forms. Formulation and evaluation of dosage forms and their advantages over other dosage forms.
- This course is designed to impart fundamental knowledge on pharmaceutical product development and translation from laboratory to market.
- To know the various pharmaceutical dosage forms and their manufacturing techniques.
- To know various considerations in development of pharmaceutical dosage forms.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the various pharmaceutical dosage forms and their manufacturing techniques.
2. Know various considerations in development of pharmaceutical dosage forms.
3. Formulate solid and novel drug delivery system.
4. Know evaluation of pharmaceutical dosage forms.
5. To understand the criteria for selection of drugs and polymers for the development of
6. Novel drug delivery systems, their formulation and evaluation
7. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality

Course content:**Formulation of tablets**

1. Preparation of sodium bicarbonate tablets.
2. Preparation of Phenobarbitone tablets.
3. Preparation of aspirin effervescent tablets.

4. Preparation of ferrous sulphate tablets.

Evaluation test for tablets

5. Test for Weight variation of tablets.
6. Test for Friability of tablets.
7. Test for Hardness of tablets.
8. Test for thickness of tablets.
9. Test for disintegration of tablets.
10. Test for dissolution of tablets.
11. Filling of capsules and evaluation tests.
12. Preparation of novel drug delivery system.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Liberman & Lachman	Theory And Practice Of Industrial Pharmacy	Lea and febiger	1986

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Remington	The science and practice of pharmacy- 20th edition Pharmaceutical Science	Lippincott Williamson	2000
2	The Indian Pharmacopoei a Commission	Indian Pharmacopoeia	Press of IPC under Ministry of Health & Family Welfare, Govt. of India	2007

WEBSITES

- www.picscheme.org
- www.ijper.org
- www.pharmpress.org

15PYU802**SEMESTER-VIII****INSTRUMENTAL METHODS OF PHARMACEUTICAL ANALYSIS – II 3H 3C**

Instruction hours/ week: L: 3 T: 1 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart a fundamental knowledge on the testing of drugs by various instrumental methods of analysis.
- This focuses on various modern instruments that are used for testing the purity of drugs in various dosage forms.
- course also gives knowledge about modern instruments that are used for drug testing like NMR- IR- Mass- HPLC- HPTLC etc.
- This course deals with the fundamentals of analytical chemistry and principles of electro chemical analysis of drugs.
- To know the principle and applications of instrumentation
- To understand the components and working of various analytical instruments.

Course Outcomes (CO's):

Upon completion of this course the student will:

1. Know the principle and applications of instrumentation
2. Understand the components and working of various analytical instruments.
3. Understand the different modern techniques of drug analysis.
4. Appreciate the advantages of instrumental methods of drug analysis.
5. Understand the principles of volumetric and electro chemical analysis.
6. Carry out various volumetric and electro chemical titrations.
7. Develop analytical skills.

Course Content:**UNIT I**

X- Ray diffraction studies – Introduction- diffraction methods and applications-**Electro chemical methods of analysis- Conductometry** – Introduction- Conductivity cell- Conductometric titrations – applications-**Potentiometry** – Electrochemical cell-construction and working of reference and indicator electrodes- methods to determine end point of titration.

UNIT II

Thermal Methods of Analysis – Theory- Instrumentation and applications of Differential Scanning Calorimetry (DSC).

UNIT III

Chromatography-Adsorption and partition column chromatography – Methodology– advantages-disadvantages and applications- **Thin layer chromatography** -Introduction – Principle – Methodology- Stahl's triangle- Rf values – advantages- disadvantages and applications- **High Performance Thin Layer Chromatography (HPTLC)** – Introduction –instrumentation – advantages – application- **Paper chromatography** – Introduction – Principle – Methodology-developmental techniques – advantages – disadvantages – applications-**Ion exchange chromatography** – Introduction – Definition – classification- ion exchange resins – properties-mechanism of ion exchange process- Factors affecting ion exchange – methodology- applications.

UNIT IV

High Performance Liquid Chromatography (HPLC) – Introduction – theory – instrumentation- advantages and applications - Introduction to UPLC and supercritical fluid chromatography-**Gas Chromatography** –Introduction – theory – instrumentation – derivatization- temperature programming – advantages- disadvantages and applications-**Electrophoresis** - Principle of separation – classification- equipment for moving boundary electrophoresis – gel- paper electrophoresis and applications-**Gel Filtration Chromatography** – Introduction – technique- factors affecting- Applications.

UNIT V

Quality assurance- Calibration and validation of following Instruments-UV-Visible spectrophotometer- pH meter- HPLC- Electronic balance- Conductivity meter- IR spectrophotometer – Fluorimeter- Flame Photometer-**Introduction to analytical method development.**

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Y.R. Sharma.	Organic Spectroscopy	S.chand	2010

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	K.A. Connors	Textbook of Pharmaceutical Analysis	Wiley-Interscience	1982

2	Gurdeep Chatwal	Instrumental methods of analysis	Mrs. Meena Pandey Himlaya Publishing house	1979
3	William Kemp	Spectroscopy	Palgrave Mc million	2008

WEBSITES

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU812

SEMESTER-VIII

**INSTRUMENTAL METHODS OF PHARMACEUTICAL ANALYSIS
LABORATORY – II****3H 2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart a fundamental knowledge on the testing of drugs by various instrumental methods of analysis.
- This focuses on various modern instruments that are used for testing the purity of drugs in various dosage forms.
- course also gives knowledge about modern instruments that are used for drug testing like NMR- IR- Mass- HPLC- HPTLC etc.
- This course deals with the fundamentals of analytical chemistry and principles of electro chemical analysis of drugs.
- To know the principle and applications of instrumentation
- To understand the components and working of various analytical instruments.

Course Outcomes (CO's):

On successful completion of the course the student will

1. Know the principle and applications of instrumentation
2. Understand the components and working of various analytical instruments.
3. Understand the different modern techniques of drug analysis.
4. Appreciate the advantages of instrumental methods of drug analysis.
5. Understand the principles of volumetric and electro chemical analysis.
6. Carry out various volumetric and electro chemical titrations.
7. Develop analytical skills.

Course Content:

1. Chromatographic analysis of some pharmaceutical products.
2. Exercises involving
 - fluorimeter
 - conductometric
 - potentiometric
 - polarographic
 - amperometric titrations

3. Infra Red spectra peak identification for different functional groups.

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Beckett and Stenlake	Practical Pharmaceutical Analysis	A & C Black	1988

REFERENCES-

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	R.M. Silverstein- John Wiley and Sons Inc.	Spectrometric identification of organic compounds	Heyden & sons Ltd	1969

WEBSITES

- www.jpr.info.com
- www.sciencedomain.org
- www.pharmaresearchlibrary.com

15PYU803

SEMESTER-VII

MEDICINAL CHEMISTRY- III

3H

3C

Instruction hours/ week: L: 3 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

Study of classification - mechanism of action (biochemical and molecular basis) - structure activity relationship including stereo chemical aspects - physicochemical properties and synthesis of selected drugs (only drugs marked with asterisk) on the following categories of drugs.

UNIT I

Non Steroidal Anti-inflammatory Drugs & antigout- Anti-inflammatory agents- Sodium salicylate – Aspirin- Salsalate*- Mefenamic acid- Meclofenamate sodium Indomethacin*- Sulindac- Tolmetin sodium- Zomepirac sodium- Diclofenac sodium – Ketorolac- Ibuprofen*- Naproxen*- Piroxicam Phenacetin – Acetaminophen – Antipyrine- Aminopyrine- Phenylbutazone* and Oxyphenbutazone-**Antiviral agents**-Types of virus- stages of viral infection- targets for prevention of viral infections - Amantadine hydrochloride- Rimantadine hydrochloride- Idoxuridine

trifluoride- Acyclovir*- Gancyclovir – Zidovudine- Didanosine – Zalcitabine – Lamivudine – Ribavirin – Saquinavir- Indinavir and Ritonavir.

UNIT II

Anti-neoplastic agents-Alkylating agents- Meclorothamine*- Cyclophosphamide – Melphalan – Chlorambucil – Busulfan- Thiotepa-**Antimetabolites-** Mercaptopurine* Thioguanine – Fluorouracil – Floxuridine – Cytarabine- Methotrexate*- Azathioprine-**Antibiotics** –Dactinomycin – Daunorubicin –hydrochloride- Doxorubicin hydrochloride – Bleomycin-**Plant products** – Etoposide- Vinblastin sulphate- Vincristin sulphate-**Miscellaneous-** Cisplatin and Mitotane.

UNIT III

Sulphonamides and Sulphones-Historical development – chemistry- classification and SAR of Sulfonamides – Sulphamethizole – Sulfisoxazole – Sulphamethizine- Sulfacetamide Sodium*- Sulphapyridine- Sulfamethoxazole*- Sulphadiazine- Mixed Sulfonamides-Mefenide Acetate- Silver Sulfadiazine – Sulfasalazine- **Folate reductase inhibitors** -Trimethoprim* Cotrimoxazole – **Sulfones** -Dapsone*-**Sex hormones** – **Androgens** – testosterone– **Estrogens** –Esterodiol – Estrone- Estriol- Diethyl Stilbestrol-**Progesterone and Oral contraceptives.**

UNIT IV

Antihistaminic agents– Histamine- receptors and their distribution in the human body-**H1 – antagonists-Amino alkyl ethers-** Diphenhydramine*- Dimenhydrinate – Doxylamine-**Ethylene diamines** –Tripeleminamine – Thonzylamine-**Piperazine derivatives** –Meclizine – Buclizine – Chlorcyclizine – Cetirizine-**Propylamine derivatives**-Chlorpheniramine*- Pheniramine-**Tricyclic derivatives-** Promethazine*- Trimeprazine – Phenidamine – Cyproheptadine – Azatidine-**Second generation non sedating** – Astemizole – Loratadine – Cetirizine – Acrivastine-**H2-antagonists-** Development of selective H2 antagonists - Cimetidine*- Famotidine – Ranitidine-**Gastric Proton pump inhibitors**-Omeprazole and Lansoprazole.

UNIT V

Prostaglandins and other eicosanoids-History and discovery- eicosanoid biosynthesis- drug action mediated by eicosanoids- design of eicosanoid drugs- eicosanoids approved for human clinical use-**Narcotic analgesic-Morphine and related drugs-**SAR of Morphine analogues- Morphine sulphate- Codeine phosphate- Hydromorphone hydrochloride- Meperidine hydrochloride*- Alphaprodine hydrochloride- Anilerdine hydrochloride- Diphenoxylate hydrochloride- Loperamide hydrochloride- Fentanyl citrate*- Methadone hydrochloride*- Propoxyphene hydrochloride – Pentazocine- Levorphanol tartarate-**Narcotic antagonists-** Nalorphine hydrochloride- Levallorphan tartarate and Naloxone hydrochloride-**Anti-tussives** – Noscapine- Dextromethorphan hydrobromide and Benzonatate- Carbetapentane.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	William Foye	Foye's Principles of Medicinal Chemistry- 5th edition.	LWW	2002

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Wilson and Gisvold's	Wilson and Gisvold's Organic medicinal and Pharmaceutical Chemistry-	11 th edition	2003
2	Burger	Burger's Medicinal Chemistry Vol I to IV	Wiley	2010
3	K.D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014

WEBSITES:

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU813**SEMESTER-VIII****MEDICINAL CHEMISTRY LABORATORY– II****3H****2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- This subject is designed to impart fundamental knowledge on the structure- chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs
- To know the importance of physicochemical properties and metabolism of drugs.
- This subject is designed to impart fundamental knowledge on the structure, chemistry and therapeutic value of drugs.
- The subject emphasizes on structure activity relationships of drugs, importance of physicochemical properties and metabolism of drugs.
- The syllabus also emphasizes on chemical synthesis of important drugs under each class.

Course Outcomes:

On successful completion of the course the student will

1. Understand the chemistry of drugs with respect to their pharmacological activity.
2. Understand the drug metabolic pathways- adverse effect and therapeutic value of drugs.
3. Know the structural activity relationship of different class of drugs.
4. Write the chemical synthesis of some drug.
5. Know the Structural Activity Relationship (SAR) of different class of drugs.
6. Write the chemical synthesis of some drugs.

Course Content:

- I. Assay of medicinal compounds (5 compounds)
- II. Monograph analysis of selected drugs from course content. (2 compounds)
- III. Preparation of medicinally important compounds or intermediates required for synthesis of drugs. (5 compounds)

TEXT BOOKS

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	A.I.Vogel	Text book of practical organic chemistry	Dorling Kindersely	2008

REFERENCES

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Ashutoshkar	Ashutoshkar's Medicinal Chemistry	New Age International	2007

WEBSITES:

- www.rsc.org
- www.acs.org
- www.medicinalchemistry.org

15PYU804**SEMESTER-VIII****PHARMACOLOGY & THERAPEUTICS –IV****3H 3C**

Instruction hours/ week: L: 3 T: 0 P:0

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Locate and isolate different organs/tissues from the laboratory animals used in pharmacological experiments
2. Demonstrate the various receptor actions using isolated tissue preparation
3. Appreciate correlation of pharmacology with related medical sciences
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:**UNIT I**

Chemotherapy-General Principles of Chemotherapy-Sulfonamides and co-trimoxazole – Antibiotics – Penicillins- Cephalosporins – Chloramphenicol – Erythromycin- Quinolones and Fluoroquinolones- tetracycline and aminoglycosides.

UNIT II

Chemotherapy of tuberculosis – leprosy- fungal diseases- viral diseases-anti protozoal drugs – anthelminitics- urinary tract infections and sexually transmitted diseases.

UNIT III

Histamine- 5-HT and their antagonists – Prostaglandins- Thromboxanes and Leukotrienes – Pentagastrin – Cholecystokinin – Angiotensin- Bradykinin and Substance P-Analgesic- anti-pyretic- anti-inflammatory and anti-gout drugs.

UNIT IV

Definition of poison- general principles of treatment of poisoning-Heavy metals and heavy metal antagonists-Definition for acute- sub acute and chronic toxicity – genotoxicity – **Carcinogenicity**- teratogenicity and mutagenicity studies.

UNIT V

Chronopharmacology-Definition of rhythm and cycles- Biological clock and their significance leading to chronotherapy.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Rang M.P- Dale M.M- Reter J.M-	Rang M.P- Dale M.M- Reter J.M- Pharmacology	Elsevier	2012

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Craig C.R. and Stitzel R.R-	Craig C.R. and Stitzel R.R- Modern Pharmacology	LWW	2003
2	Lawrence L brunton	GoodmanandGilman's- ThePharmacologicalbasis oftherapeutics	CBS Publishers- Delhi.	2011

3	K.D Tripathi	Essentials of Medical Pharmacology by Tripathi	Jaypee	2014
---	--------------	--	--------	------

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com

15PYU814**SEMESTER-VIII****PHARMACOLOGY & THERAPEUTICS –IV LABORATORY****3H****2C**

Instruction hours/ week: L: 0 T: 0 P: 3

Marks: Internal: 40 External: 60 Total: 100

External Semester Exam: 3 Hours

Course Objectives:

- The main purpose of the subject is to understand what drugs do to the living organisms and how their effects can be applied to therapeutics.
- The subject covers the complete information about the drugs like sources-physicochemical properties- mechanism of action-physiological and biochemical effects (pharmacodynamics) as well as absorption-distribution-metabolism and excretion (pharmacokinetics) along with the adverse effects-clinical uses-interactions-doses-contraindications and routes of administration of different classes of drugs.
- This subject is designed to impart the basic knowledge of preclinical studies in experimental animals including design, conduct and interpretations of results.
- To appreciate the applications of various commonly used laboratory animals.
- To appreciate and demonstrate the various screening methods used in preclinical research.
- To appreciate and demonstrate the importance of biostatistics and research methodology.

Course Outcomes:

On successful completion of the course the student will

1. Explain the pharmacological actions of different categories of drugs on various systems of the body.
2. Explain the mechanism of drug action at organ system/sub cellular/macromolecular levels.
3. Apply the basic pharmacological knowledge in the prevention and treatment of various diseases.
4. Handle the animals and conduct the experiments to observe the effect of drugs from different therapeutic classes and to interpret the results using suitable statistical analysis.
5. Understand the mechanism of drug action and its relevance in the treatment of different infectious diseases.
6. Comprehend the principles of toxicology and treatment of various poisonings.

Course Content:

1. To record the agonistic and antagonistic response by using suitable muscle preparations.
2. To estimate the strength of the test sample of agonist/ drug (e.g. Acetylcholine- Histamine- 5HT- Oxytocin etc) using a suitable isolated muscle preparation employing matching bioassay- interpolation.
3. bioassay- three point bioassay and four point bioassay.
4. Alternate methods for animal experimentation for both efficacy and toxicity studies.
5. Estimation of serum biochemical parameters by using semi- auto analyzer.

TEXT BOOKS:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	M.N.Ghosh	Fundamentals of Experimental Pharmacology	Hilton and company	2015

REFERENCES:

S.No	Author(s) Name	Title of the book	Publisher	Year of Publication
1	Kulkarni.S.K. Easton.	HandbookofExperimental Pharmacology	Elsevier	2006

WEBSITES:

- www.libguides.utep.edu
- www.pharmacology2000.com
- www.pharmacologycorner.com