

B.Sc. COMPUTER SCIENCE (COGNITIVE SYSTEMS)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus Regular (2020 – 2021)



**DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF ARTS, SCIENCE AND HUMANITIES**

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

Eachanari(Post), Coimbatore – 641 021.

Tamilnadu, India

Phone No. 0422-2980011 - 15 Fax No: 0422-2980022-23

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PROGRAM OUTCOMES:**The program must enable students to attain by the time of graduation**

- a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline
- b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.
- d) An ability to function effectively on teams to accomplish a common goal
- e) An understanding of professional, ethical, legal, security and social issues and responsibilities
- f) An ability to communicate effectively with a range of audiences
- g) An ability to use current techniques, skills and tools necessary for computing practice
- h) An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking and web systems and technologies
- i) An ability to effectively integrate IT-based solutions into the user environment
- j) An understanding of best practices and standards and their application

PROGRAM SPECIFIC OUTCOME (PSOs)

- k) Understand analyze and develop computer programs in the areas related to Database systems and Big data Analytics, cloud computing, soft computing, IoT, Image processing, Green computing, web designing, mobile computing and networking for efficient design of computer based system of varying complexity.
- l) Apply standard software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality for business success.
- m) Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.
- n) An ability to produce cost effective, quality and maintainable software products and solutions (services) meeting the global standards and requirements with the knowledge acquired and using the emerging techniques, tools and software engineering methodologies and principles and able to comprehend and write effective project reports in multidisciplinary environment in the context of changing technologies.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO I : To be a working Information Technology (IT) professional with core competencies that can be used on multi-disciplinary projects
- PEO II : To understand the importance of relationship building within the IT industry
- PEO III : To understand the need for lifelong learning in the exploration and journey in IT
- PEO IV : To understand, evaluate and practice ethical behavior within the IT industry
- PEO V : To be cognizant of security issues and their impacts on industry

MAPPING of PEOs and POs

POs	a		C	d	e	f	F	h	i	j	k	l	m	
PEO I	X	X	X				X	X	X				X	
PEO II				X	X	X								X
PEO III	X	X						X		X	X			
PEO IV			X	X	X				X			X		
PEO V					X					X		X		

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)
Coimbatore-21
Faculty of Arts, Science and Humanities
Department of Computer Science
UG Curriculum (CBCS)- (2020 – 2021) Batch

Program: B.Sc Computer Science (Cognitive Systems)

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks			Ca teg ory
		PEOs	POs	L	T	P		CIA	ESE	Total	
								40	60	100	
SEMESTER - I											
20LSU101	Language –I	IV	d,e	04	-	-	4	40	60	100	AE C
20ENU101	English - I	I	a,b,c	04	-	-	4	40	60	100	AE C
20CGU101	Object Oriented Programming using C++	I	a,b,c	04	-	-	4	40	60	100	Co re
20CGU102	Operating Systems	I	b,c,g	04	-	-	4	40	60	100	Co re
20CGU103	Web Designing	I	h,j	03	-	-	3	40	60	100	Co re
20CGU111	Object Oriented Programming using C++ - Practical	I	a,b,c,g	-	-	04	2	40	60	100	Co re
20CGU112	Operating Systems - Practical	I	a,c,g	-	-	04	2	40	60	100	Co re
20CGU113	Problem Solving using Worksheets - Practical	III	b,h,j	-	-	03	3	40	60	100	Co re
Semester Total				19	-	11	26	320	480	800	
SEMESTER – II											
20LSU201	Language – II	IV	d,e	04	-	-	4	40	60	100	AE C
20ENU201	English - II	II	d,f	04	-	-	4	40	60	100	AE C
20CGU201	Computer Networks	I	c,h,i	04	-	-	4	40	60	100	Co re
20CGU202	Information Technology Information Library	III	a,b	04	-	-	4	40	60	100	Co re
20CGU203	Discrete Structures	IV	e,i	05	-	-	4	40	60	100	All ied
20CGU211	Computer Networks - Practical	I	a,c,h,i	-	-	03	2	40	60	100	Co re
20CGU212	Web Technologies - Practical	III	a,b,j	-	-	03	1	40	60	100	Co re

20AEC201	Environmental Studies	IV	d,e	03	-	-	3	40	60	100	AE C
Semester Total				24	-	6	26	320	480	800	
SEMESTER – III											
20CGU301	Data Structures	I	a,b,g,h	04	-	-	4	40	60	100	Co re
20CGU302	Python Programming	III	a,b,h,k	04	-	-	4	40	60	100	Co re
20CGU303	Virtualization and Cloud	III	a,b,j,k	04	-	-	4	40	60	100	Co re
20CGU304A	Infrastructure Management	I	a,b,c,m	03	-	-	3	40	60	100	SE C
20CGU304B	Android Programming	IV	c,d,e,i								
20CGU311	Data Structures - Practical	I	a,b,g,h	-	-	04	2	40	60	100	Co re
20CGU312	Python ProgrammingLab	III	a,b,h,k	-	-	04	2	40	60	100	Co re
20CGU313	Virtualization and CloudLab	III	a,b,j,k	-	-	04	2	40	60	100	Co re
20CGU314A	Infrastructure ManagementLab	I	a,b,c,m	-	-	03	1	40	60	100	SE C
20CGU314B	Android Programming - Practical	IV	c,d,e,i	-	-						
Semester Total				15	-	15	22	320	480	800	
SEMESTER – IV											
20CGU401	Programming in JAVA	I	a,b,c,m	04	-	-	4	40	60	100	Co re
20CGU402	Database Management System	IV	c,d,e,l	04	-	-	4	40	60	100	Co re
20CGU403	Cognition and Problem Solving	I	a,b,g,h	04	-	-	4	40	60	100	AE C
20CGU404A	Process Management	III	a,b,h,j,k	03	-	-	3	40	60	100	SE C
20CGU404B	Programming in MATLAB	III	a,b,h,j,k								
20CGU411	Programming in JAVA - Practical	I	a,b,c,m	-	-	04	2	40	60	100	Co re
20CGU412	Database Management SystemLab	IV	c,d,e,l	-	-	04	2	40	60	100	Co re
20CGU413	Statistical Analysis - R Programming - Practical	I	a,b,g,h	-	-	04	2	40	60	100	Co re
20CGU414A	Devops toolsLab	III	a,b,h,j,k			03	1	40	60	100	SE C
20CGU414B	Programming in MATLAB - Practical	III	a,b,h,j,k								
Semester Total				15	-	15	22	320	480	800	
SEMESTER – V											
20CGU501	Information Security and Cyber Laws	I	c,g	04	-	-	4	40	60	100	Co re
20CGU502A	Introduction to Digital	I	b,e,m	04	-	-	4	40	60	100	DS

	Technology										E
20CGU502B	Machine Learning	III	a,b,h,j		-	-					
20CGU503A	Software Testing	II	a,b,h,j	04	-	-	4	40	60	100	DS
20CGU503B	Data Mining	I	a,b,h								E
20CGU504A	Client Relationship Management	II	d,e,f	03	-	-	3	40	60	100	DS
20CGU504B	Introduction to Data Science	IV	c,e,i,l								E
20CGU511	Information Security and Cyber Laws - Practical	I	b,e,m	-	-	04	2	40	60	100	Co
20CGU512A	Introduction to Digital Technology - Practical	III	a,b,h,j	-	-	04	2	40	60	100	DS
20CGU512B	Machine Learning - Practical	III	a,b,h,j								E
20CGU513A	Software Testing - Practical	I	c.g	-	-	04	2	40	60	100	DS
20CGU513B	Data MiningLab	III	a,b,h								E
20CGU514A	Client Relationship Management - Practical	II	d,e,f	-	-	03	1	40	60	100	DS
20CGU514B	Introduction to Data Science - Practical	IV	c,e,i,l	-	-						E
	Semester Total			15	-	15	22	320	480	800	
SEMESTER –VI											
20CGU601	PHP Programming	III	a,b,h,j,k	04	-	-	4	40	60	100	Co
20CGU602A	Artificial Intelligence	IV	c,d,e	04	-	-	4	40	60	100	DS
20CGU602B	Digital Image Processing	I	a,c,g,m								E
20CGU603A	Computer Graphics	I	a,d,g,m	03	-	-	3	40	60	100	DS
20CGU603B	Compiler Design	V	e,j,l								E
20CGU611	PHP Programming - Practical	III	a,b,h,j,k	-	-	04	2	40	60	100	Co
20CGU612A	Artificial IntelligenceLab	IV	c,d,e			04	2	40	60	100	DS
20CGU612B	Digital Image ProcessingLab	I	a,c,g,m	-	-						E
20CGU613A	Computer Graphics - Practical	I	a,d,g,m	-	-	03	1	40	60	100	DS
20CGU613B	Compiler Design - Practical	V	e,j,l								E
20CGU691	Project	II	d,e,f,n	08	-	-	6	40	60	100	
	ECA / NCC / NSS / Sports / General interest etc			Good							
	Semester Total			19	-	11	22	280	420	700	
	Grand Total			100	-	80	140	1880	2820	4700	

Entrepreneur Oriented Courses -Green

Employability Oriented Courses -Blue

Skill Development Oriented Courses -Red

Ability Enhancement Courses (AEC)		
Semester	Course Code	Name of the Course
I	20LSU101	Language –I
	20ENU101	English– I
II	20LSU201	Language –II
	20ENU201	English-II
IV	20CGU403	Cognition and Problem Solving

Generic Elective Courses (GE) /Allied Courses		
Semester	Course Code	Name of the Course
II	20CGU203	Discrete Structures

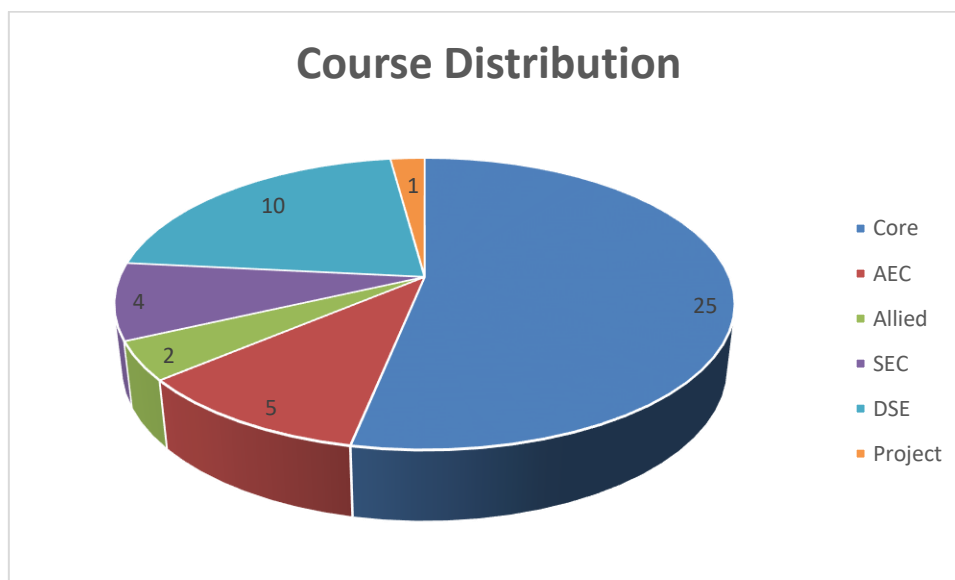
Core Courses (CC)		
Semester	Course Code	Name of the Course
I	20CGU101	Object Oriented Programming using C++
	20CGU102	Operating Systems
	20CGU103	Web Designing
	20CGU111	Object Oriented Programming using C++ - Practical
	20CGU112	Operating Systems - Practical
	20CGU113	Problem solving using Worksheets - Practical
II	20CGU201	Computer Networks
	20CGU202	Information Technology Information Library
	20CGU211	Computer Networks - Practical
	20CGU212	Web Technologies - Practical
III	20CGU301	Data Structures
	20CGU302	Python Programming
	20CGU303	Virtualization and Cloud
	20CGU311	Data Structures - Practical
	20CGU312	Python Programming - Practical
	20CGU313	Virtualization and Cloud - Practical
IV	20CGU401	Programming in JAVA
	20CGU402	Database Management System
	20CGU411	Programming in JAVA - Practical
	20CGU412	Database Management System - Practical
V	20CGU501	Information Security and Cyber Laws
	20CGU511	Information Security and Cyber LawsLab
VI	20CGU601	PHP Programming
	20CGU611	PHP Programming - Practical
	20CGU691	Project

Skill Enhancement Courses(SEC)		
Semester	Course Code	Name of the Course
III	20CGU304A	Infrastructure Management
	20CGU304B	Android Programming
	20CGU314A	Infrastructure Management - Practical
	20CGU314B	Android Programming - Practical
IV	20CGU404A	Process Management
	20CGU404B	Programming in MATLAB
	20CGU414A	Devops Tools - Practical
	20CGU414B	Programming in MATLAB - Practical

Discipline Specific Elective Courses (DSE)		
Semester	Course Code	Name of the Course
V	20CGU502A	Introduction to Digital Technology
	20CGU502B	Machine Learning
	20CGU503A	Software Testing
	20CGU503B	Data Mining
	20CGU504A	Client Relationship Management
	20CGU504B	Introduction to Data Science
	20CGU512A	Introduction to Digital Technology - Practical
	20CGU512B	Machine Learning - Practical
	20CGU513A	Software Testing - Practical
	20CGU513B	Data Mining - Practical
	20CGU514A	Client Relationship Management - Practical
	20CGU514B	Introduction to Data Science - Practical
VI	20CGU602A	Artificial Intelligence
	20CGU602B	Digital Image Processing
	20CGU603A	Computer Graphics
	20CGU603B	Compiler Design
	20CGU612A	Artificial IntelligenceLab
	20CGU612B	Digital Image Processing - Practical
	20CGU613A	Computer Graphics - Practical
	20CGU613B	Compiler Design - Practical

Course Distribution Table:

Category	No. of Courses		Total
	Theory	- Practical	
Core	12	13	25
AEC	5	0	5
Allied	1	1	2
SEC	2	2	4
DSE	5	5	10
Project	1	0	1
Total	26	21	47



20LSU101

LANGUAGE- I

Semester – I
4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

பாடத்திட்டப்பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கமேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப்பயன்விளைவு

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின்வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்' ; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத் திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

தாள்கள்வரிசையும்தேர்வுச்செயல்திட்டமும்பகுதி-I தமிழ்

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

அலகு – I : தமிழ்இலக்கியவரலாறு – I**(8மணிநேரம்)**

முச்சங்கவரலாறு-சங்கஇலக்கியத்தொகுப்பு-பாட்டும்தொகையும்-
சங்கஇலக்கியச்சிறப்பியல்புகள்-சங்கம்மருவியகாலம்-
பதினெண்கீழ்க்கணக்குநூல்கள்-திருக்குறள்-நாலடியார்-
நான்மணிக்கடிகை- பழமொழிநானூறு – பிற்காலஅறஇலக்கியங்கள்-
கொன்றைவேந்தன் – நீதிநூல்- காப்பியங்கள்-
தமிழில்காப்பியஇலக்கணம்-
தமிழில்பெருங்காப்பியங்களும்சிறுகாப்பியங்களும்-
இரட்டைக்காப்பியங்களாகச்சிலம்பும்மேகலையும்.

அலகு - II:சங்கஇலக்கியம்**(12 மணிநேரம்)****அ).எட்டுத்தொகை****நற்றிணை:**கொண்டல்மாமழை – குறிஞ்சி-தலைவன்கூற்று - 140**குறுந்தொகை:**வாரார்ஆயினும், வரினும் –முல்லை- தலைவி கூற்று-110**ஐங்குறுநூறு****:மருதம்****-தோழிகூற்று-****வேட்கைப்பத்து:**வாழிஆதன்வாழிஅவினி - 6**பதிற்றுப்பத்து:** சிதைந்ததுமன்ற - 27**பரிபாடல்:**புறத்திரட்டு- மதுரைநகர்ச்சிறப்பு –**உலகம்ஒரு நிறையாத்தான்-7, மாயோன் கொப்பூழ்-8, செய்யாட்கு இழைத்த-9, கார்த்திகை காதில்-10, ஈவாரைக் கொண்டாடி-11.****கலித்தொகை:**பாலைக்கலி-செவிலி – எறித்தரு கதிர்தாங்கி-9**அகநானூறு:**அன்னைஅறியினும்அறிக-தோழி - நெய்தல் - 110**புறநானூறு :**யாதும்ஊரேயாவருங்கேளிர்-பொதுவியல்- 192**ஆ).பத்துப்பாட்டு: நெடுநல்வாடை- கார்காலச்சிறப்பு :
வையகம்பனிப்ப -1-70****அலகு – III: அறஇலக்கியம்****(10மணிநேரம்)****1. திருவள்ளுவர்- திருக்குறள்- அதிகாரம் 67 – வினைத்திட்டம்,
அதிகாரம் 100 - பண்புடைமை****2. முன்றுறையரையனார் – பழமொழி நானூறு**5 பாடல்கள்**உணற்குஇனிய 5, பரந்ததிறலாரை 32, நெடியதுகாண்கிலாய் 46,
இனியாரும் 153, உரைசான்ற 195.****3. ஔவையார் – கொன்றைவேந்தன் (1- 50 பாடல்கள்)****அன்னையும்பிதாவும் – புலையும்கொலையும்களவும்தவிர்****4. வேதநாயகம்பிள்ளை- நீதிநூல் – (அதிகாரம்-7-
தாய்தந்தையரைப் போற்றுதல்-****தேர்ந்தெடுக்கப்பட்ட5பாடல்கள்)****சின்னவோர்பொருள், கடவுளைவருந்தி, எப்புவிகளும், வைத்தவர்,
ஈன்றவர்****அலகு - IV :காப்பிய இலக்கியம்****(10மணிநேரம்)****(அ). சிலப்பதிகாரம்(5மணிநேரம்)**

மங்கலவாழ்த்துப்பாடல்: (21-29)- நாகநீள்நகரொடு-
கண்ணகிஎன்பாண்மன்னோ .
வழக்குரைகாதை, (48-56) - நீர்வார்கண்ணை-புகாரென்பதியே .
வஞ்சினமாலை: (5-34) - வன்னிமரமும் - பிறந்தபதிப்பிறந்தேன்.
நடுகற்காதை: (207-234) - அருத்திறலரசர் - மன்னவரேறென்
வாழ்த்துக்காதை: (9) - என்னையிஃதென்னே - மீவிசும்பிறோன்றுமால்.

(ஆ). மணிமேகலை(5 மணிநேரம்)

பசியின்கொடுமை: பாத்திரம்பெற்றகாதை:

‘போதிநீழல்’ - ‘பெருகியதன்றோ’ , ‘ஆற்றுநர்க்களிப்போர்’ -
‘நல்லறம்கண்டனை’ (73-98).

சிறைக்கோட்டம்அறக்கோட்டமாக்கியகாதை:மாவண்கிள்ளிக்குகாவ
லன்உரைத்தவை:

‘பைஞ்சேறுமெழுகாப்பசும்பொன்மண்டபத்து -
அறவோர்க்காக்கினன்அரசாள்வேந்தன்’ (116-163).

**அலகு- V :அடிப்படைஇலக்கணமும்பயன்பாட்டுத்தமிழும் -I
(8மணிநேரம்)**

அ).எழுத்து, சொல், பொருள் இலக்கணங்கள்(4 மணிநேரம்)

1. முதல்மற்றும்சார்பெழுத்துகள்- பெயர்,வினை, இடை,
உரிச்சொல்முதலானஅடிப்படைஇலக்கணவிளக்கப்பயிற்சிகள்
- 2). அகத்திணைமற்றும்புறத்திணைஇலக்கணங்கள்

ஆ). கடிதப்பயிற்சி(4 மணிநேரம்)

1. தன்விவரக்குறிப்புடன்வேலைவேண்டிவிண்ணப்பம்எழுதுதல்
2. பல்கலைக்கழகப்பன்னாட்டுக்கருத்தரங்கச்செய்தியைநாளி
தழில்வெளியிடவேண்டிநாளிதழின்பதிப்பாசிரியருக்குக்கடித
ம்
3. கருத்தரங்கப்பங்கேற்புக்குஅனுமதிக்கடிதம்
4. பல்கலைக்கழகவிழாவுக்குத்தலைமையேற்கவேண்டி,
மாவட்டஆட்சியருக்குவிண்ணப்பம்
5. கல்விகடன்வேண்டிவங்கிமேலாளருக்குவிண்ணப்பம்
6. வசிப்பிடத்திற்குஅடிப்படைவசதிவேண்டிவட்டாட்சியருக்குவி
ண்ணப்பம்
7. தேசியவிருதுபெற்றநண்பனுக்குப்பாராட்டுக்கடிதம்
8. புத்தகங்கள்அனுப்பிஉதவவேண்டி,
பதிப்பகத்தாருக்குவிண்ணப்பம்

20ENU101**ENGLISH -I****Semester – I
4H – 4C**

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

Course Objective:

- To give basic knowledge on grammar.
- To train communication in real life situation.
- To be familiar with the four basic skills of English.
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.
- To provide aesthetic pleasure through literature.
- To develop the moral values of students.

Course Outcome:

1. Retrieve fundamentals of English language to construct error free sentences.
2. Develop the knowledge of interpersonal skills.
3. Establish and maintain social relationships.
4. Develop communication skills in business environment.
5. Refine communication competency through LSRW skills.
6. Improving intrapersonal skills through literary works.

UNIT - I: Grammar

Types of Sentences, Subject and Predicate, Parts of Speech, Tenses, Preposition and Articles

UNIT –II: Communication Exercise

Importance of Business Language- Words often Confused- Words often Misspelt- Common Errors in English- Charts and Pictorial Writing.

UNIT – III: Interpersonal Skills

Greetings & Introduction- Giving & Denying Permission- Telephone Etiquette- Oral Presentation – Plan, PowerPoint Presentation- Preparation of Speech- Audience psychology- Secrets of Good Delivery

UNIT - IV: LSRW Skills

Listening- Listening and its types, Basic Listening Lessons

Speaking- Basics of speaking, Regular English, Business English, Interview English

Reading- Reading and its purposes, Types of Reading, Reading Techniques

Writing- Types of Writing, Components of Writing, Language and Style with accordance to the contexts

UNIT - V: Literature

Prose: Let's Do What India Needs from Us - Dr. A.P.J. Abdul Kalam

Poem: A Prayer for My Daughter - W.B. Yeats

Short Story: Sparrows - K. Ahmad Abbas

Suggested Reading:

1. Hewings Martin, 2013 Advanced Grammar in Use, Cambridge University Press
2. Haines Simon, 2015 Advanced Skills, A resource Book of Advanced- Level Skill Activities

20CGU101 OBJECT ORIENTED PROGRAMMING USING C++	Semester-I 4H – 4C
Instruction Hours / week:L: 4 T: 0 P: 0	Marks: Internal:40External:60Total: 100 End Semester Exam :3 Hours

Course Objectives

- To understand how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.
- To use the basic object-oriented design principles in computer problem solving.

Course Outcomes (COs)

Upon completion of this course the students will be able to :

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Learn the basics of file handling mechanism that is essential for understanding the concepts in database management systems
6. Use the concepts of preprocessor directives and macros.

Unit I - Introduction

Principles of object-oriented programming: Basic concepts of object-oriented programming – Benefits of OOP – Applications of OOPs – Structure of C++ Program C++ Tokens – Control Statement – Decision Making Statements- Loop Statements - Inline Functions – Friend Function - Function Overloading.

Unit II - Control Structure, Functions and Constructors

Classes and Objects: Specifying a class – Creating Objects – Accessing Class Members – Defining Member Functions – Static Data Members – Static Member Functions - Array of Objects – Friend Functions. Constructors and Destructors: - Constructors – Parameterized Constructors - Multiple Constructors in a Class – Constructors with Default Arguments - Copy Constructor - Dynamic Constructor – Destructors.

Unit III - Operator Overloading and Inheritance

Operator overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. Inheritance: - Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

Unit IV - Pointers and I/O Operations

Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual functions- Pure Virtual Functions. Managing console I/O operations:- C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

Unit V - File Management

Files - Classes for file stream operations – Opening and Closing a file – sequential input and output operations – updating a file random access – Command Line Arguments. Templates and Exceptions: - Templates – class templates – function templates – member function templates – exception handling.

Suggested Readings

1. Antonio Mallia, Francesco Zoffoli, 2019, C++ Fundamentals, Packt Publishing, Ltd.
2. Joel Murach, Mary Delamater, 2018, C++ Programming, Mike Murach & Associates Inc.
3. Bjarne Stroustrup, 2014, Programming - Principles and Practice using C++, 2nd Edition, Addison-Wesley.
4. Stefan Bjornander, 2016, C++ Windows Programming, Published by Packt Publishing Ltd.
5. Harry, H. Chaudhary, 2014, Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.
6. Debasish Jana, 2014, C++ And Object-Oriented Programming Paradigm, Published by PHI Learning Pvt. Ltd
7. Richard L. Stegman, 2016, Focus on Object-oriented Programming with C++, 6th Edition, CreateSpace Independent Publishing Platform.

Websites

1. www.programmingsimplified.com
2. [www.programiz.com / cpp-programming](http://www.programiz.com/cpp-programming)
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com
6. <https://nptel.ac.in/courses/106101208/>

LMS

<http://172.16.13.33/course/view.php?id=599>

Semester – I

20CGU102 **OPERATING SYTSEMS** **4H – 4C**

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

Course Objectives

- To recognize the concepts and principles of Windows operating system.
- To provide students with the basic knowledge and skills of memory in Windows
- To provide device and Process management and techniques in Windows environment.
- To able to do server monitoring of Windows
- To able to create group policy in Windows 2012.
- Install MS Windows 2012 environment.

Course Outcomes (COs)

1. Ability to work in Windows 7 operating system, its tools and utilities.
2. Install and configure Windows 2012 server and client.
3. Use administrative tools and backup management for Windows 2012 server.
4. Understand device and Process management and techniques in Windows environment.
5. Monitor server OS of Windows
6. Create group policy in Windows 2012.

Unit I - WINDOWS

Windows-Hardware Basics, Operating System overview and Windows, Windows 7 Essential, Client OS-Windows 7-Users and Groups-IP Configuration, Client OS-Windows 7 Tools and Utilities-Client OS Windows 7- Installation-Features-Disk Management-File Systems.

Unit II- Server OS

Server OS-Windows Server 2012 Overview-Server DNS-Zone Creation - DHCP - PRACTICAL-Advanced server storage Management-server ADS concepts and FSMO-Server OS Windows Server 2012 Roles and features- Server OS Windows Server 2012 File and Print Services.

Unit III - OS MONITORING

Server OS monitoring and managing Windows Server 2012-Server OS Windows Server 2012 DNS and DHCP- Server OS Windows server 2012 Administrative Tools and ADS

Unit IV - SERVER OS

Server OS-Windows Server 2012-Storage and Backup Management-Client OS Windows 7 Devices and Printers-Server OS Windows Server 2012 Installation.

Unit V - GROUP POLICY MANAGEMENT

Group Policy Management-Server Windows Server 2012- File and print services-Group Policy-Server Storage Management –Server Scenario- Server OS Windows Server 2012-DNS and DHCP -Server- ADS scenario.

Suggested Readings

1. Mitch Tulloch, “Windows 7 Essential Guidance”, 2009.
2. William PanekTylor Wentworth, “Microsoft Windows 7 Administration”, Wiley Publishing, 2010
3. Charles Edge, Chris Barker EhrenSchwiebert, “Beginning MacOSX Snow Leopard Server”, 2010

4. Greg Tomsho, “Guide to Operating System”, 5th Edition, 2017.

Web Sites

1. <https://searchitchannel.techtargget.com/tip/Windows-7-user-accounts-and-groups-management>
2. <https://docs.microsoft.com/>
3. <https://www.microsoft.com/en-in/evalcenter/evaluate-windows-server-2012>

20CGU103**WEB DESIGNING****Semester – I
3H – 3C**

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

Course Objectives

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice markup languages
- To understand the technologies used in Web Programming.
- To know the importance of object-oriented aspects of Scripting.
- To understand and practice embedded dynamic scripting on client-side Internet Programming
- To design an interactive website using HTML, CSS and JavaScript.

Course Outcomes (COs)

Upon Completion of the course, the students will be able to

1. Apply basic HTML tags to format text in a web page
2. Use forms and frames in HTML to design interactive web pages.
3. Create a basic website using HTML and Cascading Style Sheets.
4. Learn to use JavaScript inside HTML to create web pages.
5. Validate user input using JavaScript objects and Events.
6. Design and implement dynamic web pages using HTML, CSS and JavaScript.

Unit I - HTML

What is HTML -HTML Documents -Basic structure of an HTML document -Creating an HTML document - Mark up Tags -Heading-Paragraphs - Line Breaks - HTML Tags. Introduction to elements of HTML- Working with Text - Working with Lists, Tables -Working with Hyperlinks, Images and Multimedia.

Unit II – Frames

Introduction to Frame, <frameset> and <frame> Tag with its Attributes, Creating Frames, Linking Frames, <noframes> tag, Complex Framesets, Floating or Inline Frame. Forms :<Form> Tag and its Attributes, <Input> Tag and its Attributes, Form Controls: Text Controls, Password Fields, Radio Buttons, Checkboxes, Reset and Submit Buttons, Form Control Selection, Option Processing and Text Area, Hidden Fields. Embedding Multimedia: Introduction, Embedding Multimedia, Inserting Sound/Audio Formats, Inserting Video File Formats.

Unit III - CSS

Concept of CSS- Creating Style Sheet - CSS Properties -CSS Styling:Background-Text Format-Controlling Fonts - Working with block elements and objects - Working with Lists and Tables - CSS Id and Class - Box Model:Introduction- Border properties- Padding Properties- Margin properties - CSS Advanced:Grouping-Dimension-Display-Positioning-Floating-Align-Pseudo class-Navigation Bar-Image Sprites-Attribute selector.CSS Color -Creating page Layout and Site Designs.

Unit IV – JavaScript Programming

Introduction to JavaScript: Utility of JavaScript-Evolution of the JavaScript Language-JavaScript Versions and Browser Support- Differences Between Client-Side vs. Server-Side JavaScript-Statements and Operators-Variable Declarations- Operators and Statements- Operator Precedence- Implementing Control Constructs: Conditional and Looping Constructs-

Implementing Functions: Defining Functions-Calling Functions- Passing Arguments- Local vs. Global Variables- Using the Return Statement-Nested Functions.

Unit V - JavaScript Objects

The JavaScript Object Model and Hierarchy- JavaScript Object Properties-Object Methods- New Keyword- This Keyword- Creating New Object Instances Using Constructor Functions- String-Date and Array Objects- Construction of Custom Objects with Individual Properties and Methods . Event Handling: Event-Driven Programming Model - Handling Link Events, Window Events, Image Events, Form Events- Setting Event Handlers- In-Line or Referencing.

Suggested Readings

1. “Web Coding & Development All-in-One For Dummies”,PaulMcFedries ,2018
“Fundamentals of Web Development” ,Randy Connolly, Ricardo Hoar ,2017
2. Principles of web design.,Joelsklar,sixth edition,2015
3. “HTML and CSS: Design and Build Websites” ,Jon Duckett,2014
4. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013

Websites

1. [http://www. freeCodeCamp Guides.com/](http://www.freeCodeCamp Guides.com/)
2. <http://www. Codrops CSS Reference/>
3. [https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide.](https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide)
4. [http://www.w3schools.com.](http://www.w3schools.com)
5. <https://nptel.ac.in/courses/106105084/>
6. <https://freevideolectures.com/blog/webdesign-online-courses-and-video-lectures/>

Semester-I**20CGU111 OBJECT ORIENTED PROGRAMMING USING C++ - PRACTICAL**
4H – 2C**Instruction Hours / week: L:0 T: 0 P:4 Marks: Internal:40 External:60 Total: 100****End Semester Exam :3 Hours****Course Objectives**

- To understand how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ programs using pointers.
- To learn file handling in C++.
- To write programs in C++ using the concepts learned above.

Course Outcomes (COs)

After the completion of this course, a successful student will be able to:

1. Understand the difference between top-down and bottom-up approach.
2. Apply the concepts of object-oriented programming in constructor and destructor.
3. Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.
4. Apply pointer concepts in C++
5. Use the concepts of preprocessor directives and macros.
6. Write programs in C++ using the concepts learned above

List of Programs

1. Write a C++ program to print sum of digits.
2. Write a C++ program to check palindrome number.
3. Write a program to swap numbers using friend function.
4. Write a program to perform multiplication of two matrices using operator overloading.
5. Write a program that will read 10 integers from user and store them in an array. Implement array using pointers.
6. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
7. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
8. Write a C++ Program to store GPA of n number of students and display it where n is the number of students entered by user (Memory Management).
9. Write a program to demonstrate the try, catch block in C++
10. Write a C++ program that uses a single file for both reading and writing the data.

Suggested Readings

1. Antonio Mallia, Francesco Zoffoli, 2019, C++ Fundamentals, Packt Publishing, Ltd.
2. Joel Murach, Mary Delamater, 2018, C++ Programming, Mike Murach & Associates Inc.
3. Bjarne Stroustrup, 2014, Programming - Principles and Practice using C++, 2nd Edition, Addison-Wesley.
4. Stefan Bjornander, 2016, C++ Windows Programming, Published by Packt Publishing Ltd.
5. Harry, H. Chaudhary, 2014, Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.

6. Debasish Jana, 2014, C++ And Object-Oriented Programming Paradigm, Published by PHI Learning Pvt. Ltd
7. Richard L. Stegman, 2016, Focus on Object-oriented Programming with C++, 6th Edition, CreateSpace Independent Publishing Platform.

Websites

1. www.programmingsimplified.com
2. [www.programiz.com / cpp-programming](http://www.programiz.com/cpp-programming)
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com

20CGU112**OPERATING SYSTEMSLAB****4H – 2C**

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

- To recognize the concepts and principles of Windows operating system.
- To provide students with the basic knowledge and skills of memory in Windows
- To provide device and Process management and techniques in Windows environment.
- To able to do server monitoring of Windows
- To able to create group policy in Windows 2012.
- Install MS Windows 2012 environment.

Course Outcomes (COs)

1. Ability to work in Windows 7 operating system, its tools and utilities.
2. Install and configure Windows 2012 server and client.
3. Use administrative tools and backup management for Windows 2012 server.
4. Understand device and Process management and techniques in Windows environment.
5. Monitor server OS of Windows
6. Create group policy in Windows 2012.

List of programs

1. Installation of client and server OS
2. Create server and play roles
3. Zone creation and DHCP
4. File and print services
5. Devices and printers
6. Group policy
7. Server storage management
8. Server scenario
9. ADS Scenario based
10. DNS and DHCP

Semester – I

20CGU113 PROBLEM SOLVING USING WORKSHEETS - PRACTICAL 3H – 3C

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

Course Objectives

- Write functions in Microsoft Excel to perform basic calculations and to convert number to text and text to number.
- Create applications using VBA code in Excel
- Construct formulas, including the use of built-in functions, and relative and absolute references.
- To be able to develop macros.
- To be able to Format worksheets.
- To create an interactive worksheet.
-

Course Outcomes (COs)

1. Create and design a spreadsheet for general office use.
2. Demonstrate the basic mechanics and navigation of an Excel spreadsheet.
3. Demonstrate the use of basic functions and formulas
4. Create applications using VBA code in Excel
5. Ability to develop macros.
6. Creating interactive worksheets

List of programs

1. Create sales dashboard (such as Market wise, Product wise, quarter wise sales) in Excel using VBA code
2. Create randomized quiz question paper in Excel using VBA code.
3. Design an attendance tracker using login time of the employee in Excel using VBA code to perform the operation like if employee is late, and then lock the system.

20LSU201

LANGUAGE-II

Semester – II
4H – 4C

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

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனை மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன் விளைவு

1. இந்தியகுடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்தமுழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத்தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன்மேம்பாட்டுடன், படைப்பாக்கத் திறன்மேம்பாடும் பெற்றிருத்தல்.
5. சமுதாயமற்றும் வாழ்வியல்மதிப்புகளைப் பேணுவதற்குக்கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
6. மொழிபெயப்புத்துறை சார்ந்த வேலைவாய்ப்புத் திறன் பெற்றிருத்தல்

அலகு – I : தமிழ்இலக்கியவரலாறு- II
(5மணிநேரம்)

தமிழ்இலக்கியவரிசையில் திருமுறைகளும் நாலாயிரத்திவ்யப்பிரப

ந்தமும்-பன்னிருதிருமுறைகள்அறிமுகம்-
 திருமுறைஆசிரியர்களின்இலக்கியப்பங்களிப்பு-
 திருமுறைகளில்பக்திநெறியும்சமுதாயநோக்கும்-
 சமயக்குரவரின்அருள்நெறி- பன்னிருஆழ்வார்கள்வரலாறு-
 ஆழ்வார்களின்இலக்கியப்பங்களிப்பு-
 திவ்யப்பிரபந்தத்தில்க்கதிநெறியும்இலக்கியநயமும்-
 தமிழில்சிறுநிலக்கியக்காலமும்கருத்தும்-
 தொண்ணூற்றாறுவகைச்சிறுநிலக்கியவரிசை- தமிழ்மொழியின்கவிதை
 - சிறுகதை - உரைநடை -இலக்கியங்களின்தோற்றம் - வளர்ச்சி -
 உத்திகள்-நாட்டுப்புறஇலக்கியங்கள்-
 கொங்குநாட்டார்வாய்மொழிவழக்காறுகள்.

அலகு - II :பக்திஇலக்கியமும்சிறுநிலக்கியமும்: (12 மணிநேரம்)

அ). பக்திஇலக்கியம்(6 மணிநேரம்)

1. 1. சைவம்- பெரியபுராணம் - இளையான்குடிமாறநாயனார்புராணம் - (19 பாடல்கள்)

(அம்பொன்நீடிய, கொண்டுவந்து, ஆளுநாயகர், செல்வம்மேவிய,
 மாரிக்காலத்து, ஈரமேனியை, நமக்குமுன்பிங்கு,
 செல்லநீங்க,மற்றம்மாற்றம், உள்ளம்அன்பு, காலினால்தடவி,
 வந்தபின்மனைவியாரும், முறித்தவைஅடுப்பின்,
 வழிவரும்இளைப்பினோடும், மனைவியார்கொழுநர்,
 கணவனார்தம்மை, அழுந்தியஇடருள், மாலயற்கரிய,
 அன்பனேஅன்பர்பூசை)

2. வைணவம் - ஆண்டாள்நாச்சியார்திருப்பாவை: (11 பாடல்கள்)

மார்கழித்திங்கள், வையத்து வாழ்வீர்காள், ஓங்கிலகளந்த,
 ஆழிமழைக்கண்ணா, மாயனைமன்னுவடமதுரை, சிற்றம்சிறுகாலே,
 ஒருத்திமகனாய், மாலைமணிவண்ணா, கூடாரைவெல்லும்,
 கறவைகள்பின்சென்று, வங்கக்கடல்கடைந்த.

ஆ). சிறுநிலக்கியம் (6 மணிநேரம்)

1. முக்கூடற்பள்ளு- 2 பாடல்கள் - சித்திரக்காலிவாலான் (நெல்வகைகள்)

குற்றாலத்திரிகூடமால்வரை (மீன்வகைகள்)

2. நந்திகலம்பகம்- 5 பாடல்கள்- என்னையெபுகழ்ந்தேன்,
பதிதொறுபுயல்பொழி,

இந்தப்புவியில், அடிவிளக்கும்துகில்,

வானுறுமதியை

3. மதுரைச்சொக்கநாதர்தமிழ்விடுதூது -தமிழின்சிறப்பு
பாடியருளபத்துப்பாட்டும்-விளம்பக்கேள்.

**அலகு - III: கவிதையும்சிறுகதையும்
மணிநேரம்)**

(16

அ). கவிதை இலக்கியம் (8 மணிநேரம்)

1. மகாகவிபாரதியார் -கண்ணன் - என்சீடன்
2. புரட்சிக்கவிஞன்பாரதிதாசன் -இளையார்ஆத்திகுடி-
அழுபவன்கோழை
3. கவிமணிதேசிகவிநாயகம்பிள்ளை-கோயில்வழிபாடு
4. கவிக்கோ. அப்துல்ரகுமான் -பாருக்குள்ளே நல்ல நாடு
5. சிற்பிபாலசுப்பிரமணியன் -மலையாளக் காற்று
6. கவிஞர்தாமரை -தொலைந்துபோனேன்
7. கவிஞர்கரிகாலன்-விடுதலை

ஆ). சிறுகதைஇலக்கியம்(8 மணிநேரம்)

1. சாபவிமோசனம் - புதுமைப்பித்தன்
2. நகரம் -சுஜாதா
3. அந்நியர்கள் -ஆர். சூடாமணி
4. இந்நாட்டுமன்னர் -நாஞ்சில்நாடன்

அலகு - IV :உரைநடைஇலக்கியம் (8 மணிநேரம்)

1. ஆளுமைத்திறன்அறிவோம்- தன்னம்பிக்கைமாதஇதழிலிருந்து
2. திருக்குறளும்சமுதாயவியலும்- முனைவர்புரிசைநடராசன்
3. தமிழ் - உயர்தனிச்செம்மொழி - முனைவர்இரா. குணசீலன்
4. நொய்யல் - முனைவர் ப. தமிழரசி

**அலகு- V :அடிப்படைஇலக்கணமும்பயன்பாட்டுத்தமிழும்-
II(7மணிநேரம்)**

இலக்கணப்பயிற்சி: 1. அணிஇலக்கணம்

உவமையணி-பிறிதுமொழிதல்அணி-சிலேடைஅணி-தீவகஅணி-
ஏகதேசஉருவகஅணி – வேற்றுமையணி-
பின்வருநிலையணிக்கானவிளக்கங்கள்.

2. துறைசார்கலைச்சொல்பயன்பாட்டாக்கம்

3. படைப்பிலக்கியப்பயிற்சிகள்

1. மரபுக்கவிதை, புதுக்கவிதை, சிறுகதை, கட்டுரைபடைப்பாக்க உத்திகள்- பயிற்சிகள்
2. எழுத்தாளருடனானநேர்காணல்மற்றும்களஆய்வுக்கானவினாநி ரல்தயாரித்தல்நுட்பங்களும்பயிற்சிகளும்.

4. மொழிபெயர்ப்புப்பயிற்சிகள்

1. தமிழ்-ஆங்கிலமொழிபெயர்ப்புப்பயிற்சிகள் -2.
2. ஆங்கிலம்-தமிழ்மொழிபெயர்ப்புப் பயிற்சிகள்-2.

பாடநூல்:கற்பகச்சோலை – தமிழ்ஏடு.

கற்பகம்உயர்கல்விகலைக்கழகத்தமிழ்த்துறை வெளியீடு.

20ENU201**ENGLISH -II****Semester – II
4H – 4C**

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

Course Objective:

- To give basic knowledge on grammar.
- To train communication in real life situation.
- To be familiar with the four basic skills of English.
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.
- To provide aesthetic pleasure through literature.
- To develop the moral values of students.

Course Outcome:

1. Retrieve fundamentals of English language to construct error free sentences.
2. Develop the knowledge of interpersonal skills.
3. Establish and maintain social relationships.
4. Develop communication skills in business environment.
5. Refine communication competency through LSRW skills.
6. Introduce literature to enhance the moral and aesthetic values.

UNIT –I – Grammar

Voice, Idioms and Phrases, Clauses and Reported Speech

UNIT –II –Business and Technical Reports

Business Correspondence –Memo, Notices, Agenda, Minutes- Resume Writing- Report Writing- Letter Writing- Personal and Social Letters- E-mail Writing

UNIT –III – Communication Practice

Verbal and Non-Verbal Communication- Group Discussion and Seminars- Note-Taking and Note-Making

UNIT –IV –LSRW Skills**Listening-** Listening Talks and Presentations**Speaking** - Public Speaking- Preparatory steps, Time Management, Handling Questions and Meeting unexpected situations**Reading** - Language of Newspapers, Magazines and Internet**Writing** -Writing Paragraphs and Essays- Content Writing**UNIT –V –Literature****Prose-** Morals in the Indian Context by Francis Nicholas Chelliah**Poetry-** Telephone Conversation by Wole Soyinka**Short Stories-**The Last Leaf by O' Henry**Books for References**

Oxford Handbook of Writing: St. Martins Handbook of Writing 2013 CU Press
 Sound Business, Julian Treasure 2012 OUP

20CGU201**COMPUTER NETWORKS****Semester – II
4H – 4C**

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

Course Objectives

- To master the fundamentals of data communications networks by gaining a working knowledge of data transmission concepts.
- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To read the fundamentals and basics concepts of Physical layer with real time examples
- To study data link layer concepts, design issues, and protocols.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer and Application layer.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Understand the functions of each layer in OSI and TCP/IP model.
2. Explain the multiplexing, switching concept and types of transmission media with real time examples.
3. Understand the error detection and correction methods and can implement the data link layer protocols
4. Understand channel error detection and correction, MAC protocols, Ethernet and WLAN.
5. Learn different medium access method to avoid collision and to learn about routing table.
6. Learn basic functionalities of transport layer and application layer.

Unit I- INTRODUCTION

Introduction - Applications – LAN – WAN – MAN - Network Hardware - Network Software: Protocol Hierarchies – Connection-oriented and connectionless services. Reference Models: OSI Reference Model – TCP/IP Reference Model – Comparison of OSI and TCP/IP.

Unit II- NETWORK BASICS

Network Basics - Protocols, Topology - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites.

Unit III - IP ADDRESSING

IP Addressing Version 4 – IP Addressing Version 6 – Subnetting Advanced VLSM - Switch Basic - VLAN - VTP / CDP - Subnetting Basic Version 4 - Network Quiz - Routing Static

Unit IV - ROUTING ALGORITHMS

Routing algorithms – Congestion Control Algorithms - CISCO IOS / Managing / Password recovery - Routing Dynamic Routing protocols OSPF RIP EIGRP - Network Advanced Routing Dynamic Routing protocols - OSPF RIP EIGRP

Unit V - MONITORING

Monitoring Network Devices - Overview of ACL\NAT\WAN\Wireless

Suggested Readings

1. David J.Wetherall, Andrew S.Tanenbaum, "Computer Networks", 5th Edition, Pearson Education, 2012.
2. Behrouz A. Forouzan, "Data Communication and Networking", 4th Edition, Tata McGraw Hill, 2007.
3. SilviuAngelescu, "CCNA Certification All-In-One for Dummies", Wiley Publishing. Inc.

Web Sites

1. <https://www.geeksforgeeks.org/basics-computer-networking/>
2. https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking/networking-basics.html
3. <http://ecomputernotes.com/computernetworkingnotes/communication-networks/describe-the-different-transmission-media>
4. https://www.tutorialspoint.com/ipv4/ipv4_addressing.htm
5. https://en.wikipedia.org/wiki/IPv6_address
6. https://en.wikipedia.org/wiki/Cisco_IOS

20CGU202**INFORMATION TECHNOLOGY
INFORMATION LIBRARY****Semester – II
4H – 4C**

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

- To be able to design a knowledge based system.
- To understand Service lifecycle model
- To know the Key Principles Models and Concepts of service management
- To understand the process management and risk management
- To know the Challenges in providing IT Infrastructure Services
- To understand the event management concepts.

Course Outcomes (COs)

1. Design a knowledge based system.
2. Understand service lifecycle model
3. Know the key principles models and concepts of service management
4. Understand the process management and risk management
5. Know the challenges in providing IT infrastructure services
6. Understand the event management concepts.

Unit I

Introduction ITIL - Service Life Cycle Model - What is ITIL - Components and Phases of a Service Life Cycle - Main concept of Service life cycle - Service management as a Practice - IT today and IT opportunity

Unit II

What is a Service - What is Service management - what comprises value - the 4 Ps of Service Design - Key It service management roles - Key Principles Models and Concepts

Unit III

Process - Functions - Specific Roles - RACI - Risk Management - Business Case - Life Cycle Phases - Service Strategy - Service Design - Service Transition - Service operation - CSI

Unit IV

Automation - Evolution of IT Infrastructure Services - Challenges in providing IT Infrastructure Services - The future state of IT Infrastructure Services - Automation and Analytics - the approach of the future

Unit V

SNOC - Event Management - Objectives of Event Management - Scope of event management - Value to the organization - Draw IT Infrastructure facilities for Hospital Management System, e - governance and Banking Sector

Suggested Readings

1. Service Support (CCTA): Part 15 (IT Infrastructure Library)

2. IT Infrastructure Risk & Vulnerability Library: A Consolidated Register of Operational & Technology Infrastructure Vulnerabilities for IT Assurance Professionals
3. IT Infrastructure Risk and Vulnerability Library: A Consolidated Register of Operational and Technology Infrastructure Vulnerabilities for IT Assurance Professionals (Japanese Edition)

20CGU203**DISCRETE STRUCTURES****Semester – II**
5H – 4C

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

This course enables the students to

- To learn the basic concepts of sets, types of sets, functions and relations
- To understand about Pigeonhole principle, Permutation and Combination, Mathematical Induction
- To solve the problems using Recurrence relations and generating functions.
- To know the basic concepts of Logical Connectives, Graphs and Trees.
- To express ideas using mathematical notation
- To solve problems with the help of tools of mathematical analysis.

Course Outcomes

On successful completion of the course, students will be able to

1. Familiar with elementary algebraic set theory.
2. Acquire a fundamental understanding of the core concepts in growth of functions.
3. Describe the method of recurrence relations.
4. Get wide knowledge about graphs and trees
5. Initiate to knowledge from inference theory
6. Solve problems with the help of tools of mathematical analysis.

UNIT I

Sets: Introduction, Sets , finite and infinite sets, uncountably infinite sets, Definition of functions and its classification, Types, composition of functions , Relations and its types , properties of binary relations, closure, partial ordering relations.

UNIT II

Pigeonhole principle, Permutation and Combination, Mathematical Induction, Principle of Inclusion and Exclusion.

UNIT III

Recurrences: Recurrence relations, generating functions, linear recurrence relations with constant coefficients and their solution.

UNIT IV

Graph Theory: Introduction, Basic terminology, graph representation, Models and types, Multigraphs and weighted graphs, graph isomorphism, connectivity, Euler and Hamiltonian Paths and circuits, Trees, basic terminology and properties of trees.

UNIT V

Propositional Logic: Propositions, Truth tables, Logical Connectives, Well-formed Formulas, Demorgan's Law, Tautologies and contradictions, PDNF and PCNF , Equivalences, Inference Theory, Rules of universal specification and generalization

Suggested Readings

1. Kenneth Rosen.(2011). Discrete Mathematics and Its Applications (7thed.), McGraw Hill Company, New Delhi.

2. Tremblay ,J .P., and Manohar R., (2001).Discrete Mathematical Structures with Applications to Computer Science(1st ed.), McGraw-Hill Book Company,New Delhi.
- 3.Sharma J K (2011).Discrete Mathematics (Third Edition),Rajiv Beri for Macmillan Publishers India Ltd.New Delhi.
- 4.Dr.A.Singaravelu., and Dr.M.P Jeyaraman (2016).Discrete Mathematics,Meenakshi Agency Chennai.
5. Hein,J.L., (2010). Discrete Structures, Logic, and Computability (3rd ed.), Jones and Bartlett Publishers,New Delhi.
6. Hunter,D.J.(2016). Essentials of Discrete Mathematics(3rd ed.).Jones and BartlettPublishers, New Delhi.

e-Resources

1. <https://youtu.be/u4IQh46VoU4>
2. <https://youtu.be/fZqfkJ-cb28>
3. <https://www.youtube.com/watch?v=6WGWFwgXhd4>
4. <https://www.youtube.com/watch?v=HmQR8Xy9DeM>
5. <https://www.youtube.com/watch?v=-QQZQNSmIpw>

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

Course Objectives

- To analyze and differentiate networking protocols used in TCP/IP protocol suite.
- To understand about subnets using IP classes
- To understand the key features and functions of TCP
- To understand how basic routing works including the use of routing protocols.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes(COs)

At the completion of the course, students will:

1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
2. Understand IP Addressing Fundamentals
3. Understand IPv4 forwarding and routing.
4. Learn about host name resolution and the Domain Name System (DNS).
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. To compare and contrast IP routing protocols

Requirements:

Cisco packet tracer software (Freeware)

List of programs

1. Switch basic VLAN
2. Routing Static
3. Switch basic commands
4. Switch basic STP
5. Dynamic Routing protocols OSPF, RIP, EIGRP

20CGU212**WEB TECHNOLOGIESLAB****3H – 1C**

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

- To understand the principles of creating an effective web page.
- To learn the language of HTML, DHTML, XML and JavaScript .
- To understand the principles XML documents.
- To Create tables and frames
- To insert a graphic and links within a web page.
- To insert ordered and unordered lists within a web page.

Course Outcomes (COs)

1. Analyze a web page and identify its elements and attributes.
2. Create a HTML page with formatting text tags, tables and lists.
3. Creating a HTML file with Frames.
4. Create web pages using XHTML and Cascading Styles sheets.
5. Build dynamic web pages using JavaScript (client side programming).
6. Create XML documents.

List of programs

1. Using Formatting Tag
2. Implementation of Table Tags
3. Using List Tags
4. Implementation of frames and frame sets
5. XML and XML documents
6. Java script to perform validations
7. Java script to perform calculations

Semester – II

20AEC201 ENVIRONMENTAL STUDIES 3H – 3C

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

Course Objectives

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- To apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- To reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Course Outcomes (COs)

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

Unit I – Introduction - Environmental Studies & Ecosystems

Environment Definition, Scope and importance; Ecosystem, Structure and functions of ecosystem. Energy flow, Food chains and food webs, Ecological succession. Classification of ecosystem. Forest ecosystem, Grassland Ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit II - Natural Resources - Renewable and Non-Renewable Resources

Natural resources - Renewable and Non – Renewable resources. Land resources and land use change, Land degradation, soil erosion and desertification. Forest resources - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water resources - Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water. Use of alternate energy sources, growing energy needs, case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit III - Biodiversity and its Conservation

Levels of biological diversity - genetic, species and ecosystem diversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. Bio-geographical classification of India. Biodiversity patterns (global, National and local levels).

Hot-spots of biodiversity. India as a mega-diversity nation. Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Unit IV - Environmental Pollution

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution. Nuclear hazards and human health risks. Solid waste management and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Case studies.

Unit V - Social Issues and the Environment

Concept of sustainability and sustainable development. Water conservation - Rain water harvesting, watershed management. Climate change, global warming, ozone layer depletion, acid rain and its impacts on human communities and agriculture. Environment Laws (Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act). International agreements (Montreal and Kyoto protocols). Resettlement and rehabilitation of project affected persons. Disaster management (floods, earthquake, cyclones and landslides). Environmental Movements (Chipko, Silent valley, Bishnois of Rajasthan). Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi). Human population growth: Impacts on environment, human health and welfare.

Suggested Readings

1. Anonymous. 2004. A text book for Environmental Studies, University Grants Commission and Bharat Vidypeeth Institute of Environmental Education Research, New Delhi.
2. Anubha Kaushik., and Kaushik, C.P. 2004. Perspectives in Environmental Studies. New Age International Pvt. Ltd. Publications, New Delhi.
3. Arvind Kumar. 2004. A Textbook of Environmental Science. APH Publishing Corporation, New Delhi.
4. Daniel, B. Botkin., and Edward, A. Keller. 1995. Environmental Science John Wiley and Sons, Inc., New York.
5. Mishra, D.D. 2010. Fundamental Concepts in Environmental Studies. S.Chand & Company Pvt. Ltd., New Delhi.
6. Odum, E.P., Odum, H.T. and Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
7. Rajagopalan, R. 2016. Environmental Studies: From Crisis to Cure, Oxford University Press.
8. Sing, J.S., Sing. S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand & Publishing Company, New Delhi.
9. Singh, M.P., Singh, B.S., and Soma, S. Dey. 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, New Delhi.
10. Tripathy. S.N., and Sunakar Panda. (2004). Fundamentals of Environmental Studies (2nd ed.). Vrianda Publications Private Ltd, New Delhi.
11. Verma, P.S., and Agarwal V.K. 2001. Environmental Biology (Principles of Ecology). S. Chand and Company Ltd, New Delhi.
12. Uberoi, N.K. 2005. Environmental Studies. Excel Books Publications, New Delhi.

20CGU301**DATA STRUCTURES****Semester – III
4H – 4C**

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

Course Objectives

- To understand the fundamental concepts of data structures
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand and apply sorting, searching algorithms
- To know about hashing algorithms
- To develop application using data structures

Course Outcomes (COs)

Upon completion of this course, the student will be able to:

1. Implement abstract data types for linear data structures.
2. Apply the different linear and non-linear data structures to problem solutions.
3. Analyze the applications of tree.
4. Implement graph theory over various data structures.
5. Critically analyze the various sorting algorithms.
6. Apply searching algorithms over various data structures.

Unit I

Abstract Data Types– List – array-based implementation – linked list implementation — singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

Unit II

StackIntroduction– Operations – Applications – Evaluating arithmetic expressions- Conversion of Infix to postfix expression – **Queue**Introduction – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.

Unit III

Tree – Introduction-Tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – B+ Tree – Heap – Applications of heap.

Unit IV

GraphsDefinition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

Unit V

Searching- Linear Search – Binary Search. **Sorting** – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort-Heap Sort-Quick Sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

Suggested Readings

1. R. S. Salaria (2018)-Data Structures and Algorithms using C, Khanna Publishing, Fifth Edition.

2. Reema Thareja, —Data Structures Using C++, Second Edition , Oxford University Press, 2011.
3. Mark Allen Weiss. (2011). Data Structures and Algorithms Analysis in Java (3rd ed.). Pearson Education.
4. Goodrich, M., & Tamassia, R. (2013). Data Structures and Algorithms Analysis in Java (4th ed.). Wiley.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms”, Second Edition, McGraw Hill, 2002.
6. Sartaj Sahni. (2011). Data Structures, Algorithms and applications in C++ (2nd ed.). Universities Press.

Websites

1. http://en.wikipedia.org/wiki/Data_structure
2. <http://www.cs.sunysb.edu/~skiena/214/lectures/>
3. www.amazon.com/Teach-Yourself-Structures-Algorithms

20CGU302**PYTHON PROGRAMMING****Semester – III
4H – 4C**

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

Course Objectives

- To Learn Syntax and Semantics of Python
- To create Functions in Python.
- To Understand the basic logic statements in Python
- To Handle Strings in Python.
- To Understand Lists, Dictionaries in Python.
- To Build GUI applications

Course Outcomes (COs)

Upon completion of this the course students will be able to:

1. Develop algorithmic solutions to simple computational problems
2. Structure simple Python programs for solving problems.
3. Learn to use logical constructs in Python
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries.
6. Read and write data from/to files in Python Programs.

Unit I - ALGORITHMIC PROBLEM SOLVING

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.

Unit II - DATA, EXPRESSIONS, STATEMENTS

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

Unit III -CONTROL FLOW, FUNCTIONS: CONDITIONALS Boolean values and operators, conditional (if), alternative (if-else), chained-conditional (if-else if-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

Unit IV -LISTS, TUPLES, DICTIONARIES

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

Unit V - FILES, MODULES, PACKAGES

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

Suggested Readings

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
4. John V Guttag, "Introduction to Computation and Programming Using Python'', Revised and expanded Edition, MIT Press , 2013

Websites

1. <http://docs.python.org/3/tutorial/index.html>.
2. <http://interactivepython.org/courselib/static/pythonds>.
3. <http://www.ibiblio.org/g2swap/byteofpython/read/>.

20CGU303**VIRTUALIZATION AND CLOUD****Semester – III**
4H – 4C**Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours**Course Objectives**

The objective of this course is

- To understand basic concepts of distributed computing,
- To Provide a good understanding of the concepts, standards in Cloud computing
- To make the student understand about the cloud service providers and their usage.
- To learn how to secure the data in cloud depending.
- To understand the various service level agreements.
- Understand the basic principles of Cloud Computing, Virtualization and Data centers

Course Outcomes(COs)

After successfully completing the course the students should be able to

1. Understand what is Cloud Computing.
2. Know the architecture of the cloud and the usage of clouds.
3. Secure their data from the security issues.
4. Understand What is Virtualization.
5. Understand Cloud Types and Cloud Service Deployment Models (IaaS*, PaaS*, SaaS*).
6. Learn How to Create Virtual Machines (VM) using vSphere.

Unit I - DISTRIBUTED SYSTEMS

Distribute a system - Distributed algorithm - Distributed Data Stores - Distributed Computing - File Systems - Distributed Messaging - Distributed Applications – Distributed Transaction - Parallel and distributed computing - Applications.

Unit II - CLOUD CONCEPTS

Introduction Cloud Computing - Advantages of Cloud - Public Cloud - five essential characteristics - three service models - Four deployment models - Benefits of Cloud Computing - Cloud Vendors - Traditional Infrastructure setup and Challenges – AWS.

Unit III - VIRTUALIZATION

Introduction to vSphere and the Software - Defined Data Center Creating Virtual Machines - VCenter Server - Configuring and Managing - Virtual Networks Configuring and Managing Virtual Storage - Virtual Machine Management - Resource Management and Monitoring.

Unit IV - VIRTUAL MACHINES

vSphere HA - vSphere Fault Tolerance - Protecting Data vSphere DRS - Network Scalability - vSphere Update Manager and Host Maintenance - Storage Scalability - Securing Virtual Machines.

Unit V - DATACENTER

Data center overview -Components - Provisions - Need of Data Center - Data Center Architecture - Different Racks - Data center architecture for cloud computing - role of data center in cloud computing.

Suggested Readings

1. Jean Dollimore formerly of Queen Mary, Tim Kindberg, “Distributed Systems Concepts and Design”, 5th Edition Cambridge University, University of London
2. VenkataJosyula , Malcolm Orr , Greg Page, “Cloud Computing: Automating the Virtualized Data Center”, 1st Edition.
3. Brian J.S. Chee, Curtis Franklin Jr., “Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center”, 1st Edition.

Websites

1. https://www.ibm.com/support/knowledgecenter/en/SSAL2T_8.2.0/com.ibm.cics.tx.doc/concepts/c_wht_is_dists_comptg.html
2. <https://www.w3schools.in/cloud-computing/cloud-virtualization/>
3. <http://www.vmwarearena.com/what-is-vmware-vsphere-beginners-guide-to-vmware-virtualization/>
4. <https://aws.amazon.com/getting-started/tutorials/>

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

Course Objectives

The objective of this course is to

- To learn the installation and configuration process for System Center 2012 R2 Operations Manager standard and DataCenter features,
- To acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.
- To design and provision custom views to relevant support teams.
- To understand how to deploy agents
- To Work with management packs
- To Create dashboards and custom visualizations

Course Outcomes (COs)

After successfully completing the course the students should be able to

1. Install a new System Center 2012 Operations Manager Management Group
2. Design and provision custom views to relevant support teams.
3. Understand how to deploy agents
4. Work with management packs
5. Create dashboards and custom visualizations
6. Tune, optimize, maintain and troubleshoot System Center Operations Manager

Unit I - INTRODUCING WINDOWS 10

Overview of Deploying Windows 10- Configure Devices and Drivers- Perform Post installation Configuration Task- Managing Apps in Window.

Unit II- MS SCCM Basics

Overview of System Center 2012 R2 Configuration Manager-Planning and Deploying a Stand-Alone Primary Site- Planning and Configuring Role-Based Administration- Planning and Deploying a Multiple-Site Hierarchy- Replicating Data and Managing Content in Configuration Manager 2012-Planning Resource Discovery and Client Deployment- Configuring Internet and Cloud-Based Client Management- Maintaining and Monitoring System Center 2012 Configuration Manager.

Unit III - OVERVIEW OF SYSTEM CENTER 2012 R2 OPERATIONS MANAGER

Operations Manager Introduction and Basic Concepts- Reason to use Operations Manager- What's New in 2012 R2 Operations Manager- System Requirements- Operations Manager Components. Planning & Installation: Deployment Scenarios-Order of Installation- Installation Process- SQL Server Configuration- Operations Console- Web Console.

Unit IV - ADMINISTRATION

Agent Deployment- Security of manual agent- Agent and Agent less managed systems-Role Based Security- Reporting server- Object Discovery. Management Packs: Management Pack Overview- Pre-Installed Management Packs- Importing Management Packs- Overrides.

Unit V - MONITORING OVERVIEW

Overriding of MPs- Creating Rules and Monitors- Agentless Monitoring- Demo on Role Based Security- Creating Groups- Configuring Notifications. Operations Manager Reporting: Installing SQL Reporting Services- Installing Operations Manager Reporting- Creating, Viewing and Customizing Reports- Dashboard- Considerations for High Availability and Disaster Recovery.

Suggested Readings

1. Kerrie Meyler, Gerry Hampson, "System Center Configuration Manager Current Branch Unleashed System" 1st Edition, 2018.
2. SlawekLigus, "Effective Monitoring and Alerting: For Web Operations" 1st Edition, 2012.

Websites

1. <http://systemcentermvp.com/2017/05/10/operations-manager-basic-concepts-nutshell/>
2. <http://techgenix.com/introduction-system-center-operations-manager-2012-part1/>
3. <https://www.business.com/articles/microsoft-scom-for-beginners/>
4. <https://docs.microsoft.com/en-us/system-center/scom/manage-agentless-monitoring>

20CGU304B**ANDROID PROGRAMMING****Semester – III
3H – 3C****Instruction Hours / week: L: 3 T: 0 P: 0****Marks: Internal: 40 External: 60 Total: 100****End Semester Exam: 3 Hours****Course Objectives**

- To compare the differences between Android and other mobile development environments.
- To learn the Object-oriented features of Kotlin and APIs for Android Development.
- To describe the working of Android applications, life cycle, manifest, and Intents
- To demonstrate the implementation of Form widgets for Android App development.
- To learn the SQLite database connectivity and database operations with android
- To design and develop useful Android applications with compelling user. interfaces .by using, extending, and creating your own layouts and Views and using Menus.

Course Outcomes (Cos)

Upon completion of this course the students will be able to:

1. Analyze the Architecture and features of Android with another Mobile Operating System.
2. Evaluate the standard of Kotlin language for developing Android Applications
3. Apply knowledge for creating user Interface and develop activity for Android App.
4. Evaluate the user interface architecture of Android for developing Android Apps
5. Understand the implementation of SQLite database operations with Android.
6. Design and implement Database Application and Content providers.

Unit I -Introduction

History of Android, Introduction to Android Operating Systems-Android Development Tools-Android Debug Bridge-Android Software Development Kit-Android Virtual Device- Android Architecture-Comparison between Android and Apple IOS

Unit II -OOPs Concepts of Kotlin Language

- Inheritance-Polymorphism-Interfaces- Abstract class-Threads- Overloading and Overriding-Exception Handling- Kotlin APIs for Android

Unit III -Creating a Hello World project

Role of XML in Android Development -Working with the AndroidManifest.xml -Features of Android Eclipse and Android Studio -Android Services - Android Service lifecycle – Android Foreground service -Android Background service

Unit IV -User Interface Architecture of Android

Application context- intents- Activity life cycle- Fragment Life Cycle. **User Interface Design:** Layout Manager- Form widgets- Text Fields- Layouts- Button control- toggle buttons- Spinners (Combo boxes)-Images- Menus-Dialog

Unit V -Introduction to SQLite database

Connecting SQLite with Android-SQLite Data Types-Cursors and content values-SQLite Open Helper-Adding- Updating and Deleting Content using SQLite Database

Suggested readings

1. Peter Spath (2019). Learn Kotlin for Android Development, APress Publications

2. James C. Sheusi, (2013). Android application development for Java programmers, Cengage Learning.

Websites

1. <http://www.developer.android.com>
2. <http://developer.android.com/about/versions/index.html>
3. <http://developer.android.com/training/basics/firstapp/index.html>
4. <http://developer.android.com/guide/components/activities.html>
5. <http://developer.android.com/guide/components/fundamentals.html>
6. <http://developer.android.com/guide/components/intents-filters.html>
7. <http://developer.android.com/training/multiscreen/screensizes.html>
8. <http://developer.android.com/guide/topics/ui/controls.html>
9. <http://developer.android.com/guide/topics/ui/declaring-layout.html>
10. <http://developer.android.com/training/basics/data-storage/databases.html>
11. <https://nptel.ac.in/courses/106106156/>
12. <http://172.16.13.33/course/view.php?id=606>

20CGU311**DATA STRUCTURES - PRACTICAL****Semester – II
4H – 2C**

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

Course Objectives

- To understand the fundamental concepts of data structures
- To Learn linear data structures – lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms
- To develop application using data structures
- To choose appropriate data structures and algorithms for problem solving.

Course Outcomes (COs)

Upon completion of this course, the student will be able to:

1. Implement abstract data types for linear data structures.
2. Apply the different linear and non-linear data structures to problem solutions.
3. Analyze the applications of tree.
4. Implement graph theory over various data structures.
5. Critically analyze the various sorting algorithms.
6. Apply hashing technique for various applications.

List of Programs

1. Write a program to search an element from a list. Give user the option to perform Linear and Binary search.
2. Give user the option to perform sorting using Insertion sort, Bubble sort and Selection sort.
3. Implement singly Linked List Include functions for insertion, deletion and search of a number, reverse the list.
5. Perform Stack operations using Linked List implementation.
6. Perform Stack operations using Array implementation.
7. Perform Queues operations using Array implementation.
7. Perform Queues operations using Linked List.
8. WAP to scan a polynomial using linked list and add two polynomial.
9. WAP to create a Binary Search Tree and include following operations in tree:
 - (a) Insertion
 - (b) Deletion
 - (c) Search a no. in BST
10. Program to implement Graph Traversal Techniques.

Suggested Readings

1. R. S. Salaria (Author)-Data Structures and Algorithms using C, Khanna Publishing, Fifth Edition - 2018
2. Reema Thareja, —Data Structures Using C++, Second Edition , Oxford University Press, 2011
3. Mark Allen Weiss. (2011). Data Structures and Algorithms Analysis in Java (3rd ed.). Pearson Education.
4. Goodrich, M., & Tamassia, R. (2013). Data Structures and Algorithms Analysis in Java (4th ed.). Wiley.
5. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.

6. Sartaj Sahni. (2011). Data Structures, Algorithms and applications in C++(2nd ed.). Universities Press.

Websites

1. http://en.wikipedia.org/wiki/Data_structure
2. <http://www.cs.sunysb.edu/~skiena/214/lectures/>
3. www.amazon.com/Teach-Yourself-Structures-Algorithms

20CGU312**PYTHON PROGRAMMINGLAB****Semester – III
4H – 2C**

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

- To Learn Syntax and Semantics of Python
- To create Functions in Python.
- To Understand the basic logic statements in Python
- To Handle Strings in Python.
- To Understand Lists, Dictionaries in Python.
- To Build GUI applications

Course Outcomes (COs)

Upon completion of this the course students will be able to:

1. Develop algorithmic solutions to simple computational problems
2. Structure simple Python programs for solving problems.
3. Learn to use logical constructs in Python
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries.
6. Read and write data from/to files in Python Programs.

List of programs

1. Find the maximum of a list of numbers
2. Linear search and Binary search
3. Selection sort, Insertion sort
4. Merge sort
5. First n prime numbers
6. Multiply matrices
7. Programs that take command line arguments (word count)
8. Find the most frequent words in a text read from a file
9. Simulate elliptical orbits in Pygame
10. Simulate bouncing ball using Pygame

20CGU313
4H – 2C**VIRTUALIZATION AND CLOUD - PRACTICAL**

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

The objective of this course is

- To understand basic concepts of distributed computing,
- To Provide a good understanding of the concepts, standards in Cloud computing
- To make the student understand about the cloud service providers and their usage.
- To learn how to secure the data in cloud depending.
- To understand the various service level agreements.
- Understand the basic principles of Cloud Computing, Virtualization and Data centers

Course Outcomes(COs)

After successfully completing the course the students should be able to

1. Understand what is Cloud Computing.
2. Know the architecture of the cloud and the usage of clouds.
3. Secure their data from the security issues.
4. Understand What is Virtualization.
5. Understand Cloud Types and Cloud Service Deployment Models (IaaS*, PaaS*, SaaS*).
6. Learn How to Create Virtual Machines (VM) using vSphere.

List of programs

1. Working with hypervisors
2. Creating account in AWS
3. Exploring AWS services like storage, machine image, pricing models, data bases

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

Course Objectives

The objective of this course is to

- To learn the installation and configuration process for System Center 2012 R2 Operations Manager standard and DataCenter features,
- To acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.
- To design and provision custom views to relevant support teams.
- To understand how to deploy agents
- To Work with management packs
- To Create dashboards and custom visualizations

Course Outcomes (COs)

After successfully completing the course the students should be able to

1. Install a new System Center 2012 Operations Manager Management Group
2. Design and provision custom views to relevant support teams.
3. Understand how to deploy agents
4. Work with management packs
5. Create dashboards and custom visualizations
6. Tune, optimize, maintain and troubleshoot System Center Operations Manager

List of programs

1. Working with SCCM
2. Working with SCOM

**20CGU314B
1C****ANDROID PROGRAMMING - PRACTICAL****Semester – III
3H –**

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

- To compare the differences between Android and other mobile development environments.
- To learn the Object-oriented features of Kotlin and APIs for Android Development.
- To describe the working of Android applications, life cycle, manifest, and Intents
- To demonstrate the implementation of Form widgets for Android App development.
- To learn the SQLite database connectivity and database operations with android
- To design and develop useful Android applications with compelling user. interfaces .by using, extending, and creating your own layouts and Views and using Menus.

Course Outcomes (Cos)

Upon completion of this course the students will be able to:

1. Analyze the Architecture and features of Android with another Mobile Operating System.
2. Evaluate the standard of Kotlin language for developing Android Applications
3. Apply knowledge for creating user Interface and develop activity for Android App.
4. Evaluate the user interface architecture of Android for developing Android Apps
5. Understand the implementation of SQLite database operations with Android.
6. Design and implement Database Application and Content providers.

List of Programs

1. Create an Android Application for implementing Button control.
2. Create an android program for implementing progress bar control.
3. Create an Android application for creating login page for checking Loginid and Password
4. Create an Android application for implementing Spinner control in Android Application
5. Create an Android application for implementing context menu.
6. Create an Android Application with list of any three courses in your college and on selecting a particular course HoD of that course should appear at the bottom of the screen.
7. Create an Android application with three option buttons with three color names and When the particular color is selected, the background color of the App should change.
8. Create an Android Application for drawing any image on screen
9. Create an Android application for implementing date picker control.
10. Create an Android application for creating sub menu.

Suggested readings

1. John Horton, Android Programming for Beginners, 2015, Packt Publishing Ltd
2. John Horton, Android Programming with Kotlin for Beginners, 2019, Packt Publishing Ltd
3. James C. Sheusi, (2013). Android application development for Java for Java programmers, Cengage Learning.

Websites

1. <http://www.developer.android.com>
2. <http://developer.android.com/about/versions/index.html>
3. <http://developer.android.com/training/basics/firstapp/index.html>
4. <http://developer.android.com/guide/components/activities.html>

5. <http://developer.android.com/guide/components/fundamentals.html>
6. <http://developer.android.com/guide/components/intents-filters.html>.
7. <http://developer.android.com/training/multiscreen/screensizes.html>
8. <http://developer.android.com/guide/topics/ui/controls.html>
9. <http://developer.android.com/guide/topics/ui/declaring-layout.html>
10. <http://developer.android.com/training/basics/data-storage/databases.html>

20CGU401**PROGRAMMING IN JAVA****Semester – IV
4H – 4C**

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

Course Objectives

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

Upon completion of this course the student will be able to:

1. Obtain knowledge of the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Use the certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

Unit I - Introduction to Java

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting.

Unit II - Arrays, Strings and I/O

Object-Oriented Programming Overview Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection-Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

Unit III - Inheritance

Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes.

Unit IV - Exception Handling and Database Connectivity

Exception types, uncaught exceptions, throw, built-in exceptions, creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Accessing and manipulating databases using JDBC.

Unit V – Java GUI Programming using Swing

Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts.

Suggested Readings

1. Herbert Schildt, Java the Complete Reference, 8th Edition.
2. ISRD Group, Introduction to object oriented programming through Java.
3. James Gosling, Bill Joy, Guy L Steele Jr, Gilad Bracha, Alex Buckley, 2014, The Java Language Specification, Java SE 8th Edition (Java Series), Published by Addison Wesley.
4. Joshua Bloch, 2008, Effective Java, 2nd Edition, Publisher: Addison-Wesley.
5. Cay S. Horstmann, Gary Cornell, 2012, Core Java 2 Volume 1 ,9th Edition, Printice Hall.
6. Cay S. Horstmann, Gary Cornell, 2013,Core Java 2 Volume 2 - Advanced Features, 9th Edition, Printice Hall.
7. Bruce Eckel, 2002, Thinking in Java, 3rd Edition, PHI.
8. E. Balaguruswamy, 2009, Programming with Java, 4th Edition, McGraw Hill.
9. Paul Deitel, Harvey Deitel, 2011, Java: How to Program, 10th Edition, Prentice Hall.
10. David J. Eck, 2009, Introduction to Programming Using Java, Published by CreateSpace Independent Publishing Platform.
11. John R. Hubbard, 2004, Programming with JAVA, Schaum's Series, 2nd Edition.
12. Ken Arnold, James Gosling, David Homes, 2005, The Java Programming Language, 4th Edition.

Websites

1. <https://docs.oracle.com/java>
2. <https://www.tutorialspoint.com/java/index.htm>
3. <https://www.w3schools.com/java/>
4. <https://www.javatpoint.com/java-tutorial>
5. <https://docs.oracle.com/javase/tutorial/java/index.html>
6. <https://www.geeksforgeeks.org/java-tutorials/>

NPTEL

7. <https://nptel.ac.in/courses/106105191/>

LMS

8. <http://172.16.25.76/course/view.php?id=1827>

20CGU402**DATABASE MANAGEMENT SYSTEM****Semester – IV
4H – 4C**

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

Course Objectives

- To understand the role and nature of relational database management systems (RDBMS) in today's IT environment.
- To understand need for normalization.
- To convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL).
- Query and manipulate databases using the SQL Data Manipulation Language (DML).
- To acquire Programming and Software Engineering skills and techniques using SQL and PL/SQL.
- To create PL/SQL applications.

Course Outcomes(COs)

1. Enhance the knowledge and understanding of Database analysis and design.
2. Enhance the knowledge of the processes of Database Development and Administration using SQL and PL/SQL.
3. Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL.
4. Use the PL/SQL code constructs of IF-THEN-ELSE and LOOP types as well as syntax and command functions.
5. Solve Database problems using Oracle SQL and PL/SQL.
6. Effectiveness of Procedures, Functions, Packages, and Triggers.

Unit I- DATABASE CONCEPTS-A RELATIONAL APPROACH

Database - Relationships - DBMS - Relational data model - Integrity rules - Theoretical relational languages. **Database Design:** Data modeling -Dependency - Database design - Normal forms - Dependency diagrams - Denormalization

UnitII -STRUCTURED QUERY LANGUAGE (SQL)

Introduction – DDL – Naming rules and conventions – Data types-Constraints- Creating a table- Displaying table information - Altering an existing table – Dropping, renaming, and truncating table - Table types

Unit III -WORKING WITH TABLES

DML - Adding a new Row/Record - Customized prompts - Updating and deleting an existing rows/records - Retrieving data from table - Arithmetic operations - Restricting data with WHERE clause - Sorting - Substitution variables - DEFINE command - CASE structure. **Functions and Grouping:** Built-in functions - Grouping data. **Joins and Views:** Join - join types-**Views:** Views - Creating a view - Removing a view - Altering a view

Unit IV- PL/SQL

Fundamentals - Block structure - comments - Data types – Other data types - Variable declaration - Assignment operation - Bind variables - Substitution variables - Printing.

Control Structures and Embedded SQL: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - Transaction control statements

Unit V-PL/SQL CURSORS AND EXCEPTIONS

Cursors - Implicit & explicit cursors and attributes - cursor FOR loops - SELECT...FOR UPDATE - WHERE CURRENT OF Clause - cursor with parameters - Cursor variables - Exceptions - Types of exceptions - Records - Tables -Procedures -Functions-Triggers

Suggested Readings

1. Nilesh Shah, “Database Systems Using ORACLE”, PHI, 2nd Edition, 2011

Websites

1. <https://www.datanamic.com/support/lt-dez005-introduction-db-modeling.html>
2. https://docs.oracle.com/cd/B12037_01/server.101/b10759/statements_1001.htm
3. <https://www.geeksforgeeks.org/sql-ddl-dml-dcl-tcl-commands/>
4. <https://www.javatpoint.com/oracle-create-table>
5. <https://www.tutorialspoint.com/plsql/>

20CGU403 COGNITION AND PROBLEM SOLVING**Semester – IV
4H – 4C****Instruction Hours / week: L: 4 T: 0 P: 0 Marks: Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours****Course Objectives**

- To understand critical thought and its interaction with knowledge
- To understand problem solving and how it uses critical thought to develop solutions to problems
- To explore project based learning as a specific method of problem solving
- To examine design thinking as a sub-set of project based learning and its scaffold process for learning
- To define argumentation and how it employs a critical thought process
- To examine specific methodologies and instruments of application for argumentation

Course Outcomes(COs)

1. The student has basic knowledge of cognitive psychology.
2. The student has knowledge of how human cognition works from attention, sensation, perception, action, language processes, problem solving and thinking to learning and memory.
3. Understand Critical Thought and its interaction with knowledge
4. Understand Problem Solving and how it uses Critical Thought to develop solutions to problems
5. The student has developed a scientific attitude comprising the ability of reflection and logic reasoning.
6. The student has developed an ability of critical thinking including respect for scientific data and ethical values.

Unit I-INTRODUCTION TO COGNITION

Meaning cognitive processes, Development of cognitive psychology: Structuralism, Functionalism, Behaviourism, Memory Research, Gestalt Psychology, Emergence of cognitive psychology, Information Processing, Connectionism, Alternate approaches to cognitive psychology, Research Methods in Cognitive Psychology.

Unit II-PERCEPTUAL PROCESSES

Object Recognition- theories of object recognition, Bottom-Up and Top-Down Processing, Face Perception, Change Blindness. Attention: Divided attention, Selective Attention, Visual attention and Auditory attention. Consciousness: Varieties, Subliminal Perception. Visual Perception "Perceptual Organizational Processes, Multisensory interaction and Integration – Synesthesia, Comparing the senses, Perception and Action.

Unit III-MEMORY

Working Memory: Research on Working Memory, Factors affecting the capacity of working Memory, Baddeley's Working Memory Approach. Long Term Memory: Encoding and Retrieval in Long Term Memory, Autobiographical Memory. Memory Strategies: Practice, Mnemonics using Imagery, Mnemonics using organization, The Multimodal Approach, Improving Prospective Memory. Metacognition :Metamemory, TOT, Metacomprehension.

Unit IV-PROBLEM SOLVING, REASONING AND DECISION MAKING

VUCA World Problem Solving – Types of problem, Understanding the problem, Problem-Solving Approaches, Factors that influence Problem Solving. Creativity. Reasoning – Inductive and Deductive Reasoning Decision Making – Heuristics in decision making – representativeness, availability and Anchoring and adjustment. The framing effect, Overconfidence in decisions, The Hindsight Bias.

Unit V-FUTURE SKILLS

Critical thinking, Adaptive thinking, Cognitive Load Management, Design thinking, Virtual Collaboration and Cultural Sensitivity

Suggested Readings

1. Matlin M.W. (2003) 'Cognition' 5th Edition, Wiley Publication.
2. Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology – Applying the Science of Mind. 2nd Edition, Pearson Education.
3. Benjafield J G (2007). 'Cognition' 3rd Edition. Oxford University Press.
4. Goldstein B.E.(2008) 'Cognitive Psychology' 2nd Edition, Wadsworth.

Websites

1. <https://nptel.ac.in/courses/109103134/23>
2. <https://lockwoodresource.com/problem-solving-in-a-vuca-world-what-kind-of-problem-are-you-solving-by-lisa-solomon/>
3. <https://www.instructionaldesign.org/theories/cognitive-load/>

20CGU404A**PROCESS MANAGEMENT****Semester – IV
3H – 3C**

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

Course Objectives

- To provide students with a theoretical as well as practical understanding of software development practices and process models
- To understand Agile development and testing in Scrum.
- To acquire knowledge about Devops principles
- To learn to use Lean UX.
- To learn the basics of Sprint
- To understand Design Thinking principles

Course Outcomes (COs)

After successfully completing the course the students should be able to

- Have practical understanding of software development practices and process models
- Understand Agile development and testing in Scrum.
- Understand about Devops principles
- Learn to use Lean UX, Sprint
- Differentiate Devops and Agile principles
- Usage of Scrum and design thinking principles for software development

Unit I - SOFTWARE AND SOFTWARE ENGINEERING

The Nature of Software –The Unique Nature of WebApps-Software Engineering- Software Process-Software Engineering Practice-Software Myths. Software Process Model: A Generic Process Model- Process Assessment and Improvement –Perspective Process Models-Specialized Process Model-The Unified Process.

Unit II - AGILE

Agile Methodology-Manifesto-Principles of Agile-Agile Methodologies-Challenges with Agile. Scrum: Overview of Scrum-Scrum Roles-Scrum Ceremonies-Scrum Artifacts-Extreme programming vs Scrum.

Unit III - DEVOPS

Introduction to Devops-Principles-Automation-Performance Measurement through KPIS and Metrics-Agile and Devops-Agile Infrastructure-Velocity-Lean Startup UPS.

Unit IV - LEAN UX AND AGILE ANTI-PATTERNS

Sprint -Staggered sprints -Sprint zero and design sprints- Dual-track Agile- Listening to Scrum's rhythms- Listening to Scrum's rhythms- Participation- Design is a team sport- Coordinating multiple Lean UX teams- Managing up and out – Agile anti-patterns.

Unit V- DESIGN THINKING

Introduction to Design Thinking – Lean thinking - Actionable Strategy- The Problem with Complexity - Vision and Strategy - Defining Actionable Strategy Act to Learn - Leading Teams to Win.

Suggested Readings

1. Roger S Pressman, “Software Engineering APractitioners Approach”, 7th Edition 2010
2. KalloriVikraman, “Introduction to Devops”, 1st Edition, 2016.
3. Stephen Haunts, “Essential of Scrum” Addison-Wesley Professional; 1st Edition, 2012
4. Jeff Gothelf, Josh Seiden, “Lean UX”, 2nd Edition, 2016.
5. Jonny Schneider, “Understanding Design Thinking, Lean, and Agile” O’Reilly Media 2017.
6. Jeff Gothelf , "Lean vs. Agile vs. Design Thinking", Sense and Respond Press,2017.

Websites

1. https://www.tutorialspoint.com/sdlc/sdlc_overview.htm
2. <https://existek.com/blog/sdlc-models/>
3. <https://www.agilealliance.org/agile101/>
4. <https://devops.com/>
5. <http://theleanstartup.com/principles>

20CGU404B	PROGRAMMING IN MATLAB	Semester – IV 3H – 3C
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Instruction Hours / week: L: 3 T: 0 P: 0 **Marks: Internal: 40 External: 60 Total: 100**
End Semester Exam: 3 Hours

Course Objectives

- To understand the need for simulation/implementation for the verification of mathematical functions.
- To understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
- To implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
- To interpret and visualize simple mathematical functions and operations thereon using plots/display.
- To analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.
- To apply MATLAB tools for implementation/simulation and visualization of basic mathematical functions

Course Outcomes (Cos)

On successful completion of the course, the students should be able to

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.
6. Apply MATLAB tools for implementation/simulation and visualization of basic mathematical functions

UnitI- INTRODUCTION TO PROGRAMMING

Components of a computer, working with numbers, Machine code, Software hierarchy.

UnitII- PROGRAMMING ENVIRONMENT

MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement, Arrays.

UnitIII- GRAPH PLOTS

Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. Procedures and Functions: Arguments and return values, M-files, Formatted console input-output, String handling,

UnitIV- CONTROL STATEMENTS

Conditional statements: If, Else, Else-if, Repetition statements: While, for loop

UnitV- MANIPULATING TEXT

Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list.

GUI Interface: Attaching buttons to actions, Getting Input, Setting Output

Suggested Readings

1. Amos Gilat. MATLAB: An Introduction with Applications(2nd ed). New Delhi: Wiley.
2. Moler,C.B.(2004). Numerical Computing with MATLAB.NewDelhi:SIAM.

Websites

1. <https://www.mathworks.in/help/matlab/>
2. <https://www.tutorialspoint.com/matlab/>
3. <http://www.matrixlab-examples.com/matlab-tutorial.html>

20CGU411
4H – 2C**PROGRAMMING IN JAVA - PRACTICAL**

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

- To understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.
- To understand the fundamental of Exception Handling and AWT component and AWT classes.

Course Outcomes (COs)

1. Student will obtain knowledge of the structure and model of the Java programming language.
2. How to use the Java programming language for various programming technologies (understanding)
3. Develop software in the Java programming language (application)
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements (analysis)
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem (synthesis)
6. Choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems. (evaluation)

List of Programs

1. To convert a decimal to binary number
2. Write a program to find the sum of series $1+x+x^2+x^3+\dots$
3. To find the sum of any number of integers entered as command line arguments
4. To learn use of single dimensional array by defining the array dynamically.
5. Write a program to find maximum and sum of an array
6. Write a Program to generate Fibonacci Series and Factorial for a number
7. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions (from lower to higher data type)
8. Write a program to an exception out of bounds, if mark is greater than 100 throw an exception
9. Write a program —DivideByZero|| that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
10. Write a program to generate multiplication table by multithreading
11. Write a program to demonstrate priorities among multiple threads

12. Write a program to perform string operations

Suggested Readings

1. Herbert Schildt, 2014, Java Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.
2. ISRD Group, 2007, Introduction to Object Oriented Programming through Java, 1st Edition, Tata McGraw Hill, New Delhi
3. Deitel H.M. and P.J.Deitel, 2005, Java-How to Program, 6th Edition, Pearson Education, New Delhi.
4. Dr.S Somasundaram, 2004, Java Programming, 1st Edition, Techmedia. New Delhi.
5. E.Balagurusamy, 2010, Programming with Java – A Primer, 4th Edition, Tata McGraw Hill, New Delhi.

Web Sites

1. www.java.sun.com
2. www.knking.com
3. www.webdeveloper.com
4. www.forums.sun.com
5. www.netbeans.com
6. java.sun.com/docs/books/tutorial/
7. www.java.net/

Semester – IV**20CGU412
4H – 2C****DATABASE MANAGEMENT SYSTEM - PRACTICAL**

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

- To understand the role and nature of relational database management systems (RDBMS) in today's IT environment.
- To understand need for normalization.
- To convert conceptual data models into relational database schemas using the SQL Data Definition Language (DDL).
- Query and manipulate databases using the SQL Data Manipulation Language (DML).
- To acquire Programming and Software Engineering skills and techniques using SQL and PL/SQL.
- To create PL/SQL applications.

Course Outcomes(COs)

1. Enhance the knowledge and understanding of Database analysis and design.
2. Enhance the knowledge of the processes of Database Development and Administration using SQL and PL/SQL.
3. Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL.
4. Use the PL/SQL code constructs of IF-THEN-ELSE and LOOP types as well as syntax and command functions.
5. Solve Database problems using Oracle SQL and PL/SQL.
6. Effective use of Procedures, Functions, Packages, and Triggers.

List of programs

1. Using Different operators
2. using Control Structures
3. implement Built-in functions
4. implement update and Alter table
5. implementing PL/SQL Block
6. implement PL/SQL table and record
7. using Functions
8. using Cursors
9. using Triggers

Semester – IV**20CGU413 STATISTICAL ANALYSIS - R PROGRAMMING - PRACTICAL 4H – 2C**

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

Course Objectives :

Upon successful completion of this course, students will be able to:

- To acquire the computing tasks such as using conditional processing statements, loops, and writing one's own functions.
- To perform advanced graphing of data and statistical modeling of data.
- To use statistical distribution functions in R
- To read Structured Data into R from various sources
- To understand split-apply-combine (group-wise operations) in R
- To perform basic statistical modeling of data using R

Course Outcome:

1. Learn how to install and configure software necessary for a statistical programming environment.
2. Discuss generic programming language concepts as they are implemented in a high-level statistical language.
3. The course covers practical issues in statistical computing which includes programming in R, reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code.
4. Import external data into R for data processing and statistical analysis
5. Learn the main R data structures – vector and data frame
6. Design and develop R applications for data analytics.

List of Programs:

1. Write a program to demonstrate functions and operators
2. **Vectors:** Grouping values into vectors, then doing arithmetic and graphs with them
3. **Matrices:** Creating and graphing two-dimensional data sets
4. **Summary Statistics:** Calculating and plotting some basic statistics: mean, median, and standard deviation
5. **Factors:** Creating and plotting categorized data
6. **Data Frames:** Organizing values into data frames, loading frames from files and merging them
7. Write a program to design R as a calculator
8. Write a program to demonstrate Probability distributions
9. Write a program to demonstrate Importing and exporting data
10. Write a program to Establish a Regression

Suggested Readings

1. Daniel Navarro,(2013). *Learning Statistics with R*. University of Adelaide Publications.
2. Garrett Grolemond and Hadley Wickham (2016). *R for Data Science*
3. Hadley Wickham, (2014). *Advanced R Programming*, (1st ed.)
4. Jeffrey Stanton,(2013). *Introduction to Data Science, with Introduction to R*, Version3 ,
5. Roger.D.Peng, (2015). *R Programming for Data Science*

Websites

1. <https://www.r-project.org/>
2. <https://www.datamentor.io/r-programming/>
3. https://www.datacamp.com/courses/free-introduction-to-r?utm_
4. <https://www.coursera.org/learn/r-programming>
5. <https://172.16.25.76/Course/View.php?id = 2216>
6. <https://nptel.ac.in/courses/111104100/>
7. https://nptel.ac.in/content/syllabus_pdf/111104100.pdf
8. <https://www.edx.org/learn/r-programming>

20CGU414A
1C**DEVOPS TOOLS - PRACTICAL****Semester – IV**
3H –

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

- To provide students with a theoretical as well as practical understanding of software development practices and process models
- To learn to use Apache Maven.
- To acquire knowledge about Nexus Artifacts
- To build and test your software projects with Jenkins
- To setup LAMP
- To learn to use Docker.

Course Outcomes (COs)

After successfully completing the course the students should be able to

1. practical understanding of software development practices and process models
2. Device revision control systems using Apache Maven
3. To build and test your software projects with Jenkins, Nexus Artifacts
4. Setup LAMP in Linux environment
5. Setup and use Docker
6. Monitoring the system

List of programs

Introduction to DevOps – Tools and settings

1. Revision Controls System
2. Configuration Management
3. Build Automation -Introduction with Maven
4. Nexus Artifacts/Proxy Tool
5. Jenkins Framework
6. LAMP Setup
7. Working with Docker
8. System Monitoring

20CGU414B
1C**PROGRAMMING IN MATLAB - PRACTICAL****Semester – IV**
3H –

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

- To understand the need for simulation/implementation for the verification of mathematical functions.
- To understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
- To implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
- To interpret and visualize simple mathematical functions and operations thereon using plots/display.
- To analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.
- To apply MATLAB tools for implementation/simulation and visualization of basic mathematical functions

Course Outcomes (Cos)

On successful completion of the course, the students should be able to

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.
6. Apply MATLAB tools for implementation/simulation and visualization of basic mathematical functions

List of programs

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
 - a. $(3+4)/(5+6)$
 - b. $2\pi^2$
 - c. $\sqrt{2}$
 - d. $(0.0000123 + 5.67 \times 10^{-3}) \times 0.4567 \times 10^{-4}$
2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:

- a. 2, 4, 6, 8, 10
 - b. 1/2, 1, 3/2, 2, 5/2
 - c. 1, 1/2, 1/3, 1/4, 1/5
 - d. 1, 1/4, 1/9, 1/16, 1/25
4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill.
5. The `sortrows(x)` function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The `eye()` function is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with the `eye()` function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is $A*B=I$.
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the 1,4,9,16,...,Nth entries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates :
- $$r_n = \sqrt{n}$$
- $$\theta_n = \frac{137.51}{180} \pi n$$
10. Calculate 10 approximate points from the function $y=2x$ by using the formulae:
- i. $x_n = n$
 - ii. $y_n = 2n + \text{rand} - 0.5$
- Fit a line of best fit to these points using the function `polyfit()` with `degree=1`, and generate co-ordinates from the line of best fit using `polyval()`. Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.
11. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called `ex35.wav`. Plot the first 100 samples.
12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nth harmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called `FtoC` (`ftoc.m`) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with:
- i. `FtoC(96)`
 - ii. `lookfor Fahrenheit`
 - iii. `helpFtoC`

15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:

i. Enter string 1: Mark

ii. Enter string 2: Huckvale

iii. Mark Huckvale

iv. *****

v. elavkcuH kraM

20CGU501	INFORMATION SECURITY AND CYBER LAWS	Semester – V 4H – 4C
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Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours

Course Objectives

- To provide an overview of Information Security and Assurance.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
- To explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
- To understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications
- To understand the various Cyber laws and its sections with case studies.

Course Outcomes(COs)

A student who successfully completes this course should at a minimum be able to:

1. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
2. State the basic concepts in information security
3. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
4. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
5. Understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications
6. Understand the various Cyber laws and its sections with case studies.

Unit I - Course Introduction

Computer network as a threat, hardware vulnerability, software vulnerability, importance of data security.

Digital Crime: Overview of digital crime, criminology of computer crime.

Unit II - Information Gathering Techniques

Tools of the attacker, information and cyber warfare, scanning and spoofing, password cracking, malicious software, session hijacking

Unit III - Risk Analysis And Threat

Risk analysis, process, key principles of conventional computer security, security policies, authentication, data protection, access control, internal vs external threat, security assurance, passwords, authentication, and access control, computer forensics and incident response

Unit IV- Introduction To Cryptography And Applications

Important terms, Threat, Flaw, Vulnerability, Exploit, Attack, Ciphers, Codes, Caesar Cipher, Rail-Fence Cipher, Public key cryptography (Definitions only), Private key cryptography (Definition and Example)

Safety Tools and Issues : Firewalls, logging and intrusion detection systems, Windows and windows XP / NT security, Unix/Linux security, ethics of hacking and cracking

Unit V- Cyber Laws

CYBER LAWS to be covered as per IT 2008:

- Chapter 1: Definitions 88
- Chapter 2: Digital Signature And Electronic Signature
- [Section 43] Penalty and Compensation for damage to computer, computer system, etc.
- [Section 65] Tampering with Computer Source Documents
- [Section 66 A] Punishment for sending offensive messages through communication service, etc.
- [Section 66 B] Punishments for dishonestly receiving stolen computer resource or communication device
- [Section 66C] Punishment for identity theft
- [Section 66D] Punishment for cheating by personation by using computer resource
- [Section 66E] Punishment for violation of privacy
- [Section 66F] Punishment for cyber terrorism
- [Section 67] Punishment for publishing or transmitting obscene material in electronic form
- [Section 67A] Punishment for publishing or transmitting of material containing sexually explicit act, etc. in electronic form
- [Section 67B] Punishment for publishing or transmitting of material depicting children in sexually explicit act, etc. in electronic form
- [Section 72] Breach of confidentiality and privacy

Suggested Readings

1. M. Merkow, J. Breithaupt. 2005. Information Security Principles and Practices. Pearson Education. 2005.
2. G.R.F. Snyder, T. Pardoe. 2010. Network Security. Cengage Learning.
3. A. Basta, W. Halton. 2008. Computer Security: Concepts, Issues and Implementation. Cengage Learning India.
4. Nina Godbole & SUNIT Belapur. (2013) CYBER SECURITY. Wiley India Pvt. Ltd. New Delhi.

Websites

1. <http://www.csc.ncsu.edu/faculty/ning>
2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

20CGU502A INTRODUCTION TO DIGITAL TECHNOLOGY 4H – 4C

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

Course Objectives

- To understand the fundamental concepts of digital technology
- To introduce the concepts of cloud, big data, digital marketing
- To introduce the principles of Artificial Intelligence, Block chain technology
- To recognize the use of Digital technology in various Industries
- To understand the principles of Automatrix, Automation Anywhere
- To understand and create Bots

Course Outcomes (COs)

A student who successfully completes this course should be able to

1. Understand the fundamental concepts of digital technology
2. Comprehend the concepts of cloud, big data, digital marketing
3. Familiarize the principles of Artificial Intelligence, Block chain technology
4. Recognize the use of Digital technology in various Industries
5. Understand the principles of Automatrix, Automation Anywhere
6. Create bots and understand its various types

Unit I - DIGITAL PRIMER

Why is Digital Different? - Digital Metaphors On Cloud 9 - A Small Intro to Big Data - Social Media & Digital Marketing - Artificial Intelligence - Unchain the Block chain - Internet of Everything - Immersive Technology.

Unit II - DIGITAL FOR INDUSTRIES

Manufacturing and Hi-tech - Banking and Financial Services - Insurance and Healthcare - Retail - Travel & Hospitality - Communications, Media & Information Services - Government.

Unit III - AUTOMATIX

Art of RPA - Introduction - Setting the Context - RPA Prelude - RPA Demystified - RPA vs BPM
 RPA Implementations - RPA in Industries - RPA Tools - Automatrix - Art of RPA

Unit IV - AUTOMATION ANYWHERE

Getting Started with AA Enterprise - Exploring AA Enterprise - AA Enterprise – Architecture.

Unit V - Knowing the Bots

More About TaskBots - AA Enterprise - All About Recorders - Designers - MetaBots - Cognitive RPA.

Suggested Readings

1. Richard Murdoch, “Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant”
2. Kelly Wibbenmeyer, “The Simple Implementation Guide to Robotic Process Automation (RPA): How to Best Implement RPA in an Organization”

Websites

1. https://en.wikipedia.org/wiki/Robotic_process_automation
2. [https://en.wikipedia.org/wiki/Automatix_\(software\)](https://en.wikipedia.org/wiki/Automatix_(software))
3. <https://www.automationanywhereuniversity.com/>
4. <https://www.automationanywhere.com/in/products/iq-bot>

20CGU502B**MACHINE LEARNING****Semester – V
4H – 4C**

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

Course Objectives

- To introduce students to the basic concepts and techniques of Machine Learning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study and research.
- To recognize the characteristics of machine learning that make it useful to real-world problems.
- To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
- To effectively use machine learning toolboxes.

Course Outcomes(COs)

On successful completion of the course the student should be

1. Remember the basic concepts and techniques of Machine Learning.
2. Develop skills of using recent machine learning software for solving practical problems.
3. of doing independent study and research.
4. To recognize the characteristics of machine learning that make it useful to real-world problems.
5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
6. To effectively use machine learning toolboxes.

Unit I - Foundations Of Learning

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound – bias and variance – learning curve

Unit II - Linear Models

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – generalization and over fitting – regularization – validation

Unit III - Distance-Based Models

Nearest neighbor models – K-means – clustering around medoids – silhouettes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta silhouettes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

Unit IV - Tree and Rule Models

Decision trees – learning decision trees – ranking and probability estimation trees –Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning

Unit V - Reinforcement Learning

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal - difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

Suggested Readings

1. Tom.M.Mitchell (2017), Machine Learning, Tata McGraw Hill Publications
2. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin. (2012).Learning from Data, AMLBook Publishers.
3. P. Flach. (2012). “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press.
4. K. P. Murphy. (2012). Machine Learning: A probabilistic perspective, MIT Press,
5. D. Barber. (2012). Bayesian Reasoning and Machine Learning, Cambridge University Press.

Web Sites

1. <https://machinelearningmastery.com/linear-regression-for-machine-learning/>
2. <https://www.cambridge.org/core/books/machine-learning/distancebased-models/>
3. <https://dzone.com/articles/machine-learning-with-decision-trees>
4. <http://reinforcementlearning.ai-depot.com/>
5. <https://nptel.ac.in/courses/106106139/>
6. https://swayam.gov.in/nd1_noc19_cs81/preview

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

Course Objectives

- To learn about different type of applications and testing, along with the purpose of automation testing.
- To gain insight into the evolution of Selenium
- To get an overview of Selenium and its components and compare commonly used automation tool with Selenium automation tools.
- Explore the features and use of Selenium-WebDriver
- To record and importing tests with Selenium IDE
- To learn data driven testing using TestNG

Course Outcomes (COs)

1. Understand Selenium Architecture and its components
2. Work with Selenium RC
3. Understand Selenium WebDriver
4. Use WebDriver advanced features e.g. taking screenshots, handling cookies and managing exceptions
5. Create Data driven, Keyword driven and Hybrid test framework
6. Record and importing tests with Selenium IDE and Write Test cases using TestNG

Unit I - INTRODUCTION TO AUTOMATION

Planning before Automation - Introduction to Selenium - Installing Selenium Components.

Unit II - USING SELENIUM IDE

Managing User Interface Controls - Basics of Java- Creating First Selenium Web Driver Script.

Unit III- SELENIUM METHODS

Common Selenium Web Driver Methods - Verification Point in Selenium - Exploring the Features of Web Driver.

Unit IV- HANDLING POP-UP DIALOGS AND MULTIPLE WINDOWS

Working with Dynamic UI Objects- Data driven testing using TestNG - Selenium Functions, Common Questions and Tips.

Unit V - REPORTING IN SELENIUM

Batch Execution- Automation Frameworks - Understanding Selenium Grid.

Suggested Readings

1. AdithyaGarg, Ashish Mishra “A Practitioner’s Guide to Test Automation Using Selenium”, Tata McGraw Hill Education, 2015.

2. NavneeshGarg, “Test Automation Using Selenium WebDriver with Java”, AdactIn Group Pvt Ltd. 2014.
3. SatyaAvasarala, “Selenium Web Driver - PRACTICAL Guide”, Packt Publishing, 2014.
4. Rex Allen Jones II, “Selenium Web Driver for Functional Automation Testing”, Test 4 Success, LLC. 2016.
5. David Burns,” Selenium 1.0 Testing Tools”, Packt Publishing, 2010.

Websites

1. <https://www.seleniumhq.org/docs/>
2. <https://www.javatpoint.com/selenium-tutorial>
3. <https://www.softwaretestingmaterial.com/selenium-tutorial/>

20CGU503B**DATA MINING****Semester – V**
4H – 4C

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

Course Objectives

- To introduce students to the basic concepts and techniques of Data Mining.
- To understand data mining fundamentals and characterize the kinds of patterns that can be discovered by association rule mining
- To compare and evaluate different data mining techniques like classification, prediction, etc.
- To cluster the high dimensional data for better organization of the data
- To describe complex data types with respect to spatial and web mining
- To design data warehouse with dimensional modelling and apply OLAP operations.

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Understand the basic concepts and techniques of Data Mining
2. Extract knowledge using data mining techniques and Implement Preprocess the data for mining applications and apply the association rules for mining the data
3. Design and deploy appropriate classification techniques
4. Understand the concept of clustering and its real time applications
5. Explore recent trends in data mining such as web mining, spatial-temporal mining
6. Analyze the basic concepts of data warehouse and OLAP operations

UNIT I- Introduction

Data mining application - data mining techniques - the future of data mining - data mining software - Association rules mining: basics- task and a naïve algorithm- Apriori algorithm - improve the efficient of the Apriori algorithm - mining frequent pattern without candidate generation (FP-growth) - performance evaluation of algorithms.

UNIT II - Classification

Introduction - decision tree - over fitting and pruning - DT rules- Naive bayes method- estimation predictive accuracy of classification methods - other evaluation criteria for classification method - classification software.

UNIT III - Cluster analysis

cluster analysis - types of data - computing distances-types of cluster analysis methods - partitioned methods - hierarchical methods - density based methods - dealing with large databases - quality and validity of cluster analysis methods - cluster analysis software.

UNIT IV- Web data mining

Introduction- web terminology and characteristics- locality and hierarchy in the web- web content mining-web usage mining- web structure mining - web mining software - Search engines: Search engines functionality- search engines architecture - ranking of web pages.

UNIT V -Data warehousing

Introduction - Operational data sources- data warehousing - Data warehousing design - Guidelines for data warehousing implementation - Data warehousing metadata - Online analytical processing (OLAP): Introduction - OLAP characteristics of OLAP system -

Multidimensional view and data cube - Data cube implementation - Data cube operations OLAP implementation guidelines.

Suggested Readings

1. Steinbach Tan, Kumar, "Introduction to Data Mining", First edition, Pearson Education; 2016.
2. Mohammed J. Zaki, Wagner Meira, Jr. "DataMining and Analysis Fundamental Concepts and Algorithms", Cambridge University Press, May 2014
3. Han, Kamber& Pei, "Data Mining: Concepts and Techniques",Morgan Kaufmann Publisher, Third Edition,2013
4. G.K. Gupta, "Introduction to Data mining with case studies", 2nd Edition, PHI Private limited, New Delhi, 2011.
5. Arun K Pujari, "Data Mining Techniques", 10th impression, University Press, 2008.

Websites

1. www.geeksforgeeks.org
2. www.tutorialride.com
3. www.javatpoint.com
4. <https://nptel.ac.in/courses/106105174/>
5. <http://172.16.25.76/course/view.php?id=100>

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

Course Objectives

- to Acquire knowledge about ServiceNow platform
- To get comprehensive knowledge of ITSM principles and architecture.
- To get acquainted with various features of Service Now platform and tool.
- To use Flows and Workflows for process automation
- To use various script types used throughout the platform
- To capturing and moving configurations between instances, using update sets

Course Outcomes (COs)

1. Task management using assignment rules, presence, and work notes
2. Protecting ServiceNow instance data using Access Control rules
3. Populating the database using import sets
4. Using Flows and Workflows for process automation
5. Various script types used throughout the platform
6. Capturing and moving configurations between instances, using update sets

Unit I - SERVICE NOW INTERMEDIATE LEVEL

Administrator-ServiceNow Introduction-ServiceNow Platform UI ServiceNow ITSM overview- Managing Users, Groups and Roles, departments, companies and Assignment Rules-Tables, Columns, Attributes, Dictionary Entries, Schema Map- Managing Forms, Layouts and Lists- Dictionary Overrides and Simple Reference Qualifiers.

Unit II - SYSTEM PROPERTIES

Incident management - Problem management- Change management- Overview of other ITSM Modules - Overview of other ITSM Modules- SLA Basics-Introduction to Client and Server Side Scripting-server-side scripting - Server Side Glide API -server-side scripting - Server Side Glide API -Server Side script Debugging-Server Side Scripting Best Practices-Business Rules-Client Side APIs-UI Policies and Data Policies-Client Scripts -Client Side script Debugging.

Unit III - CLIENT SCRIPTS & CLIENT GLIDE APIS-BEST PRACTICES

Client-side scripting & policies (UI and Data)-Modularize programming using UI Actions (both Server and Client Side)-Script Include-Glide AJAX-UI Pages and UI Macros-Managing Update Sets-Custom Applications Automated Test Framework –Events-Inbound/Out Bound notifications-Mail Templates and Scripts.

Unit IV - MANAGE WORKFLOWS

Managing Stage Sets -Manage Workflows -Manage Workflows -Flow Designer (Over view)- Service Catalogs, Categories, Items and variables-Manage Execution Plans and workflows-Card Layouts-Client scripts and UI policies-Record Producers-Order Guides & Scriptable Order Guides-Scheduled Jobs. VTB Agent Intelligence (Over View)-Restrict access to applications and application modules-Automatically create application Access Controls -Manually create, test,

and debug Access Controls-Managing ServiceNow imports and exports-Managing Import Sets and Transform Map-Configure and run Reports and Dashboards Security Controls-Database Views.

Unit V - SERVICENOW SERVICE PORTALS OVERVIEW

ServiceNow Service portals core components -Scripting in Service Portal-ITSM Virtual Agent – Overview-Performance Analytics Overview-ServiceNow on Mobile-ServiceNow Integration Overview.

Suggested Readings

1. Tim Woodruff, “Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation”, 2nd Edition, Packt Publishing Ltd., 2018.
2. AshishRudraSrivastava “ServiceNow Cook Book” Packt Publishing Ltd, 2017.
3. Andrew Kindred , “Mastering ServiceNow Scripting” Packt Publishing2018.

Websites

1. <https://www.servicenow.com/products/it-service-management.html>
2. <https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/resource-center/data-sheet/ds-itsm.pdf>
3. <https://www.guru99.com/servicenow-tutorial.html>

Semester – V

20CGU504B INTRODUCTION TO DATA SCIENCE 3H – 3C

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

Course Objective

- To provide an overview of a new language R used for data science.
- To introduce students to the R programming environment and related eco-system and thus provide them with an in-demand skill-set, in both the research and business environments
- To introduce the extended R ecosystem of libraries and packages
- To demonstrate usage of as standard Programming Language.
- To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R
- To enable students to use R to conduct analytics on large real life datasets.

Course Outcomes (COs)

1. Install and use R for simple programming tasks.
2. Extend the functionality of R by using add-on packages
3. Extract data from files and other sources and perform various data manipulation tasks on them.
4. Code statistical functions in R.
5. Use R Graphics and Tables to visualize results of various statistical operations on data.
6. Apply the knowledge of R gained to data Analytics for real life applications.

Unit I - DATA SCIENTIST'S TOOL BOX

Turning data into actionable knowledge, introduction to the tools that will be used in building data analysis software: version control, markdown, git, GitHub, R, and RStudio.

Unit II -R PROGRAMMING BASICS

Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling

Unit III - GETTING AND CLEANING DATA

Obtaining data from the web, from APIs, from databases and from colleagues in various formats. basics of data cleaning and making data —tidy.

Unit IV - EXPLORATORY DATA ANALYSIS

Essential exploratory techniques for summarizing data, applied before formal modeling commences, eliminating or sharpening potential hypotheses about the world that can be addressed by the data, common multivariate statistical techniques used to visualize high-dimensional data.

Unit V- REPRODUCIBLE RESEARCH

Concepts and tools behind reporting modern data analyses in a reproducible manner, To write a document using R markdown, integrate live R code into a literate statistical program, compile R markdown documents using knitr and related tools, and organize a data analysis so that it is reproducible and accessible to others.

Suggested Readings

1. Rachel Schutt., &Cathy O'Neil.(2013). Doing Data Science: Straight Talk from the Frontline. Schroff/O'Reilly.
2. Foster Provost.,&Tom Fawcett.(2013). Data Science for Business What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly.
3. John, W. Foreman. (2013). Data Smart: Using data Science to Transform Information into Insight. John Wiley & Sons.
4. Ian Ayres. (2007). Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart (1st ed.). Bantam.
5. EricSeigel. (2013).PredictiveAnalytics:ThePowertoPredictwhoWillClick,BuyLie,or Die (1sted.). Wiley.
6. Matthew, A. Russel. (2013). Mining the Social Web: Data mining Facebook, Twitter, LinkedIn, Goole+,GitHub, and More (2nd ed.). O'Reilly Media.

Websites

1. <https://www.iqonlinetraining.com/data-science-tutorial/>
2. <https://www.edx.org/course/introduction-to-r-for-data-science-2>
3. <https://www.tutorialspoint.com/r/index.htm>
4. <https://www.w3schools.in/r/>

20CGU511 INFORMATION SECURITY AND CYBER LAWS - PRACTICAL
4H – 2C

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

Course Objectives

- To provide an overview of Information Security and Assurance.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
- To explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
- To understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications
- To use various tools to implement various cryptographic algorithms.

Course Outcomes(COs)

A student who successfully completes this course should at a minimum be able to:

1. Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
2. State the basic concepts in information security
3. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
4. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
5. Understand the concepts of cryptographic utilities and authentication mechanisms to design secure applications
6. Use various tools to implement various cryptographic algorithms.

List of Programs

1. Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
2. Use of Password cracking tools : John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
3. Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
4. Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
5. Use nmap/zenmap to analyse a remote machine.
6. Use Burp proxy to capture and modify the message.
7. Demonstrate sending of a protected word document.
8. Demonstrate sending of a digitally signed document.
9. Demonstrate sending of a protected worksheet.
10. Demonstrate use of steganography tools.
11. Demonstrate use of gpg utility for signing and encrypting purposes.

Suggested Readings

- 1.M. Merkow, J. Breithaupt. 2005. Information Security Principles and Practices. Pearson Education. 2005.
- 2.G.R.F. Snyder, T. Pardoe. 2010. Network Security. Cengage Learning.
- 3.A. Basta, W.Halton. 2008. Computer Security: Concepts, Issues and Implementation. Cengage Learning India.
- 4.Nina Godbole & SUNIT Belapure.(2013) CYBER SECURITY. Wiley India Pvt.Ltd.New Delhi.

Websites

1. <http://www.csc.ncsu.edu/faculty/ning>
2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

20CGU512A INTRODUCTION TO DIGITAL TECHNOLOGY - PRACTICAL 4H – 2C

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

Course Objectives

- To understand the fundamental concepts of digital technology
- To introduce the concepts of cloud, big data, digital marketing
- To introduce the principles of Artificial Intelligence, Block chain technology
- To recognize the use of Digital technology in various Industries
- To understand the principles of Automata, Automation Anywhere
- To understand and create Bots

Course Outcomes (COs)

A student who successfully completes this course should be able to

1. Understand the fundamental concepts of digital technology
2. Comprehend the concepts of cloud, big data, digital marketing
3. Familiarize the principles of Artificial Intelligence, Block chain technology
4. Recognize the use of Digital technology in various Industries
5. Understand the principles of Automata, Automation Anywhere
6. Create bots and understand its various types

List of programs

1. Creating bots for automatic software installation
2. Creating bots for automatic software patch installation
3. Creating bots for file transfer
4. Creating bots for automatic file backup

20CGU512B
4H – 2C**MACHINE LEARNING - PRACTICAL**

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

- To understand the various characteristics of Intelligent agents
- To learn about the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.
- To effectively use machine learning toolboxes to design and develop machine learning applications.

Course Outcomes (Cos)

Upon completion of this course the students will be able to:

1. Identify problems that are amenable to solution by AI methods.
2. Identify appropriate AI methods to solve a given problem.
3. Formalize a given problem in the language/framework of different AI methods.
4. Implement basic AI algorithms.
5. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.
6. To effectively use machine learning toolboxes to design and develop machine learning applications.

List of Programs

1. Perform elementary mathematical operations in Octave/MATLAB like addition, multiplication, division and exponentiation.
2. Perform elementary logical operations in Octave/MATLAB (like OR, AND, Checking for Equality, NOT, XOR).
3. Create, initialize and display simple variables and simple strings and use simple formatting for variable.
4. Create/Define single dimension / multi-dimension arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.
5. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file, store matrix data to a text file, finding out variables and their features in the current Course Objectives.
6. Perform basic operations on matrices (like addition, subtraction, multiplication) and display specific rows or columns of the matrix.
7. Perform other matrix operations like converting matrix data to absolute values, taking the negative of matrix values, adding/removing rows/columns from a matrix, finding the maximum or minimum values in a matrix or in a row/column, and finding the sum of some/all elements in a matrix.
8. Create various type of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further label different axes in a plot and data in a plot.
9. Generate different subplots from a given plot and color plot data.
10. Use conditional statements and different type of loops based on simple example/s.

11. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices.
12. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the estimated price of a given house.
13. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built – predict the price of a house.
14. Implement a classification/ logistic regression problem. For example based on different features of students data, classify, whether a student is suitable for a particular activity. Based on the available dataset, a student can also implement another classification problem like checking whether an email is spam or not.
15. Use some function for regularization of dataset based on problem 14.
16. Use some function for neural networks, like Stochastic Gradient Descent or back propagation - algorithm to predict the value of a variable based on the dataset of problem

Suggested Readings

1. Santanu Chattopadhyaya. (2011). Systems Programming. New Delhi: PHI.
2. Alfred, V. Aho., Monica, S. Lam., RaviSethi., & Jeffrey, D. Ullman. (2006). Compilers: Principles, Techniques, and Tools (2nd ed.). New Delhi: Prentice Hall.
3. Dhamdhere, D. M. (2011). Systems Programming. New Delhi: Tata McGraw Hill.
4. Leland Beck., & Manjula, D. (2008). System Software: An Introduction to System Programming (3rd ed.). New Delhi: Pearson Education.
5. Grune, D., Van Reeuwijk, K., Bal, H. E., Jacobs, C. J. H., & Langendoen, K. (2012). Modern Compiler Design (2nd ed.). Springer.

20CGU513A**SOFTWARE TESTING - PRACTICAL****Semester – V
4H – 2C**

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

- To learn about different type of applications and testing, along with the purpose of automation testing.
- To gain insight into the evolution of Selenium
- To get an overview of Selenium and its components and compare commonly used automation tool with Selenium automation tools.
- Explore the features and use of Selenium-WebDriver
- To record and importing tests with Selenium IDE
- To learn data driven testing using TestNG

Course Outcomes (COs)

1. Understand Selenium Architecture and its components
2. Work with Selenium RC
3. Understand Selenium WebDriver
4. Use WebDriver advanced features e.g. taking screenshots, handling cookies and managing exceptions
5. Create Data driven, Keyword driven and Hybrid test framework
6. Record and importing tests with Selenium IDE and Write Test cases using TestNG

List of programs

1. Write a test case based on controls.
2. Test data in a flat file.
3. Manual test case to verify student grade
4. Write and test a program to select the number of students who have scored more than 60 in any one subject(or all Subjects)
5. Write and test a program to login a specific web page.
6. Write and test a program to get the number of list items in a list / combo box.
7. Test a HTML file.
8. Test a program in MS Excel for Data Driven Wizard.
9. Test the addition of two values in C++ Program.

20CGU513B
2C**DATA MINING - PRACTICAL****Semester – V**
4H –

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

- To Understand Data Mining fundamentals and Characterize the kinds of patterns that can be discovered by association rule mining
- To Compare and evaluate different data mining techniques like classification, prediction,
- To Cluster the high dimensional data for better organization of the data
- To describe complex data types with respect to spatial and web mining
- To Design data warehouse with dimensional modelling and apply OLAP operations.
- To use Weka tool to implement various data mining algorithms.

Course Outcomes (COs)

Upon completion of this course students will be able to:

1. Extract knowledge using data mining techniques and Implement Preprocess the data for mining applications and apply the association rules for mining the data
2. Design and deploy appropriate classification techniques
3. Understand the concept of clustering and its real time applications
4. Explore recent trends in data mining such as web mining, spatial-temporal mining
5. Able to know the basic concepts of data warehouse and OLAP operations
6. Use Weka tool to implement various data mining algorithms

List of Programs

1. Use the following learning schemes, with the default settings to analyze the weather data (in weather.arff). for test options, first choose “Use training set”, then choose “Percentage split” using default 66% percentage split. Report model percent errorrate.
2. Use iris dataset preprocess and classify it with j4.8 and Naive Bayes classifier. Examine the tree in the classifier output panel.
3. Using the dataset ReutersCorn – Train and ReutersGrain – Train. Classify articles using binary attributes and word count attributes.
4. Apply any two association rule based algorithm for the supermarketanalysis.
5. Using weka experimenter perform comparison analysis of j4.8, oneR and ID3 forvote dataset.
6. Using weka experimenter perform comparison analysis of Naive Bayes with different datasets.
7. Apply ZeroR, OneR and j4.8, to classify the iris data in an experiment using 10 train and test runs, with 66% of the data used for 34% used for testing.
8. Using Weka Knowledge flow set up a flow to load an ARFF file (batch mode) and perform a cross-validation using j4.8 (WEKS’s C4.5implementation).
9. Draw multiple ROC curves in the same plot window, using j4.8 and RandomForest as classifiers.
10. Use any three clustering algorithm on Vehicle data set and find best amongthem.

Suggested Readings

1. Steinbach Tan, Kumar, "Introduction to Data Mining", First edition, Pearson Education; 2016.
2. Mohammed J. Zaki, Wagner Meira, Jr. "Data Mining and Analysis Fundamental Concepts and Algorithms", Cambridge University Press, May 2014
3. Han, Kamber & Pei, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publisher, Third Edition, 2013
4. G.K. Gupta, "Introduction to Data mining with case studies", 2nd Edition, PHI Private limited, New Delhi, 2011.
5. Arun K Pujari, "Data Mining Techniques", 10th impression, University Press, 2008.

Websites

1. www.geeksforgeeks.org
2. www.tutorialride.com
3. www.javatpoint.com

4.

Semester – V

20CGU514A CLIENT RELATIONSHIP MANAGEMENT - PRACTICAL 3H – 1C

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

- acquainted with various features of Service Now platform and tool.
- To use Flows and Workflows for process automation
- To use various script types used throughout the platform
- To capturing and moving configurations between instances, using update sets

Course Outcomes (COs)

1. Task management using assignment rules, presence, and work notes
2. Protecting ServiceNow instance data using Access Control rules
3. Populating the database using import sets
4. Using Flows and Workflows for process automation
5. Various script types used throughout the platform
6. Capturing and moving configurations between instances, using update sets

List of programs

1. Creating tickets for servicing requests from clients
2. Creating reports of status of client services

**20CGU514B
1C****INTRODUCTION TO DATA SCIENCE - PRACTICAL****Semester – V
3H –**

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

Course Objectives

- To provide an overview of a new language R used for data science.
- To introduce students to the R programming environment and related eco-system and thus provide them with an in-demand skill-set, in both the research and business environments
- To introduce the extended R ecosystem of libraries and packages
- To demonstrate usage of as standard Programming Language.
- To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R
- To enable students to use R to conduct analytics on large real life datasets.

Course Outcomes (COs)

1. Describe what Data Science is and the skill sets needed to be a data scientist.
2. Explain in basic terms what Statistical Inference means.
3. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.
4. Use R to carry out basic statistical modeling and analysis.
5. Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.
6. Describe the Data Science Process and how its components interact.

List of programs

1. Write a program that prints _hello World to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement linear search.
8. Implement binary search.
9. Implement matrices addition, subtraction and Multiplication
10. Fifteen students were enrolled in a course. Their ages were: 20 20 20 20 20 21 21 21 22 22 22 22 23 23 23
 - i. Find the median age of all students under 22 years
 - ii. Find the median age of all students
 - iii. Find the mean age of all students
 - iv. Find the modal age for all students
 - v. Two more students enter the class. The age of both students is 23. What is now mean, mode and median?
11. Following table gives a frequency distribution of systolic blood pressure. Compute all the measures of dispersion.

Midpoint	95.5	105.5	115.5	125.5	135.5	145.5	155.5	165.5	175.5
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Number	5	8	22	27	17	9	5	5	2
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12. Obtain probability distribution of X , where X is number of spots showing when a six-sided symmetric die (i.e. all six faces of the die are equally likely) is rolled. Simulate random samples of sizes 40, 70 and 100 respectively and verify the frequency interpretation of probability.
13. Make visual representations of data using the base, lattice, and ggplot2 plotting systems in R, apply basic principles of data graphics to create rich analytic graphics from available datasets.
14. Use Git / Github software to create Github access count. Also, create a repo using Github.

Suggested Readings

1. Rachel Schutt., & Cathy O'Neil. (2013). Doing Data Science: Straight Talk from the Frontline. Schroff/O'Reilly.
2. Foster Provost., & Tom Fawcett. (2013). Data Science for Business What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly.
3. John, W. Foreman. (2013). Data Smart: Using data Science to Transform Information into Insight. John Wiley & Sons.
4. Ian Ayres. (2007). Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart (1st ed.). Bantam.
5. Eric Segel. (2013). Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die (1st ed.). Wiley.
6. Matthew, A. Russel. (2013). Mining the Social Web: Data mining Facebook, Twitter, LinkedIn, Google+, GitHub, and More (2nd ed.). O'Reilly Media.

Websites

1. <https://www.iqonlinetraining.com/data-science-tutorial/>
2. <https://www.edx.org/course/introduction-to-r-for-data-science-2>
3. <https://www.tutorialspoint.com/r/index.htm>
4. <https://www.w3schools.in/r/>

20CGU601

PHP PROGRAMMING

Semester – VI
4H – 4C

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

Course Objectives

- To write basic PHP syntax using various operators.
- To write PHP scripts to handle HTML forms.
- To analyze different tasks using PHP functions.
- To understand the regular expressions in PHP.
- To learn array data structure using PHP scripts.
- To work with open source applications that deal with database and website development.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Write PHP scripts using operators to perform various functions
2. Design PHP scripts to handle HTML forms.
3. Implement different types of PHP functions.
4. Write regular expressions including modifiers, operators, and metacharacters.
5. Create PHP scripts using array.
6. Develop dynamic web pages.

Unit I -Introduction to PHP

PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.) -PHP with other technologies, scope of PHP -Basic Syntax, PHP variables and constants -Types of data in PHP, Expressions, scopes of a variable (local, global)- PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator-PHP operator Precedence and associativity

Unit II -Handling HTML form with PHP

Capturing Form Data-GET and POST form methods-Dealing with multi value fields Redirecting a form after submission -**PHP conditional events and Loops:** PHP IF Else conditional statements (Nested IF and Else) -Switch case, while, For and Do While Loop -Goto, Break, Continue and exit

Unit III -PHP Functions

Function, Need of Function, declaration and calling of a function -PHP Function with arguments, Default Arguments in Function -Function argument with call by value, call by reference -Scope of Function Global and Local

Unit IV -String Manipulation and Regular Expression

Creating and accessing String, Searching & Replacing String -Formatting, joining and splitting String, String Related Library functions-Use and advantage of regular expression over inbuilt function -Use of preg_match(), preg_replace(), preg_split()-functions in regular expression

Unit V -Array

Anatomy of an Array, Creating index based and Associative array, Accessing array-Looping with Index based array, with associative array using each() and foreach()-Some useful Library function

Suggested Readings

1. David Sklar, Adam Trachtenberg, (2014). PHP Cookbook: Solutions & Examples for PHP.
2. Robin Nixon,(2014). Learning PHP, MySQL, JavaScript, CSS & HTML5, (3rd ed.) Paperback, O'reilly.
3. Luke Welling, Laura Thompson,(2008). PHP and MySQL Web Development, (4th ed.), Addition Paperback, Addison-Wesley Professional.
4. Timothy Boronczyk, Martin E. Psinas, (2008). PHP and MYSQL (Create-Modify-Reuse), Wiley India Private Limited.
5. Steven Holzner, (2007). PHP: The Complete Reference Paperback, McGraw Hill Education (India), 2007.

Websites

1. www.php.net/
2. en.wikipedia.org/wiki/PHP
3. www.w3schools.com/PHP/default.asp
4. http://www.nptelvideos.com/php/php_video_tutorials.php
5. <http://172.16.25.76/course/view.php?id=1839>

20CGU602A **ARTIFICIAL INTELLIGENCE** **Semester – VI**
4H – 4C

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

Course Objectives

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To experiment with a machine learning model for simulation and analysis.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

Course Outcomes (COs)

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate proficiency in applying scientific method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Unit I - INTRODUCTION TO AI AND PRODUCTION SYSTEMS

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem solving methods – Problem graphs, Matching. Heuristic functions - Hill Climbing-Depth first and Breadth first search, A* Algorithm, Simulated Annealing, Constraints satisfaction.

Unit II - REPRESENTATION OF KNOWLEDGE

Game playing –Predicate logic – Representing Instance and Isa Relationship, Introduction to predicate calculus, Resolution, Knowledge representation -Production based system, Frame based system

Unit III - KNOWLEDGE INFERENCE & PLANNING.

Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors -Basic plan generation systems – Strips -Advanced plan generation systems – K strips.

Unit IV- MACHINE LEARNING AND EXPERT SYSTEMS

Learning- Machine learning, Adaptive Learning. Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge. Typical expert

systems–MYCIN, DART, XOON, Expert systems shells

Unit V – PROLOG

Programming in Logic (PROLOG): Introduction, Prolog variables, Syntax, Using rules, Input and Output predicates, Procedural and declarative meanings, Arithmetic operation, unification, lists, control structures, use of fail, CUT, Not.

Suggested Readings

1. Kevin Knight and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill- 2017.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007.
3. Ivan Brako, PROLOG: Programming for Artificial Intelligence, 3rd edition Pearson, 2011
4. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
5. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
6. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.

Web Sites

1. <https://nptel.ac.in/courses/106/105/106105077/>
2. https://www.tutorialspoint.com/artificial_intelligence/index.htm

20CGU602B**DIGITAL IMAGE PROCESSING****Semester – VI
4H – 4C**

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

- To understand the fundamental concepts of a digital image processing system.
- To understand concepts of image enhancement techniques.
- To apply various Image Transforms.
- To analyze various Compression techniques and Morphological concepts
- To know various segmentation techniques, and object descriptors.
- To apply color models and various applications of image processing

Course Outcomes (COs)

1. Remember the fundamental concepts of image processing.
2. Explain different Image enhancement techniques
3. Understand and review image transforms
4. Analyze the basic algorithms used for image processing & image compression with morphological image processing.
5. Contrast Image Segmentation and Representation
6. Design & Synthesize Color image processing and its real world applications

Unit I - Introduction

Introduction: Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization. Spatial Domain Filtering: Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, smoothing filters, sharpening filters, gradient and Laplacian.

Unit II – Transforms and Properties

Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Discrete Cosine Transform, Frequency domain filtering.

Unit III– Image Restoration

Image Restoration, Basic Framework, Interactive Restoration, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Image Compression-Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Run length coding.

Unit IV – Image Compression

FAX compression (CCITT Group-3 and Group-4), Symbol-based coding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation

Wavelet based Image Compression: Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding, Digital Image Watermarking

Unit V - Morphological Image Processing

Basics, SE, Erosion, Dilation, Opening, Closing, Boundary Detection, skeletons, pruning. Image Segmentation: Boundary detection-based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding.

Suggested Readings

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing (4th Edition), 2017, Pearson Education
2. Mark Nixon, Feature Extraction and Image Processing for Computer Vision, Third Edition, 2012, Elsevier
3. Wilhelm Burger, Mark J. Burge, Principles of Digital Image Processing: Fundamental Techniques (Undergraduate Topics in Computer Science), 2011, Springer
4. Maria Petrou, Costas Petrou, Image Processing: The Fundamentals, 2010, Wiley Publications
5. Wilhelm Burger, Mark J. Burge, Principles of Digital Image Processing: Core Algorithms (Undergraduate Topics in Computer Science), 2009, Springer
6. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, Digital Image Processing Using MATLAB, 2nd ed., 2009, Gatesmark Publishing
7. Gonzalez, R. C., & Woods, R. E. (2008). Digital Image Processing (3rd ed.). New Delhi: Pearson Education.
8. Rafael, C. Gonzalez., Richard, E. Woods., & Steven Eddins. (2004). Digital Image Processing using MATLAB. New Delhi: Pearson Education.

Websites

1. http://www.imageprocessingplace.com/DIP-3E/dip3e_classroom_presentations_downloads.htm
2. <https://www.tutorialspoint.com/dip/index.htm>
3. <https://www.javatpoint.com/digital-image-processing-tutorial>
4. <https://nptel.ac.in/courses/117/105/117105135/>
5. <http://172.16.25.76/course/view.php?id=101>

Semester – VI

20CGU603A COMPUTER GRAPHICS 3H – 3C

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

Course Objectives

- To describe characteristics and functioning of common graphics input/output devices
- To learn the basic principles of 3- dimensional computer graphics
- To Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition
- To Provide an understanding of mapping from a world coordinates to device coordinates and projections.
- To extract scene with different clipping methods and its transformation to graphics display device.
- To explore projections and visible surface detection techniques for display of 3D scene on 2D screen

Course Outcomes(COs)

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this..

Unit I - A Survey of Computer Graphics

Video Display Devices- Refresh cathode-Ray Tubes-Raster Scan Displays-Random Scan Displays-Color CRT Monitors-Direct –View Storage Tubes-Flat Panel Displays-Raster Scan Systems-Three Dimensional Viewing Devices-Random Scan Systems.

Unit II - Input Devices

Keyboards-Mouse –Track Ball and Space ball-Joysticks-Data Glove- digitizers-Image Scanners-Touch Panels-Light Pens-Voice Systems-**Hard Copy Devices: Printers and Plotters**

Unit III - Point and Lines- Line Drawing Algorithms

DDA Algorithm- Bresenham's Line Algorithm. **Circle Generating Algorithms:** Mid Point Circle Algorithm. Two Dimensional Geometric Transformations: **Basic Transformations:** Translation-Rotation-Scaling-**Composite Transformations:** Translations-Rotations- Scaling. General Pivot Point Rotation- General Fixed Point Scaling.

Unit IV - Two Dimensional Viewing

The Viewing Pipeline- Window to view port Transformation-**Clipping Operations**-Point Clipping -Line Clipping: Cohen Sutherland Line Clipping. **Polygon Clipping: Sutherland –Hodgeman Polygon Clipping-Text Clipping.**

Unit V Three – Dimensional Display Methods

Parallel Projection- three Dimensional Geometric Transformations: Translation-Rotations-Scaling. **Projections:** Parallel Projections-Perspective Projections. **Visible Surface Detection Methods:** Classification of Visible Surface Detection Algorithms-Back Face Detection- Depth Buffer Method- Area Sub division Method.

Suggested Readings

1. John F Hughes;Andries Van Dam;MorganMcGuire;David F Sklar;James D Foley;Steven K Feiner;Kurt Akeley,2018 ,Computer Graphics: Principles and Practice by Pearson
2. V. Scott Gordon, 2018,Computer Graphics Programming in OpenGL with Java (2e)Publisher: Mercury
3. OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V 9th Edition, Kindle Edition byJohn Kessenich (Author), Graham Sellers (Author), Dave Shreiner (Author) 2016.
4. Interactive Computer Graphics: A Top-Down Approach with WebGL (7th Edition) 7th Edition by Edward Angel (Author), Dave Shreiner (Author),2014.
5. Donald Hearn and M. Pauline Baker. 2007. Computer Graphics-C Version, 2nd Edition, Pearson Education, New Delhi.

Websites

1. www.cgshelf.com
2. www.cgtutorials.com
3. www.allgraphicdesign.com
4. <https://nptel.ac.in/courses/106/102/106102063/>

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

Course Objectives

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand syntax-directed translation and intermediate code generation
- To learn to implement run-time storage administration.
- To learn to implement code optimization and code generator.
- Learn how to optimize and effectively generate machine codes

Course Outcomes (COs)

1. Understand the different phases of compiler.
2. Apply different parsing algorithms to develop the parsers for a given grammar.
3. Understand syntax-directed translation and run-time environment.
4. Develop the run-time storage administration.
5. Understand to implement code optimization techniques and a simple code generator.
6. Learn about Code optimization

Unit I

Introduction to Compilers: Compilers and Translator – Need of Translator – The structure of a Compiler – Lexical analysis – Syntax analysis – Intermediate code generation – optimization – code generation – Compiler – writing tools. Finite automata and lexical Analysis: The role of the lexical analysis – A simple approach to the design of lexical analysers- Regular expressions to finite automata – Minimizing the number of states of a DFA.

Unit II

The Syntactic specification of programming languages: context free grammars – derivations and parse trees – capabilities of context free grammars. Basic parsing techniques: Parsers – shift – reduce parsing – operator – precedence parsing – top down parsing – predictive parsers.

Unit III

Syntax – directed translation: syntax – directed translation schemes – implementation of syntax – directed translators – intermediate code – postfix notation – parse trees and syntax trees – 3 address code – quadruples and triples – translation of assignment statements – Boolean expressions – statements that alter the flow of control. Symbol tables: the contents of a symbol table – data structures for symbol table – representing scope information.

Unit IV

Run time storage administration: Implementation of a simple stack allocation scheme – implementation of block-structured languages – storage allocation in block structured languages. Error deduction and recovery: errors – lexical phase errors – syntactic phase errors – semantic errors.

Unit V

Introduction of code optimization: The principle sources of optimization – loop optimization – the DAG representation of basic blocks – value numbers and algebraic laws – Global data flow analysis. Code generation: Object programs – problems in code generation – a machine model –

a simple code generator – register allocation and assignment – code generation from DAG's – peephholes optimization.

Suggested Readings

1. V. Raghavan, Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2009.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003.
5. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures:
6. A Dependence based Approach, Morgan Kaufmann Publishers, 2002.

Websites

1. http://www.vssut.ac.in/lecture_notes/lecture1422914957.pdf
2. <https://www.iith.ac.in/~ramakrishna/Compilers-Aug14/>
3. https://swayam.gov.in/nd1_noc20_cs13/preview
4. <https://nptel.ac.in/courses/106105190/>
5. <http://172.16.25.76/course/view.php?id=1847>

20CGU611
2C**PHP PROGRAMMING - PRACTICAL****Semester – VI**
4H –

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

- To write basic PHP syntax using various operators.
- To write PHP scripts to handle HTML forms.
- To analyze different tasks using PHP functions.
- To understand the regular expressions in PHP.
- To learn array data structure using PHP scripts.
- To work with open source applications that deal with database and website development.

Course Outcomes (COs)

Upon completion of this course, students will be able to:

1. Write PHP scripts using operators to perform various functions
2. Design PHP scripts to handle HTML forms.
3. Implement different types of PHP functions.
4. Write regular expressions including modifiers, operators, and metacharacters.
5. Create PHP scripts using array.
6. Develop dynamic web pages.

List of Programs

1. Write a PHP program that will use the concept of form.
2. Write a PHP program to read the employee detail using Form Component.
3. Write a PHP program to demonstrate the use of Array.
4. Write a PHP program to prepare the student mark sheet using Switch statement
5. Write a PHP program to generate the Multiplication of Matrix.

Suggested Readings

1. David Sklar, Adam Trachtenberg, (2014). PHP Cookbook: Solutions & Examples for PHP.
2. Luke Welling, Laura Thompson, (2008). PHP and MySQL Web Development, (4th ed.), Addition Paperback, Addison-Wesley Professional.
3. Robin Nixon, (2014). Learning PHP, MySQL, JavaScript, CSS & HTML5, (3rd ed.) Paperback, O'reilly.
4. Steven Holzner, (2007). PHP: The Complete Reference Paperback, McGraw Hill Education (India), 2007.
5. Timothy Boronczyk, Martin E. Psinas, (2008). PHP and MYSQL (Create-Modify-Reuse), Wiley India Private Limited.

20CGU612A ARTIFICIAL INTELLIGENCE - PRACTICAL**Semester – VI
4H – 2C**

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

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To experiment with a machine learning model for simulation and analysis.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

Course Outcomes (COs)

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate proficiency in applying scientific method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

List of Programs

Write the following programs using PROLOG

1. Program to read address of a person using compound variable.
2. Program of fun to show concept of cut operator.
3. Program to count number of elements in a list.
4. Program to find member of a set.
5. Program to concatenate two sets.
6. Program to find permutation of a set.
7. Program to demonstrate family relationship.
8. Write a program to solve Nqueens problem
9. Solve any problem using depth first search.
10. Solve any problem using best first search.
11. Solve traveling salesman problem.

Suggested Readings

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2017.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3. Ivan Brako, PROLOG: Programming for Artificial Intelligence, 3rd edition Pearson, 2011
4. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.

5. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
6. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.

Web Sites

<https://nptel.ac.in/courses/106/105/106105077/>

**20CGU612B
2C****DIGITAL IMAGE PROCESSING - PRACTICAL****Semester – VI
4H –**

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

- To understand the fundamental concepts of a digital image processing system.
- To understand concepts of image enhancement techniques.
- To apply various Image Transforms.
- To analyze various Compression techniques and Morphological concepts
- To know various segmentation techniques, and object descriptors.
- To apply color models and various applications of image processing

Course Outcomes (COs)

1. Remember the fundamental concepts of image processing.
2. Explain different Image enhancement techniques
3. Understand and review image transforms
4. Analyze the basic algorithms used for image processing & image compression with morphological image processing.
5. Contrast Image Segmentation and Representation
6. Design & Synthesize Color image processing and its real world applications

List of Programs

1. Write program to read and display digital image using MATLAB or SCILAB
 - a. Become familiar with SCILAB/MATLAB Basic commands
 - b. Read and display image in SCILAB/MATLAB
 - c. Resize given image
 - d. Convert given color image into gray-scale image
 - e. Convert given color/gray-scale image into black & white image
 - f. Draw image profile
 - g. Separate color image in three R G & B planes
 - h. Create color image using R, G and B three separate planes
 - i. Flow control and LOOP in SCILAB
 - j. Write given 2-D data in image file
2. To write and execute image processing programs using point processing method
 - a. Obtain Negative image
 - b. Thresholding
 - c. Obtain Flip image
 - d. Contrast stretching
3. To write and execute programs for image arithmetic operations
 - a. Addition of two images
 - b. Subtract one image from other image
 - c. Calculate mean value of image
 - d. Different Brightness by changing mean value
4. To write and execute programs for image logical operations
 - a. AND operation between two images
 - b. OR operation between two images
 - c. Calculate intersection of two images
 - d. Water Marking using EX-OR operation
 - e. NOT operation (Negative image)

5. To write a program for histogram calculation and equalization using
 - a. Standard MATLAB function
 - b. Program without using standard MATLAB functions
 - c. C Program
6. To write and execute program for geometric transformation of image
 - a. Translation
 - b. Scaling
 - c. Rotation
 - d. Shrinking
 - e. Zooming
7. To understand various image noise models and to write programs for
 - a. image restoration
 - b. Remove Salt and Pepper Noise
 - c. Minimize Gaussian noise
 - d. Median filter and Wiener filter
8. Write and execute programs to remove noise using spatial filters
 - a. Understand 1-D and 2-D convolution process
 - b. Use 3x3 Mask for low pass filter and high pass filter
9. Write and execute programs for image frequency domain filtering
 - a. Apply FFT on given image
 - b. Perform low pass and high pass filtering in frequency domain
 - c. Apply IFFT to reconstruct image
10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask
11. Write and execute program for image morphological operations erosion and dilation.
12. To write and execute program for wavelet transform on given image and perform inverse wavelet transform to reconstruct image.

Suggested Readings

1. Gonzalez, R. C., & Woods, R. E. (2008). Digital Image Processing (3rd ed.). New Delhi: Pearson Education.
2. Jain, A. K. (1989). Fundamentals of Digital image Processing. New Delhi: Prentice Hall of India.
3. Castleman, K. R. (1996). Digital Image Processing. New Delhi: Pearson Education.
4. Schalkoff. (1989). Digital Image Processing and Computer Vision. New York: John Wiley and Sons.
5. Rafael, C. Gonzalez., Richard, E. Woods., & Steven Eddins. (2004). Digital Image Processing using MATLAB. New Delhi: Pearson Education.

Websites

1. http://www.imageprocessingplace.com/DIP-3E/dip3e_classroom_presentations_downloads.htm
2. <https://www.tutorialspoint.com/dip/index.htm>
3. <https://www.javatpoint.com/digital-image-processing-tutorial>

20CGU613A COMPUTER GRAPHICS - PRACTICAL
3H – 1C

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

- To describe characteristics and functioning of common graphics input/output devices
- To learn the basic principles of 3- dimensional computer graphics
- To Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition
- To Provide an understanding of mapping from a world coordinates to device coordinates and projections.
- To extract scene with different clipping methods and its transformation to graphics display device.
- To explore projections and visible surface detection techniques for display of 3D scene on 2D screen

Course Outcomes(COs)

1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Use of geometric transformations on graphics objects and their application in composite form.
4. Extract scene with different clipping methods and its transformation to graphics display device.
5. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
6. Render projected objects to naturalize the scene in 2D view and use of illumination models for this..

List of Programs

1. Program to draw a line using DDA algorithm.
2. Program to draw a line using Bresenham's algorithm.
3. Program to draw a circle using Bresenham's algorithm.
4. Program to implement the Character generation algorithm.
5. Program to implement the Polygon clipping algorithm.
6. Program to implement the Text clipping algorithm.
7. Program to implement the line Clipping algorithm.
8. Program to implement the 2D Translation, 2D Rotation and 2D scaling.
9. Program to implement the 3D Translation, 3D Rotation and 3D scaling.
10. Program to implement the Shearing and Reflection of an object.

Suggested Readings

1. John F Hughes;Andries Van Dam;MorganMcGuire;David F Sklar;James D Foley;Steven K Feiner;Kurt Akeley,2018 ,Computer Graphics: Principles and Practice by Pearson
2. V. Scott Gordon, 2018,Computer Graphics Programming in OpenGL with Java (2e)Publisher: Mercury

3. OpenGL Programming Guide: The Official Guide to Learning OpenGL, Version 4.5 with SPIR-V 9th Edition, Kindle Edition by John Kessenich (Author), Graham Sellers (Author), Dave Shreiner (Author) 2016.
4. Interactive Computer Graphics: A Top-Down Approach with WebGL (7th Edition) 7th Edition by Edward Angel (Author), Dave Shreiner (Author), 2014.

Web Sites

1. www.cgshelf.com
2. www.cgtutorials.com
3. www.allgraphicdesign.com

NPTEL WEBSITE

1. <https://nptel.ac.in/courses/106/102/106102063/>
2. <https://nptel.ac.in/courses/106106090/>
3. <http://www.nptelvideos.in/2012/11/computer-graphics.html>

20CGU613B
3H – 1C

COMPLIER DESIGN - PRACTICAL

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

Course Objectives

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand syntax-directed translation and intermediate code generation
- To learn to implement run-time storage administration.
- To learn to implement code optimization and code generator.
- Learn how to optimize and effectively generate machine codes

Course Outcomes (COs)

1. Understand the different phases of compiler.
2. Apply different parsing algorithms to develop the parsers for a given grammar.
3. Understand syntax-directed translation and run-time environment.
4. Develop the run-time storage administration.
5. Understand to implement code optimization techniques and a simple code generator.
6. Learn about Code optimization

LIST OF PROGRAMS:

1. Implementation of Symbol Table
2. Implementation of Lexical Analyzer using Lex Tool
 - a) The program replaces the substring abc by ABC from the given input string:
 - b) Well formedness of brackets
 - c) Finding vowels and consonant in a string
 - d) Finding the capital
 - e) It is used to display the Keywords and identifiers in the given program.
3. Construction Of Operator Precedence Parse Table
4. Generate YACC specification for a few syntactic categories.
 - a) Implementation Of Calculator Using Yacc.
5. Generation of code for a given intermediate code.
6. Implementation of code optimization techniques

Suggested Readings

1. V. Raghavan, Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2009.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers – Elsevier Science, India, Indian Reprint 2003.
5. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures:
6. A Dependence based Approach, Morgan Kaufmann Publishers, 2002.

Websites

1. https://studentsfocus.com/notes/anna_university/IT/6SEM/IT6612%20-%20CD%20Lab/CS6612%20-%20CD%20LAB%20%20MANUAL.pdf

2. https://swayam.gov.in/nd1_noc20_cs13/preview
3. <https://nptel.ac.in/courses/106105190/>
4. <http://172.16.25.76/course/view.php?id=1847>
5. http://www.vssut.ac.in/lecture_notes/lecture1422914957.pdf<https://www.iith.ac.in/~ramakrishna/Compilers-Aug14/>

20CGU691**PROJECT****Semester – VI**
8H – 6C

Instruction Hours / week: L: 0 T: 0 P: 8 **Marks:** Internal: 40 External: 60 Total: 100
End Semester Exam: 3 Hours