KARPAGAM ACADEMY OF HIGHER EDUCATION
DEPARTMENT OF BIOTECHNOLOGY
B. Sc. Biotechnology
SCHEME OF EXAMINATION (2015 -2016 Batch)

Code	Subjects	Objectives and Outcomes		Ins*			Marks			Exam/ Hrs	Credits
		PEO´s	PO´s & PSO´s	L	T	P	CIA	ESE	Total		
Semester – I											
15LAU101	Language – I	-	-	05	00	00	40	60	100	3	05
15ENU101	English – I	-	-	04	00	00	40	60	100	3	04
15BTU101	Biochemistry	I	a, b	04	01	00	40	60	100	3	05
15BTU111	Biochemistry – Practical I	I	a, b	00	00	05	40	60	100	3	03
15BTU102	Allied Chemistry I	I	a	04	00	00	40	60	100	3	04
15BTU112	Allied Chemistry- Practical I	I	a	00	00	03	40	60	100	3	02
15FCA101	Foundation course A -Value Education	I	a	02	00	00	100	-	100	-	01
15SSD101	Soft Skill Development I	IV	o	01	01	00	-	-	-	-	-
	Semester Total			**20**	**02**	**08**	**340**	**360**	**700**	**-**	**24**
Semester – II											
15LAU201	Language – II	-	-	05	00	00	40	60	100	3	05
15ENU201	English – II	-	-	04	00	00	40	60	100	3	04
15BTU201	Microbiology	I	c	04	01	00	40	60	100	3	05
15BTU211	Microbiology -Practical II	I	c	00	00	05	40	60	100	3	03
15BTU202	Allied Chemistry II	I	a	04	00	00	40	60	100	3	04
15BTU212	Allied Chemistry - Practical II	I	a	00	00	03	40	60	100	3	02
15FCB201	Foundation course B - Environmental studies	I, IV	d, o	02	00	00	100	-	100	-	01
15SSD101	Soft Skill Development – I	IV	o	01	01	00	100	-	100	-	01
	Semester Total			**20**	**02**	**08**	**440**	**360**	**800**	**-**	**25**
Semester – III											
15ENU301	English – III	-	-	04	00	00	40	60	100	3	04
15BTU301	Bioinstrumentation	I, III	d, l	03	01	00	40	60	100	3	04
15BTU302	Cell and Molecular Biology	II	e	04	00	00	40	60	100	3	04
15BTU311	Cell and Molecular Biology-Practical III	II, IV	e, n	00	00	05	40	60	100	3	02
15BTU303	Allied Elective –I	I, III, IV	c, l, o	04	00	00	40	60	100	3	04

15BTU312	Allied Elective Practical I	I, III	c, l, o, n	00	00	03	40	60	100	3	02
15FCC301	Computer course	I	a	04	00	00	100	-	100	-	02
15SSD301	Soft Skill Development – II	IV	o	01	01	00	-	-	-	-	-
	Semester Total			**20**	**02**	**08**	**340**	**360**	**700**	**-**	**22**
Semester –IV											
15ENU401	English – IV	-	-	04	00	00	40	60	100	3	04
15BTU401	Genetics	II	e	06	00	00	40	60	100	3	05
15BTU402	Immunology	II	f	05	01	00	40	60	100	3	05
15BTU411	Genetics and Immunology – Practical IV	II	f, n	00	00	05	40	60	100	3	03
15BTU403	Allied Elective - II	I, III	c, k	04	00	00	40	60	100	3	03
15BTU412	Allied Elective Practical - II	III, IV	c, k, n	00	00	03	40	60	100	3	02
15SSD401	Soft Skill Development –II	IV	o	01	01	00	100	100	100	-	01
	Semester Total			**20**	**02**	**08**	**340**	**460**	**700**	**-**	**23**
Semester –V											
15BTU501	Recombinant DNA Technology	II	e, g	04	01	00	40	60	100	3	05
15BTU502	Bioprocess Technology	II	g, h	04	01	00	40	60	100	3	05
15BTU503	Food Biotechnology			05	00	00	40	60	100	3	05
15BTU504	Environmental Biotechnology	III, IV	d, k, l	05	00	00	40	60	100	3	05
15BTU505	Core Elective – I	III, IV	j, l	05	00	00	40	60	100	3	05
15BTU506 15BTU604	Additional Course	I, IV	a, n	-	-	-	-	100	100	3	04
15OEU501	Open elective	I, II	k, l, m, o	00	00	-	-	100	100	3	03
15BTU511	rDNA, Bioprocess, Food, and Environmental Biotechnology - Practical V	I, III, IV	d, k, l, n	00	00	05	40	60	100	3	03
15BTU521	Internship	III	l	00	00	-	50	-	50	-	02
	Semester Total			**23**	**02**	**05**	**290**	**560**	**850**	**-**	**37**
Semester –VI											
15BTU601	Animal Biotechnology	III	i	04	01	00	40	60	100	3	05

15BTU602	Plant Biotechnology	II, III	i, g	04	01	00	40	60	100	3	05
15BTU603	Core Elective –II	I, II	k, l, m, o	05	00	00	40	60	100	3	04
15BTU611	Animal and Plant Biotechnology -Practical VI	II, III, IV	i, g, n	00	00	05	40	60	100	3	03
15BTU691	Project and Viva- voce	III	l	10	00	00	60	90	150	3	06
	Extension Activity			00	00	-	-	-	-	-	-
	Semester Total			**23**	**02**	**05**	**220**	**330**	**550**	**-**	**23**
	G. Total			**126**	**12**	**42**	**1970**	**2430**	**4300**	**-**	**154**

*Additional credit not counted for program requirement

Core Elective

Core Elective –I		**Core Elective -II**	
15BTU505A	Bioinformatics	15BTU603A	Tissue Engineering
15BTU505B	Bio-nanotechnology	15BTU603B	Applied Biotechnology
15BTU505C	Biofertilizer Technology	15BTU603C	Herbal Technology

Allied Elective – I

Theory		**Practical**	
15BTU303A	Biostatistics	15BTU312A	Biostatistics – Practical
15BTU303B	Clinical Microbiology	15BTU312B	Clinical Microbiology -Practical
15BTU303C	General Mathematics		

Allied Elective – II

Theory		**Practical**	
15BTU403A	Fundamentals of Computer	15BTU412A	C Programming - Practical
15BTU403B	Biophysics	15BTU412B	Biophysics - Practical
15BTU403C	Medical Microbiology	15BTU412C	Medical Microbiology -Practical

Open Elective

15OEU401	Sericulture Technology

Additional course(s)

Code	**Course (s)**
15BTU506	Animal House Management
15BTU604	Entrepreneurship Biotechnology

LS: Language course; EN: English course ; ECA: Extra Curricular Activities; NCC: National Cadet Corps; NSS: National Social Service; DSE : Discipline Specific Elective

Blue – Employability Green – Entrepreneurship Red- Skill Development

PROGRAMME OUTCOMES (POs)

a) Graduates will acquire in-depth understanding of basic concept, knowledge about biochemistry and cell organelles, their functions for applied field, allied subject and life skills.

b) The students will be able to discuss the metabolic aspects of biomolecules.

c) The Graduates will gain the technical capability of handling, isolating and identifying various organisms from different sources.

d) Understanding and better knowledge of the causes, types and control methods for environmental pollution by the students.

e) The student will be able to discuss the mechanisms associated with gene expression system in prokaryotes and eukaryotes.

f) Understand the role of different types of cells, effectors and effectors mechanisms in immune-technology by the students.

g) Develop skills associated with screening of industrially important strains, various aspects of bioprocess technology and rDNA technology by the graduates.

h) The student will be able to understand the production of enzymes from different sources and enzyme characterization and kinetic actions in living organisms.

i) The student will be able to understand the production of transgenic plants and animals for human and environmental welfare.

j) Understand the basic concepts and modern knowledge of bioinformatics by graduates.

k) Apply the knowledge and skills gained from molecular aspects should be useful in developing new innovations in different life forms by the graduates.

l) The student will be able design, solve the application-oriented problem in biotechnological field through project-based learning.

PROGRAMME SPECIFIC OUTCOMEs (PSOs)

To enable the student to emerge as:

m) Proficiency to work on biotechnological concepts and interdisciplinary areas of science and technology towards product and process development for industrial and academic research applications.

n) An expert in Biotechnology and allied fields (medical, microbial, agricultural, environmental, plant and animal) for utilizing the practical skills to address biotechnological challenges.

o) Proficiency to acquire knowledge in facing the interviews, to become an entrepreneur and develop leadership skills with life-long learning.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

To impart the following PEOs to the students of Under-graduates in Biotechnology:

PEO I: To obtain detailed information about the fundamentals of Biotechnology, allied subjects and life skills.

PEO II: To provide information about the molecular methods which involved in cellular processes of living systems such as microbes to higher order organisms for applied aspects. To address the emerging need for skilled scientific manpower with research ethics involving organisms.

PEO III: To impart the basics and current molecular tools in the areas of Molecular Diagnostics, Fermentation Technology, Plant, Animal & Environmental Biotechnology are included to train the students for man power development and also sensitize them to scope for research. The practical subjects will provide information about the careers in the industry and applied research where biological system is employed.

PEO IV: To make the graduates of Biotechnology to learn and to adopt in a competitive world of technology update and contribute to all forms of life.

MAPPING OF PEOs AND POs

PEOs	Programme Outcome (s)														
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
PEO I	×	×	×	×											
PEO II					×	×	×	×							
PEO III									×	×	×	×			
PSO IV											×	×	×	×	×

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
முதல் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)
(For I-UG Science Degree Classes) 15LSU101

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், 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

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்நோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
ஒன்று	I	5	3	40 / 60	100	5

பகுதி – I, தமிழ் | பருவம் I

15LAU101 : தமிழ் முதல் தாள் 5-H,5-C

அலகு – I : இக்கால இலக்கியம்

தத்துவம் : மகாகவி பாரதியார் – பகைவனுக்கு அருள்வாய்.
கவிஞர் ந.பிச்சமூர்த்தி – கிளிக்கூண்டு
இயற்கை : பாவேந்தர் பாரதிதாசன் – அழகின் சிரிப்பு – ஞாயிறு.
சமுதாயம் : கவிக்கோ அப்துல் ரகுமான் – இன்றைய நிலை
அறிவியல் : கவிஞர் சிற்பி பாலசுப்பிரமணியன் – காலம்.
பெண்ணியம் : கவிஞர் சிவரமணி – வையகத்தை வெற்றிகொள்ள
சூழலியல் : அன்பாதவன் - மரணம்
காதல் : வைரமுத்து - காதல் உயில்
தன்னம்பிக்கை பா.விஜய் - தன்னம்பிக்கை

அலகு – II : அற இலக்கியம்

1. திருக்குறள் - தேர்ந்தெடுக்கப்பட்ட குறள்கள் 20
2. நான்மணிக்கடிகை - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்
3. திரிகடுகம் - தேர்ந்தெடுக்கப்பட்ட ஐந்து பாடல்கள்

அலகு - III : சிற்றிலக்கியம்

1. நரிவிருத்தம் - அறன் வலியுறுத்தல்
2. தமிழ் விடு தூது - தமிழின் சிறப்புரைத்தல்
3. மதுரை மீனாட்சியம்மைப் பிள்ளைத்தமிழ் - தொடுக்கும் கடவுள் பழம்பாடல்

அலகு – IV : சிறுகதை

1. புதுமைப்பித்தன் - நிகும்பலை
2. தனுஷ்கோடி ராமசாமி - கந்தகக் கிடங்கிலே
3. கந்தர்வன் - துண்டு
4. வாஸந்தி - வடிகால்
5. சி.ஆர். ரவீந்திரன் - வழுக்குமரம்

அலகு- V : மொழிப்பயிற்சி

1. விண்ணப்பங்கள் எழுதுதல் மற்றும் கடிதப் பயிற்சி
2. மொழிபெயர்ப்புப் பயிற்சி

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

Part I TAMIL 2015. Karpagam University, Coimbatore – 21.

SEMESTER I

15ENU101 ENGLISH - 1 4H - 4C

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

Course Objectives

The main objectives of the course are

- To enable the learners to acquire English language skills at a faster pace
- To introduce different kinds of literary works
- To familiarize different genres of Literature
- To instruct moral values through literature
- To improvise their productive and receptive skills
- To strengthen the basic knowledge about grammar

Course Outcomes

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

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

UNIT I:

Prose: Google Guys (Extract) – Richard L Brandt
Poetry: The Blind Pedlar – Osbert Sitwell
Short Story: A Garden So Rich – Christie Craig
Vocabulary: Prefixes, Antonyms, Sentence Completion
Grammar: Articles, Adverbs, Pronouns
Composition: Proverb Expansion

UNIT II:

Prose: Happiness 101 – Geeta Padmanabhan
Poetry: An Old Woman **–** Arun Kolatkar
Vocabulary: Suffixes, Analogies
Grammar: Nouns, Adjectives
Composition: Dialogue Writing

UNIT III:

Prose: Structured Procrastination – John Perry
Short Story: The Umbrella Man – Roald Dahl
One-Act Play: The Boy Who Stopped Smiling – Ramu Ramanathan
Vocabulary: Synonyms, Euphemisms, Word Definitions
Grammar: Verbs, Conjunctions and Interjection, Indirect/Reported Speech

UNIT IV:

Poetry: No Sentence – Anjum Hassan
One-Act Play: While the Auto Waits- O' Henry
Vocabulary: Words Often Confused, Anagrams
Grammar: Prepositions, Voice- Active and Passive
Composition: Letter Writing- Informal

UNIT V:

Short Story: The Bird **–** Amar Jalil
One-Act Play: The Cellphone Epidemic – Claudia I. Haas
Vocabulary: Portmanteau Words, One Word Substitute
Grammar: Questions, Pronunciation
Composition: Letter Writing- Formal

Prescribed Texts

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

Reference

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

15BTU101 BIOCHEMISTRY 5H - 5C

Total hours/week: L:4 T:1 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To know the qualitative and quantitative determination of the biochemical substances
- To study their structure and functions of macromolecules
- To identify the molecular interactions between the atoms and molecules
- To derive the mathematical equations of enzyme kinetics
- To understand the metabolic pathways that occurs in the normal human life
- To elucidate the role of macromolecules for the growth and development of organisms

Course Outcomes

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

1. Demonstrate and understand the fundamental biochemistry principles, including topics specific to chemistry and biochemistry
2. Acquaint knowledge in understanding the structure/function of biomolecules
3. Explain the metabolic pathways
4. Understand the regulation of biological/biochemical processes
5. Insight into protein structures and folding mechanism
6. Explain the applications of protein engineering in academia and industry

UNIT –I

Introduction: Atoms, molecules, chemical bonds: covalent and non-covalent, Van der Waals, electrostatic and hydrophobic interactions. Chemical foundation of biology: pH, pKa, acids, bases and buffers.

UNIT- II

Carbohydrates: Structure and functions, classification, physical and chemical properties. **Proteins:** Amino acids and peptides Structure and classification of amino acids. Classification and organization of proteins: – primary, secondary, tertiary and quaternary. Structure of peptide bond and its biological significance.

UNIT- III

Lipids: Lipids: Classification, structure and functions. Triglycerides; Phospholipids; Steroids and terpenes. Glycolipids and lipoproteins-structure and function. Role of lipids in biomembranes. **Nucleic acids**: Structure, properties and functions of nucleic acids, DNA, RNA and their types.

UNIT -IV

Enzyme catalysts: Basic principles and factors affecting enzyme activity. Enzyme kinetics – Michaleis – Menten equation. Mechanism of enzyme regulation. Co-enzyme, co-factors, difference between chemical and enzyme catalysis, enzyme inhibition.

UNIT -V

Metabolism: Glycolysis, gluconeogenesis, Tri Carboxylic Acid cycle, electron transport chain and oxidative phosphorylation, photophosphorylation- light reaction, dark reaction. Hormones: Structure and function; Vitamins: Types, structure and functions.

Textbooks

1. Palmer, T. and P. Bonner, 2008. Enzymes Biochemistry, Biotechnology, Clinical Chemistry. II Edition, First East West Press Pvt Ltd., New Delhi.

References

1. Lehninger, A, D. L. Nelson, M. Cox and M. M. Cox, 2009. Principles of Biochemistry. MPS Publishers, New York.
2. Zubay, G.L, 1995. Principles of Biochemistry. WCB Publishers, London.
3. Herg, J.M, J.L. Tymoczko and L. Stryer, 2002. Biochemistry. V Edition, WH-Freeman and Co, New York.
4. Voet, G. and A. Voet, 1995. Fundamentals of Biochemistry. II Edition, John Wiley and Sons, Inc. New York.
5. Murray, R.K, D.K. Granner, P.A. Mayes and V.W. Rodwell, 2003. Harper's Illustrated Biochemistry. XXVI Edition, McGraw-Hill Publishers, New York. (Online version).

15BTU111 BIOCHEMISTRY- PRACTICAL - I 5H - 3C

Total hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To acquire skill on various experimental methods and techniques
- To analyze the given protein and sugar samples
- To design biochemical experiments using classical techniques and modern instruments
- To estimate calcium in urine samples
- To analyze the oil sample
- To quantify the lipids in the given sample

Course Outcomes

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

1. Quantify the amount of sugar in the given sample
2. Quantify the amount of protein in the given sample
3. Perform the analysis of amino acids using paper and thin layer chromatography
4. Determine the iodine number, saponification value and acid number in a given oil sample
5. Gain skills on quantitative estimation methods for various biomolecules from natural sources
6. Prepare casein from milk sample

Experiments

1. Bio instruments – Introduction and demonstration
2. Quantification of sugars (Anthrone method)
3. Quantification of proteins (Lowry *et al* Method)
4. Quantification of total free amino acids
5. Quantification of lipids
6. Analysis of oils- Iodine number, Saponification value and Acid number
7. Quantification of Ascorbic acid
8. Paper Chromatography (Ascending and descending)
9. Thin Layer Chromatography (Amino acids)
10. Estimation of DNA (DPA method)
11. Estimation of RNA (Orcinol method)
12. Spot test for biomolecules
13. Preparation of casein from milk
14. Estimation calcium in urine

Textbooks

1. Boyer, R, 2000. Experimental Biochemistry. Benjamin Cummings, Redwood City, California, USA.
2. Palanivelu, P, 2001. Analytical Biochemistry and Separation Techniques. Kalaimani Printers, Madurai.

References

1. Sadasivam, S. and A. Manickam, 2002. Biochemical Methods. New Age International Pvt Ltd Publishers, New Delhi.
2. Wilson, K. and K.H. Goulding, 1986. Biologists Guide to Principles and Techniques of Practical Biochemistry. ELBS Edition, London.

15BTU102 ALLIED CHEMISTRY-1 4H - 4C

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

Course Objectives

The main objectives of the course are

- The molecular orbital theory, preparation and properties of inorganic compounds.
- Theory of covalent bond, polar effects and stereochemistry of organic compounds.
- About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
- Elements of photochemistry, chemical kinetics and chromatography.
- About the dyes, chemotherapy and vitamins.
- To know the principles of Column, Paper and Thin Layer Chromatography.

Course Outcomes

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

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About important industrial chemicals like silicones, fuel gases and fertilizers and their impact on environment.
4. Elements of photochemistry, chemical kinetics and chromatography.
5. About the dyes, chemotherapy and vitamins.
6. Principles and applications of Column, Paper and Thin Layer Chromatography.

Unit-I

Chemical Bonding: Molecular orbital theory-linear combination of atomic orbitals-bonding and antibonding molecular orbitals-energy level diagram-bond order- M.O. configuration of H_2, N_2 and F_2 molecules. Diborane: Preparation, properties and structure. $NaBH_4$: Preparation and uses. Borazole: Preparation and properties. Interhalogen compounds: ICl, BrF_3, IF_5 - preparation, properties, uses and structure. Basic properties of iodine. Compounds of sulphur: Sodium hydrosulphite- preparation, properties, uses and structure. Per acids of sulphur: Preparation, properties, uses and structure.

Unit-II

Industrial Chemistry: Silicones: Synthesis, properties and uses. Fuels gases: Natural gas- water gas-semi water gas-carbureted water gas-producer gas- oil gas (Manufacturing details not required). Fertilizers: NPK fertilizer-ammonium sulphate-urea-superphosphate of lime- triple superphosphate-potassium nitrate-ammonium nitrate. Pollution: Water, air and soil pollution-sources and remedies-acid rain-ozone hole-greenhouse effect.

Unit- III

Covalent Bond and Stereoisomerism:

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

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

Unit- IV

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

Preparation, uses and mechanism of action sulpha drugs- preparation and uses of prontosil, sulphadiazine and sulphafurazole-structure and uses of pencillins and chloromycetin. **Vitamins:** Diseases caused by the deficiency of vitamins A, B1, B2, C and D-sources of these vitamins.

Unit- V

Elements of Photochemistry, Chemical Kinetics and Chromatography: Elements of Photochemistry: Photochemical Laws-Beer Lambert's law-Grotthuss-Draper law-Stark- Einstein law (statement only).

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

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

Textbooks

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

Reference Books

1. Gopalan, R. & Sundaram, S. (2003). *Allied Chemistry* (3rd ed.). New Delhi: Sultan Chand & Sons.

15BTU112 ALLIED CHEMISTRY –PRACTICAL 1 3H - 2C

Total hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100

Course Objectives

The student should know

- The molecular orbital theory, preparation and properties of inorganic compounds.
- Theory of covalent bond, polar effects and stereochemistry of organic compounds.
- Theory about important Aromatic or aliphatic
- About the preliminary test
- Elements of chemical confirmatory test.
- Understand the concepts of safe laboratory practices.

Course Outcomes

The student understands

1. The molecular orbital theory, preparation and properties of inorganic compounds.
2. Theory of covalent bond, polar effects and stereochemistry of organic compounds.
3. About importance of the preliminary test
4. About the chemical confirmatory test
5. Elements of photochemistry, chemical kinetics.
6. About the safety measures to handle the chemicals in the lab.

Experiments:

Systematic analysis of an organic compound, Preliminary tests, detection of elements present, aromatic or liphatic, saturated or unsaturated, nature of the functional group, confirmatory tests-aldehyde, ketones, amines, diamide, carbohydrates, phenols, acids, esters & nitro compounds

Note: Each student analyzes minimum 6 compounds

Reference Books

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

15FCA101 FOUNDATION COURSE A – VALUE EDUCATION 2H - 1C

Instruction hours/week: L:2 T:0 P:0 Marks: Internal: 100 External: Nil Total: 100

Course Objectives

The main objectives of the course are

- To develop a sense of competitive spirit, co-operation, leadership, diligence, punctuality and team spirit
- To provide a backdrop for the development of their creative talents
- To train the students towards sustainable life style
- To improve the Interpersonal relationship
- To know the importance of family relationship
- To acquire tolerance and truthfulness

Course outcome

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

1. Acquire knowledge in facing the interviews
2. Acquire knowledge of Time management
3. To know about Goal Setting
4. To know about Spiritualization
5. Able to create awareness about the values and their significance role
6. Imbibe the concept of discipline and freedom

Unit I

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

Unit II

Goal Setting – meaning and importance; steps in goal setting manners and etiquette – meaning need and importance; means to improve, Positive thinking.

Unit III

Discipline-meaning, concept of roles and responsibility; Time management – Meaning and steps for effective time management

Unit IV

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

Unit V

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

Textbooks:

1. Karpagam University Study Material, 2015

SEMESTER I

15SSD101 SOFT SKILL DEVELOPMENT I 2H - 0C

Instruction hours/week: L:1 T:1 P:0

Course Objectives

The main objectives of the course are

- To impact knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- To adopt new faster methods of calculations.
- To acquire knowledge on coding and decoding
- To get knowledge on the calculation of simple and compound interest
- To develop interpersonal skills

Course outcome

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

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculation
4. Do coding and decoding
5. Calculate profit and loss
6. Improve interpersonal skills

UNIT – I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT – II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding.

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest.

UNIT- IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills**.**

கற்பகம் உயர்கல்வி கலைக்கழகம்
தமிழ்த்துறை
பகுதி - I தமிழ்ப் பாடத்திட்டம் (2015 - 2016)
இரண்டாம் பருவம்
(இளநிலை அறிவியல் பட்ட வகுப்புகளுக்குரியது)

(For I-UG Science Degree Classes) 15LSU201

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், 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

- இந்திய குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில், விருப்பப் பாடமாக இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வுமனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல் தமிழ்' ; 'இணைய தமிழ்' குறித்த பன்நோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.
- மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத் திறன் பெற்றிருத்தல்

தாள்கள் வரிசையும் தேர்வுச் செயல்திட்டமும் பகுதி-I தமிழ்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அக/எழுத்து	மொத்தம்	மதிப்பீடு
இரண்டு	II	5	3	40 / 60	100	5

அலகு - I : பக்தி இலக்கியம்

1. சைவம் - முதல் தேவாரத்திலிருந்து தேர்ந்தெடுக்கப்பெற்ற15 பாடல்கள்
2. வைணவம் – ஆண்டாள் நாச்சியாரின் திருப்பாவையிலிருந்து 11 பாடல்கள்

அலகு – II : சங்கஇலக்கியம்

அ). எட்டுத்தொகை

நற்றிணை: 1. இலை இல பிடவம், திணை – முல்லை,
ஆசிரியர் – விழிக்கட் பேதைப் பெருங்கண்ணனார்.
2. மடல் மா ஊர்ந்து, திணை – குறிஞ்சி, ஆசிரியர் – மடல் பாடிய மாதங்கீரனார்.

குறுந்தொகை : 1. உள்ளார் கொல்லோ, திணை – பாலை, ஆசிரியர் – பெருங்கடுங்கோ.
2. யாரிணும் இனியன், திணை – மருதம், ஆசிரியர் – வடமவண்ணக்கன் தாமோதரனார்.

ஐங்குறுநூறு : 1. நுண்ணோர் புருவத்த, திணை – குறிஞ்சி, ஆசிரியர் – கபிலர்.
2. அவறொறுந் தேரை, திணை – முல்லை, ஆசிரியர் - பேயனார்.

பதிற்றுப்பத்து – ததைந்த காஞ்சி, ஆசிரியர் - பாலைக் கௌதமனார்.

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

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

அகநானூறு - 1. ஆடு அமைக் குயின்ற, திணை – குறிஞ்சி, ஆசிரியர் – கபிலர்.
2.யான் எவன் செய்கோ தோழி, திணை – பாலை, ஆசிரியர் – நோய்பாடியார்.

புறநானூறு - 1. சிறப்பில் சிதடு முறுப்பில், திணை – பொதுவியல்,
ஆசிரியர் – உறையூர் முதுகண்ணன் சாத்தனார்.
2.இளையரு முதியரும் வேறுபுலம் படா – ஆசிரியர் – கயமனார்.

ஆ). பத்துப்பாட்டு - சிறுபாண் ஆற்றுப்படை – கடையெழு வள்ளல்களின் சிறப்பு.
நல்லியக்கோடனின் சிறப்பு, ஈகைத் திறம்.

அலகு - III : காப்பியங்கள்

1.மணிமேகலை –பாத்திரம் பெற்ற காதை – தீவதிலகை, மணிமேகலைக்குச் சொல்லியது,
சிறைக்கோட்டம் அறக்கோட்டமாக்கிய காதை – மணிமேகலை வேண்ட,
மாவண்கிள்ளி, சிறைக்கோட்டத்தை அறக்கோட்டமாக்கியது.

2. கம்பராமாயணம் - இலக்கியநயம் மிக்க, தேர்ந்தெடுக்கப்பெற்ற 41 பாடல்கள்.

அலகு - IV : கட்டுரைகள்

1.திருக்குறளில் மனிதவள மேலாண்மைக் கருத்துக்கள் - திருமிகு ஹரி விஜயலட்சுமி.

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

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

4.தமிழில் அறிவியல் – ஒரு பார்வை - பேராசிரியர் சிவகுமார்.

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

அலகு - V : இலக்கணமும் மொழிப்பயிற்சியும்

1.எழுத்து, சொல், பொருள் இலக்கண எழுத்துப்பயிற்சிகள்

2.பொதுக் கட்டுரைகள்

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

Semester II

15ENU201 **ENGLISH-II** **4H - 4C**

Total hours / week: L:4 T:0 P:0 **Marks: Internal: 40 External :60 Total:100**

Course Objectives

The main objectives of the course are

- To acquire English language skills through literature
- To familiarize them with English literature
- To acquire Grammar knowledge
- To imbibe cultural values
- To get skill of making correct sentences
- To reflect originality on the application of soft skills and express in writing their views

Course Outcomes

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

1. Learn to enjoy the ecstasy of literature
2. The select literary pieces will develop the confidence level of the learners
3. To get the social values
4. To know the importance of communication
5. Get sound knowledge in English
6. Communicate well for business purpose

UNIT I:

Prose: The Unexpected- Robert Lynd
Poetry: The Village Schoolmaster – Oliver Goldsmith
Short Story: The Lion's Share – Arnold Bennett
Vocabulary: Homonyms
Grammar: Irregular Verbs

UNIT II:

Prose: Travel by Train – J. B. Priestly
Poetry: The Gift of India **–** Sarojini Naidu
Grammar: Sentence patterns
Composition: Reading Comprehension

UNIT III:

Prose: Women's Education is Almost More Important than the Education of Boys and Men – Indira Gandhi
Short Story: The Necklace – Guy De Maupassant
One-Act Play: The Referee – W.H. Andrews and Geoffrey Dearmer
Vocabulary: Similes
Grammar: Discourse Markers
Composition: Report Writing

UNIT IV:

Poetry: Ozymandias – P.B. Shelley
One-Act Play: The Pot of Broth- W.B. Yeats
Vocabulary: Collective Nouns
Grammar: Correction of Sentences
Composition: Picture Reading

UNIT V:

Short Story: The Silver Butterfly**–** Pearl S. Buck
One-Act Play: The Bear – Anton Chekov
Vocabulary: Acronyms
Grammar: Question Tags
Composition: Drafting Advertisement

Prescribed Texts

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

Reference

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

SEMESTER II

15BTU201 MICROBIOLOGY 5H - 5C

Total hours/week: L:4 T:1 P:0 **Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course are

- To inculcate knowledge on fundamentals of microorganisms.
- To learn the structural organization, morphology and reproduction of microbes.
- To know the principles of Microscopy and advancements in Microscopy
- To deal with the study of genetic, metabolic strategies and ecology of microorganisms.
- To learn the basic knowledge of the main microbiological techniques to be applied in the laboratory.
- To develop understanding about microbial metabolism, growth, energy generation and disease caused.

Course Outcomes

On completion of the course, students are able to

1. Gain rigorous knowledge on historical perspective of Microbiology
2. Acquire basic knowledge on different structure of microbes.
3. Get Ideas on different type of microscope.
4. Acquire basic knowledge the different applications of microbiology in biotechnology.
5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms.
6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused.

UNIT - I

General Microbiology: Definition, history, scope, discovery and development of microorganisms, **Microscopy**: Bright field, dark field, phase contrast, fluorescence and confocal microscopy. Electron Microscope - SEM and TEM.

UNIT –II

Microbiological Techniques: Types of media preparation, methods of sterilization, techniques of pure culture, maintenance and preservation. Staining – types of stains and dyes, staining methods. Microbial growth.

UNIT –III

Microbial Physiology: Microbial growth, growth factors, Impact of environmental factors on growth, nutritional classification of microbes- energy production, oxidation, reduction reactions, aerobic and anaerobic.

UNIT – IV

Microbial Diversity: General structure of microbes-bacteria, viruses, algae, fungi and protozoans – Outline classification of each group and identification. Viruses **–** Structure, Classification and Replication.

UNIT - V

Microbial Diseases: Causative agent, pathology, diagnosis, control and treatment of Bacterial - TB, Cholera and Typhoid. Protozoan – Amoebiasis and Malaria. Viral - AIDS. Control of microorganisms – drugs, chemotherapy, antimicrobial agents.

Textbooks:

1. Cossart, P, P. Boquet, and S. Normark, 2005. Cellular Microbiology. American Society for Microbiology, New York.
2. Jay, J. M, M. J. Loessner, G. A. David, 2006. Modern Food. VII Edition. Springer Publications, New York.

References:

1. Pelzar, M.J, 2003. Microbiology. Tata McGraw-Hill Publishing Company Ltd, New York.
2. Prescott. L.M, 1996. Microbiology. III Edition, Wm. C. Brown Publishers, London.

15BTU211 MICROBIOLOGY- PRACTICAL II 5H - 3C

Total hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To understand the basic principles of microscopy ultra-structure of microbes along with staining and sterilization methods
- To understand various accessories for microbiology Practicals
- To acquaint the students with various aspects of basic and applied microbiology
- To understand the biochemical characterization of isolated microbes
- To develop practical biological skills such as staining, sterilization etc.
- To develop skills on primary screening of microorganisms

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in aseptic techniques
2. Have outline knowledge on isolation, sub culture and maintenance of microbes
3. Gain experience in microbiological laboratory practices and skills in the design and execution of microbiology related research
4. Develop skills to prepare useful medias for microbial growth in the laboratory
5. Use of handling of glass wares, minor equipment for conducting experiments
6. Learn safety and precautionary measures for working with microbes in a laboratory

Experiments

1. Sterilization, Disinfection, and Antisepsis
2. Culturing and Preserving Microorganisms
3. Media preparation (Liquid, solid and semi-solid)
4. Isolation of organisms from soil, water and air
5. Pure culture technique – Pour plate, streak plate and Spread plate method
6. Staining technique - Simple staining, Gram's staining, Flagella staining Endospore staining, Lacto phenol cotton blue.
7. Biochemical analysis – IMVIC, Urease, Carbohydrate fermentation, TSI
8. Measurement of growth rate of bacteria
9. Plaque Assay for Bacteriophage
10. Motility – Hanging drop, Soft agar analysis

Texts

1. Bharucha, F.D. and A.I. Mehta, 2000. Handbook of Microbiological Methods and Media. Sevak Printers, Mumbai.
2. Cappuccino, J.G. and N. Sherman, 2004. Microbiology-A Lab Manual. Pearson Education, Singapore.

References

1. Dubey, R.B. and E. Maheswari, 2004. Practical Microbiology. S. Chand and Co. Publishers, New Delhi.
2. Goldman, E. and H. G. Lorrence, 2008. Practical Handbook of Microbiology. II Edition, CRC press, London.

15BTU202 ALLIED CHEMISTRY-II 4H - 4C

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

Course Objectives

- To make the student to be conversant with the extraction of metals, coordination chemistry, preparation, properties uses and structure of naphthalene and heterocyclic compounds.
- To make the student acquire sound knowledge of electrochemistry, biological functions of amino acids and proteins.
- To educate students on chemistry of carboxylic acids, nitro compounds and carbohydrates.
- To impart basic understanding on Thermodynamics
- To educate students on topics Electrochemistry
- To educate on thermodynamic laws, entropy, enthalpy change and the principles of electroplating.

Course Outcomes

1. The students will be able to understand the metallurgy of metals and the theories of coordination compounds and the industrial importance of EDTA, haemoglobin and chlorophyll.
2. The students will be able to understand the concept of aromaticity and preparation of aromatic compounds including heterocyclic compounds.
3. The students will be able to understand the preparation, classifications and properties of amino acids, proteins and carbohydrates.
4. The students will be able to understand the concepts of first and second laws of thermodynamics.
5. The students will be able to understand the fundamentals of electrochemistry.
6. To expose students on radical analysis in inorganic mixtures; Determination of surface tension and viscosity of liquids.

Unit-I - Metals and Coordination Chemistry:

Metals: General methods or extraction of metals-method of ore dressing-types of furnaces-reduction methods-electrical methods-types of refining- Van Arkel process – zone refining.

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

Unit-II - Aromatic Compounds and Heterocyclic Compounds:

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

Naphthalene: Isolation, preparation, properties and structure.

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

Unit- III - Amino acids, Proteins and Carbohydrates:

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

Proteins: Classification, properties, biological functions and structure.

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

Unit- IV

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

Unit- V

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

Textbooks

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

Reference Books

1. Gopalan, R. & Sundaram, S. (2003). *Allied Chemistry* (3rd ed.). New Delhi: Sultan Chand & Sons.

15BTU212 ALLIED CHEMISTRY –PRACTICAL II 3H - 2C

Total hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total: 100

Course Objectives

- The student on successful completion of the course should learn the principles of volumetric analysis
- To estimate the compounds by acidimetry, alkalimetry and permanganometry.
- Experimental practice of quantitative volumetric analysis.
- The objective of the titration is the determination of the concentration or the mass of the minimum formula from the titrated chemical material composing a pure liquid or a solution.
- The main objective of volumetric analysis is to determine the amount of a substance ϖ in a given sample.
- When dealing with volumetric analysis the concept of concentration cannot be avoided. Molarity i.e. moles per litre or decimeter is widely used unit of concentration.

Course Outcomes

1. Student will be able to learn the principles of quantitative analysis of inorganic compounds.
2. Student will be able to learn the estimation of sample present in a solution by volumetric analysis
3. Understand the concepts of quantitative analysis
4. Recognize the indicators, acid and bases used in volumetric analysis
5. Estimate the amount of substance present in a given solution
6. Utilize the mathematical skills doing calculations

Contents

VOLUMETRIC ANALYSIS

A. Acidimetry & Alkalimetry

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

B. Permanganometry

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

Reference Books

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

SEMESTER II

15FCB201 FOUNDATION COURSE B – ENVIRONMENTAL STUDIES 2H - 1C

Total hours/week: L:2 T:0 P:0 Marks: Internal: 40 External: 60 Total: 100

Course Objectives

The main objectives of the course are

- To study the definition and components of ecosystem
- To get knowledge on the classification of ecosystem
- To know about biodiversity and threats to biodiversity
- To gain adequate information about rain water harvesting and its importance
- To acquire knowledge on Environmental Protection Act
- To recognize Resettlement and Rehabitilisaion

Course Outcomes

On completion of the course, students are able to

1. Explain the components of ecosystem
2. Describe the biodiversity and point out the biodiversity hot spots
3. Designate the threats to biodiversity
4. List out the effects of environmental pollution
5. Elucidate the solid waste management
6. Explicate the poaching of wildlife

Unit - I:

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

Unit - II:

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

Unit - III:

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

Unit - IV:

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

Unit - V:

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

Textbooks

1. Agarwal, K.M., P.K. Sikdar and S.C. Deb, 2002. A Text Book of Environment, Mac Millan India Ltd, Kolkatta,

2. Kotwal, P.c. and S. Banerjee, 2002. Biodiversity Conservation - In Managed forest and protected areas, Agrobios, India.

References

1. Singh, M.P., B.S. Singh and Soma S. Dey, 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, Delhi.

2. Uberoi, N.K., 2005. Environmental Studies, Excel Books Publications, New Delhi, India.

3. Shaw, Rand Krishnamurthy, R.R. 2009. Disaster management: global challenges and local solutions Universities Press (India) Private Ltd, Hyderabad.

4. Sorokin Pitirim. A, 1942. Man and Society In Calamity. New York: Dutton, 1942

5. Patrick L.Abbott, 2008. Natural Disasters, Mc Graw Hill, New York. Page: 1-7.

SEMESTER I & II

15SSD201 SOFT SKILL DEVELOPMENT I 2H - 0C

Instruction hours/week: L:1 T:1 P:0

Course Objectives

The main objectives of the course are

- To impact knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate various principles involved in solving mathematical problems
- To adopt new faster methods of calculations.
- To acquire knowledge on coding and decoding
- To get knowledge on the calculation of simple and compound interest
- To develop interpersonal skills

Course outcome

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

7. Acquire knowledge in facing the interviews
8. Obtain acquaintance of time management
9. Imply new faster methods for calculation
10. Do coding and decoding
11. Calculate profit and loss
12. Improve interpersonal skills

UNIT – I

Introduction to Quantitative Aptitude, Speed Maths, Problems on Numbers, Averages, Ratios and Proportions, Problems on Ages

UNIT – II

Number Series, Blood Relation, Image Analysis, Direction Sense, Syllogism, Coding and Decoding.

UNIT – III

Percentages, Data Interpretation, Profit and Loss, Simple Interest and Compound Interest.

UNIT- IV

Parts of Speech, Tense, Subject Verb Agreement, Active and Passive Voice, Articles, Prepositions

UNIT – V

Conditional Clause, Degrees of Comparison, Goal Setting, Interpersonal Skills**.**

15ENU301 ENGLISH - III 4H - 4C
Total hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To develop confidence to respond in English during situations where the use of English is imperative
- To grow fluency in actual conversation in the English language
- To develop speech skills necessary for confident and intelligent participations in Group discussions
- To develop knowledge about business communication
- To improve the hearing skills
- To enhance the reading skills
- To sequence the sentence appropriately

Course Outcomes

On completion of the course, students are able to

1. Explain the basics and purposes of listening skill
2. Understand the importance of speaking
3. Students developed the speaking skills on telephone, business and also in travel
4. Implement an effective vocabulary learning strategy
5. Make an effective communication
6. Translating short sentences and passages

UNIT I

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

UNIT II

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

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

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

(Completing dialogues)

UNIT III

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

UNIT IV

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

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

UNIT V

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

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

Reference Books

1. Language in Use: Kenneth Anderson, Cambridge University Press.
2. Study Speaking: A course in Spoken English for Academic Purpose: Kenneth Anderson, Joan MacLean and Tony Lynch, Cambridge University Press, 2008.
3. Spoken English Part I & II (for Tamil speakers), Orient Longman Pvt. Ltd.
4. Dr. J. John Love Joy, Dr. Francis M.Peter S.J. "Lets Communicate – Basic English for Everyone", Vaigarai Publications, 1st edition, Dindigul 2007.

15BTU301 BIOINSTRUMENTATION 4H – 4C
Total hours/week: L:3 T:1 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives
The main objectives of the course are

- To study the bio-analytical tools and their applications
- To have sufficient knowledge on the separation of compounds from a mixture
- To recognize the working principle and instrumentation of spectrometer
- To understand the procedure for handling the instruments
- To study the applications of centrifugation
- To understand the gel documentation and application

Course Outcomes
On completion of the course, students are able to

1. Know the working principle, maintenance, and calibrations of bioanalytical tools and technique
2. Estimate the number of biomolecules using the Bioanalytical tool
3. Implement the bioanalytical techniques to analyze the biomolecules
4. Explain the working principle of spectrophotometer
5. Appreciate the applications of the gel documentation
6. Acquaint knowledge on the results interpretations

UNIT – I
Analytical Devices: Triple beam – analytical and semi microbalance. pH meter: pH scale, methods of calculating pH from Henderson's equation. Types of electrode, measurement of pH, pH indicators. Conductivity meter: Principles, instrumentation and application.

UNIT – II
Colorimetry: Colour and absorption spectra, Beer's law and Lambert's law, principles, Instrumentation and applications. Spectrophotometry: component of the instrument, single beam, double beam, UV-visible spectrophotometer-Principle and instrumentation and application. Fluorimetry-Principle, Instrumentation and application.

UNIT – III
Centrifugation: Principles, types, analytical and preparative, density gradient and ultra centrifugation-instrument and applications- fractionation of cellular components.

UNIT – IV
Chromatography: Paper, TLC, HPTLC **-**Principles, instrumentation and applications. Column and ion exchange chromatography, GC and HPLC.

UNIT – V
Electrophoresis: Principles, instrumentation and application of agarose gel electrophoresis, native SDS-PAGE, Isoelectric focusing and immunoelectrophoresis. Gel documentation and application.

Textbooks

1. Holme, DJ. and Hazelpeck, K, 1998. Analytical Biochemistry. III edition, Longman Publications, London.
2. Boyer.R, 2000. Modern Experimental Biochemistry, III Edition, Addision Wesley Longman, New Delhi.

References

1. David Friedfelder, 2001. Molecular Biology, V Edition Oxford Publishers, New York.
2. Keith Wilson and John Walker, 2006. Principles and Techniques of Biochemistry and Molecular Biology, VIth Edition, Cambridge University Press, India.
3. Switzer, R and Garrity.L, 1999. Experiment Biochemistry. III edition, W.H. Freeman and Company Publishers, New York.

15BTU302 CELL AND MOLECULAR BIOLOGY 4H - 4C

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

Course Objectives

The main objectives of the course are

- To enable students to learn the basic structure of cells
- To know the structural organization of plasma membrane
- To understand the concept of cell signaling and signal transduction
- To emphasize the basic knowledge about genetic code and its concept
- To obtain the adequate knowledge on the structure and functions of biomolecules
- To gain the information about the DNA damage and repair mechanisms

Course Outcomes

The learners will be able to

1. Appreciate the unique features of plant and animal cells
2. Gain knowledge on the organization of the plasma membrane
3. Acquire knowledge about the concepts of genetic code
4. Achieve knowledge about the functions of nucleic acids and proteins
5. Obtain an in-depth knowledge on the structural organization of biomolecules
6. Explain about mutations and its types

UNIT – I

Cellular Organization: Cell theory, Classification cell types- Prokaryotic and Eukaryotic cells, structure and organization- plant and animal cell. Various types of cell division. Chromosome biology – histone and non-histone proteins, Recombination in models- Homologous and site-specific recombination.

UNIT – II

Membrane models, Composition, structure and functions of plasma membrane- functions: electrochemical gradients and action potentials, pumps, channels. transport of nutrients, ions –Active and passive. Cell signaling and Signal transduction.

UNIT – III

Genetic Material: DNA as genetic material**,** structure of Nucleic acids –DNA, supercoils, RNA- types – tRNA, mRNA, rRNA and Sn RNA, Genetic code and its concept, Anatomy of a gene, DNA replication and its models, DNA binding protein.

UNIT – IV

Protein synthesis: Control sequence- Promoter, operator, terminator, enhancers, silencers and attenuation, Transcription and translation. Operon concept- regulatory genes and structural, Lactose, tryptophan.

UNIT – V

DNA damage and repairs mechanisms: Types, Mutation and its types, Mutagens-Physical and chemical. Transposon and retrotransposon.

Textbooks

1. Lehninger and Nelson Cox. 1993. Principles of Biochemistry. CBS Publishers, New Delhi.
2. Bruce Alberts, D. Bray, J. Lewis, M. Raff, Roberts and J.D. Watson, 1994. Molecular Cell Biology, II Edition, Garland Publishing Inc., New York.

References

1. Gerald Karp, 2005. Cell and Molecular Biology- Concepts and Experiments, IV Edition, Wiley International Edition, New York.

2. Sambrook, J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning, a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York.

3. Watson, J.D, N.H. Hopkins, J.W. Roberts, J. Steitz and A.M. Weiner, 1987. Molecular Biology of Gene. IV Edition, The Benjamin Cummings Publishers Inc., California.

Course Objectives

The main objectives of the course are,

- To inculcate practical skill in handling Microscope
- To develop skills on identification of cells in plant and animal sources
- To detect the chromosomal aberration
- To analyze the membrane components
- To learn what are the solutions required for cell and molecular biology experiments and how to prepare it
- To understand the principles and applications of cell and molecular biology

Course Outcomes

The learners will be able to

1. Perform the experiments for isolation, purification and visualize the nucleic acid from various sources
2. Acquire skills on microtomy
3. Gain basic knowledge on sex chromatin
4. Know the protocol for fractionation of cellular components
5. To perform the chromosomal aberration experiment
6. Know how they control cellular activity and they respond to environment

Experiments

1. Identification of plant and animal cell types
2. Identification of microbial cell types
3. Fractionation of cellular components (Chloroplast, Mitochondria)
4. Cell membrane, separation and analysis of membrane components
5. Cell permeability
6. Chromosomal aberration (Onion root)
7. Microtomy
8. Preparation of sex chromatin
9. Mitotic preparation from onion root tip
10. Salivary gland chromosomes of *Chironomous* larvae

Textbooks

1. Nigam, A. and A. Ayyagari, 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill Publishing Company Private Ltd., India

2. Dealtry, G.B. and Rickwood, D, 1992. Cell Biology. LAB FAX. Bio Scientific Publishers, India.

References

1. Sambrook, J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning, a Laboratory Manual, Cold Spring Harbor Laboratory Press, New York.
2. Watson, J.D, N.H. Hopkins, J.W. Roberts, J. Steitz and A.M. Weiner, 1987. Molecular Biology of
3. Gene. IV Edition, The Benjamin Cummings Publishers Inc., California.

15BTU303A ALLIED ELECTIVE – I BIOSTATISTICS 4H - 4C
Total hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60
Total:100

Course Objectives

The main objectives of the course are

- To know the scope of biostatistics
- To learn the knowledge about graphical and diagrammatic representation of Statistical data
- To gain adequate knowledge about the applications of biostatistics
- To learn the knowledge about collection, processing and presentation of data and testing of hypothesis
- To learn the knowledge about measures of central tendency, measures of dispersion
- To learn the knowledge about correlation analysis and regression analysis

Course Outcomes

On completion of the course, students are able to

1. Apply the statistical tool knowledge for research data analysis
2. Understand the concept of various hypothesis regarding data analysis
3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)
4. To perform analysis to determine the mean, median, mode and standard deviation of given sample/data
5. To perform analysis, determine the probability of given sample/data
6. To perform the t-test/F-Test and Chi-square test of given data

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT – IV

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

UNIT – V

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

Textbooks

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

References

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

15BTU303A ALLIED ELECTIVE – I BIOSTATISTICS – PRACTICAL 3H - 2C
Total hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To gain mathematical approach for analyzing the data.
- To learn the knowledge about graphical and diagrammatic representation of Statistical data.
- To learn the knowledge about Scope and applications of biostatistics
- To learn the knowledge about collection, processing and presentation of data and Testing of hypothesis
- To learn the knowledge about Measures of central tendency, Measures of dispersion
- To learn the knowledge about Correlation analysis and regression analysis

Course Outcomes

On completion of the course, students are able to

1. Apply the statistical tool knowledge for research data analysis.
2. Understand the concept of various hypothesis regarding data analysis.
3. To perform analysis for the data based on graphical representation (Bar, multiple bars, histogram, pie chart etc.)
4. To perform analysis to determine the mean, median, mode by SPSS package
5. To perform analysis, determine the probability of given sample/data
6. To perform Karl Pearson's Correlation of given data

PRACTICAL

1. Mean for individual, discrete series using SPSS Package.
2. Mean for continuous series using SPSS Package.
3. Median for individual and discrete series using SPSS Package.
4. Median for continuous series using SPSS Package.
5. Mode for individual and discrete series using SPSS Package.
6. Standard deviation for individual and discrete series using SPSS Package.
7. Coefficient of variation for individual and discrete series using SPSS Package
8. Karl Pearson's Correlation using SPSS Package.
9. Rank Correlation Coefficient for United Rank using SPSS Package
10. Rank Correlation Coefficient for Tied Rank using SPSS Package.

References:

1. Navanitham P. A, 2004, Business Mathematics and Statistics, Jai Publications, Trichy.

2. Gupta S.P., 2001, Statistical methods, Sultan Chand & Sons, New Delhi.

15BTU303A ALLIED ELECTIVE – I CLINICAL MICROBIOLOGY 4H - 4C
Total hours/week: L:4 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To inculcate knowledge on fundamentals of microorganisms
- To learn the structural organization, morphology and reproduction of microbes
- To know the principles of Microscopy and advancements in Microscopy
- To deal with the study of genetic, metabolic strategies and ecology of microorganisms
- To learn the basic knowledge of the main microbiological techniques to be applied in the laboratory
- To develop understanding about microbial metabolism, growth, energy generation and disease caused

Course Outcomes

On completion of the course, students are able to

1. Gain rigorous knowledge on historical perspective of Microbiology
2. Acquire basic knowledge on different structure of microbes
3. Get Ideas on different type of microscope
4. Acquire basic knowledge the different applications of microbiology in biotechnology
5. Acquire basic knowledge of genetic, metabolic strategies and ecology of microorganisms
6. Acquire basic knowledge about microbial metabolism, growth, energy generation and disease caused

UNIT – I

Scope of clinical Microbiology- Safety precautions in laboratory – Aseptic collections – transportation – handling of pathological specimens (blood, urine, sputum, pus and stool)- Antibiotic susceptibility testing (Kirby Bauer method).

UNIT – II

Definitions of pathogens, saprophytes and commensals – Infection- Sources and methods – Infectious disease cycle – Definitions of Endemics, Epidemics and Pandemics- Investigation of epidemics and its control.

UNIT – III

Gram Positive bacteria: Morphology, cultural characteristics, pathogenecity and laboratory diagnosis. *Staphylococcus aureus, Streptococcus pyogenes, Bacillus anthracis, Corynebacterium diphtheriae.*

UNIT – IV

Gram negative bacteria: Morphology, cultural characteristics, pathogenecity, and laboratory diagnosis, *E. Coli, Klebsiella pneumonia, Proteus vulgaris, Pseudomonas aeruginosa, Vibrio cholera.*

UNIT – V

Normal microbial flora of the human body (skin, intestinal tract, genitourinary tract and respiratory tract) – Vaccines and Antibiotics.

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Baron, E. J. and S. M. Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Collee J. G., A. G. Fraser, B.P. Marmion and A. Simmons, 1996. Mackie and McCartney Practical Medical Microbiology 14th Edition. New York, Churchill Livingstone.
5. Thomas, P.A. 2007, Clinical Microbiology. Orient Longman Private Ltd, New Delhi.

SEMESTER III

15BTU303A **ALLIED ELECTIVE – I** **3H - 2C**

CLINICAL MICROBIOLOGY PRACTICAL

Total hours/week: L:0 T:0 P:3 **Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course are

- To understand the basic principles of Analysis of Blood grouping
- To understand various accessories for clinical microbiology practical
- To acquaint the students with various aspects of analysis of Rh typing
- To learn the techniques of antibiotic sensitivity assessment
- To develop practical skills to perform WIDAL test

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in aseptic techniques
2. Perform blood grouping and Rh typing
3. Carry out antibiotic sensitivity test
4. Do WIDAL test
5. Learn safety and precautionary measures for working with microbes in a laboratory
6. Accomplish the processing of urine and csf

Practical

- Analysis of Blood grouping and Rh typing
- Collection and processing of sputum and stool
- Collection and processing of urine and csf
- Performance of WIDAL – slide and tube test
- Preparation of antibiotic disc.
- Antibiotic sensitivity testing – disc diffusion method
- Antibiotic sensitivity testing – well diffusion method

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Baron, E. J. and S. M. Finegold, 1990. Bailey and Scott's Diagnostic Microbiology. 8th Edition, The C.V. Mosby Company. St. Louis, Missouri.
3. Gunasekaran, P. 1996. Lab Manual in Microbiology. 1st Edition, New age international P. Ltd., Publishers, New Delhi.
4. Jayaram, J. 2002. Lab Manual in Biochemistry. New age international P. Ltd., Publishers, New Delhi.
5. Kannan, N. 2002. Laboratory Manual in General Microbiology. Panima Publishing Corporation, New Delhi.

SEMESTER III

15BTU303A ALLIED ELECTIVE – I GENERAL MATHEMATICS 4H - 4C

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

Course Objectives

The main objectives of the course are

- To gain mathematical approach for analyzing the data
- To learn the knowledge about matrix Algebra
- To learn the knowledge about differential calculus
- To learn the knowledge about Integral calculus
- To learn the knowledge about probability theory
- To learn the knowledge about theoretical distribution

Course Outcomes

On completion of the course, students are able to

1. Apply the algebra for research data analysis
2. Understand the concept of Differential Calculus
3. Perform Integral Calculus
4. Perform analysis based on Probability theory
5. Perform analysis on the theoretical distribution
6. Perform analysis on First and Second order derivatives

UNIT- I

Matrix Algebra: Addition - Subtraction - Multiplication - Transpose – Inverse of a matrix- Solving Simultaneous Linear equations by matrix method.

UNIT- II

Differential Calculus: Meaning of derivatives - Simple Differentiation of Algebraic, Exponential, Logarithmic functions - Evaluation of First and Second order derivatives- Maxima and Minima of functions.

UNIT- III

Integral Calculus: Definite and Indefinite integrals - Methods of Integration - Integration by substitution - Integration by parts.

UNIT-IV

Probability theory: Axioms of Probability-Addition theorem - Multiplication theorem- conditional Probability - Baye's theorem.

UNIT- V

Theoretical Distribution: Basic Concepts - Binomial distribution, Poisson Distribution &Normal distribution (No derivations) and simple problems.

Textbook

1. Singaravelu.A.,2011, Engineering Mathematics Vol 1, Meenakshi Publications Arpakkam.
2. Manickavasagam Pillai.T.K, and S. Narayanan, 2002. "Calculus", Volume I, and Volume II, S.V Printers & Publishers, Chennai.
3. Gupta.S.P, 200l. "Statistical methods". Sultan Chand & Sons, New Delhi.

References

1. Navanitham.PA, 2006."Business Mathematics and Statistics". Jai Publishers, Trichy - 2l.
2. PilIai.R.S.N , and V. Bagavathy, 2002. "Statistics", S. Chand & Company Ltd. New Delhi.

15FCC301 INTRODUCTION TO COMPUTERS 4H - 2C Total

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

Course Objectives

The main objectives of the course are

- To understand the basic characteristics of Computers
- To understand classification and development of Computers
- To acquaint the students with various aspects of MS Office
- To understand the working principles of MS Word
- To develop practical skills of MS PowerPoint
- To develop skills on MS Excel

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in basics of operating in system
2. Have outline knowledge on development of Computers
3. Gain experience in practicing MS Office
4. Develop skills to prepare MS PowerPoint presentations
5. Use of handling of computers
6. Learn safety and precautionary measures while working with computers

Unit-I

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

Unit-II

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

Unit III

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

Unit IV

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

Unit-V

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

Textbook:

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

15SSD401 SOFT SKILL DEVELOPMENT - II 2H – 1C

Total hours/week: L:1 T:1 P:0

Course Objectives

The main objectives of the course are

- To impact knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate Time, Speed and Distance
- To adopt new faster methods of Data Sufficiency
- To acquire knowledge on Synonyms, Antonyms, Verbal Analogy
- To get knowledge on Resume Writing, Introduction to HR rounds
- To develop interpersonal skills

Course outcome

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

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculating data sufficiency
4. Do Verbal Analogy
5. Perform best resume writing
6. Improve interpersonal skills

UNIT- I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT-II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT-III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT-IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT – V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behavior

15ENU401 ENGLISH - IV 4H – 4C

Total hours/week: L:6 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To train the students in understanding the concepts of communication
- To be familiar with the four basic skills of English
- To train students in developing their written communication
- To train students in developing their presentation skills
- To acquire the skill of making grammatically correct sentences
- To reflect originality on the application of soft skill views and express in writing their views

Course Outcome

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

1. Students have acquired proficiency in communication
2. Students have become adept in written communication and presentation skills
3. Developed the skill of writing in English and that of public speaking
4. Establish and maintain social relationships
5. Develop communication skills in business environment
6. Enhanced communication competency through LSRW skills

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

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

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

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

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

Textbook

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

Reference

1. Badi, R.V and K. Aruna. Business Communication, 2008, Vrinda Publications: New Delhi.
2. Balasubramanian M and G Anbalagan. Performance in English. 2007.Anuradha Publications: Kumbakonam
3. Mohan, Krishna and Meenakshi Raman.2008, Effective English Communication, Tata McGraw Hill: New Delhi.
4. Selley, John. Oxford Guide to Effective Writing and Speaking. 2005. OUP: New Delhi.

15BTU401 GENETICS 6H – 5C

Total hours/week: L:6 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To deliver the basic concepts of heredity in different living organisms
- To gain the information about the level of genome organization in various living organisms
- To obtain the knowledge about transmission of genetic information across generation at the individual and population level
- To understand how to identify and classify mutations in DNA
- To relate the structure and function of the DNA molecule to its functional role in encoding genetic material
- To describe the basic aspects of the flow of genetic information

Course Outcomes

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

1. Acquire knowledge about the central theories and methodologies traditional, molecular and population genetics
2. Acquire information on sex- linked inheritance and associated diseases
3. Understand the role of genetics in breeding and natural selection
4. Apply the principles of inheritance as formulated by Mendel
5. Apply the Chromosome Mapping
6. Acquire knowledge about the relationship between genetic, physical, and cytogenetic maps

UNIT - I

Science of Genetics – Introduction, Scope and history of Genetics, Mendelian genetics**:** Mendel's principles - Laws of Segregation, independent assortment, applications of Mendel's principles.

UNIT- II

Non-Mendelian genetics- Incomplete dominance, over-dominance and co-dominance. Cytoplasmic inheritance, extranuclear inheritance (mitochondrial, chloroplast), non-chromosomal inheritance, maternal inheritance, uniparental inheritance, Chromosomal variation in Number & Structure, Chromosomal Mosaics, Polytene chromosomes.

UNIT - III

Linkage and Crossing over: Chromosome theory of Linkage, kinds of linkage, linkage groups, types of Crossing over, mechanism of Meiotic Crossing over, kinds of Crossing over, theories about the mechanism of Crossing over, cytological detection of Crossing over, significance of Crossing over.

UNIT - IV

Chromosome Mapping: Haploid mapping (2 point & 3-point cross), Diploid mapping (Tetrad analysis), determination of linkage groups, determination of map distance, determination of gene order, cytological mapping.

UNIT - V

Human Cyto-Genetics: Human karyotype, Banding techniques, classification, use of Human Cyto-genetics in Medical science, Chromosomal abnormalities in spontaneous abortions, viable monosomies & trisomies, chromosomal deletions & duplications, genetics of chromosomal inversions & translocations, human traits, Genomic position effects on Gene expression.

Textbooks

1. Brown, T.A, 2007. Genomes III. Garland Science, London.
2. Friedfielter, D, 2007. Molecular Biology. Narosa Publishing House, New Delhi.
3. Gardner, G, 2001. Principles of Genetics. John Wiley and Sons Inc, New York.

References

1. Louise, G, 2004. Genetic Engineering. Gale Group Farmington Hills, New York.
2. Leland, H, 2008. Genetics: From Genes to Genomes. McGraw-Hill, New York
3. Lewin, B, 2004. Genes VIII. Pearson Education Inc., New Jersy.

15BTU402 **IMMUNOLOGY** **6H – 5C**

Total hours/week: L:5 T:1 P:0 **Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course are

- To understand the basic concepts of immunology
- To expose students to use these principles of immune system to combats infections
- To gain the information about the auto immune diseases
- To identify the cellular and molecular basis of immune responsiveness
- To describe the roles of the immune system in both maintaining health and contributing to disease
- To demonstrate a capacity for problem-solving about immune responsiveness

Course Outcomes

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

1. Gain about the various cells and organs involved in the immune system
2. Understand the molecular mechanisms of antigen-antibody interactions
3. And also, the molecular mechanisms behind the immune response evoked after infection by various pathogens
4. Learn the theoretical basis for the various immunological techniques
5. Apply immunological laboratory techniques to understand principles of antigen-antibody reaction
6. Use different immunological test to study the immune effector function and immune development

UNIT - I

Introduction: Historical background & Biological aspects of Immunology, Self and non-self recognition, specificity, memory of immune system. Primary & Secondary lymphoid organs: Thymus, Bone marrow, Lymph nodes, Spleen & MALT.

UNIT - II

Antigens: Essential features of Ag, haptens, Carrier molecule, Immunological valence, Antigenic determinants. Adjuvants: Freund's complete and incomplete.

Antibodies: Nature, Primary structure of immunoglobulins; Classification of Ig: Types – IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE (Origin, structural functions); Major Histocompatability Complex (MHC): antigen processing and presentation; synthesis of antibody and secretion. **Theories of Ab formation:** Instructive, selective, clonal selection.

UNIT - III

Immunity: Active, Passive - Cell-mediated, Humoral, Immune response: primary and secondary response.

Phagocytosis - its mechanism; Null cells: Natural Killer cells; Interferons: Definition & its types; Complement system: Nature, components of compliment pathway; Pathways: Classical and Alternative pathways.

UNIT - IV

Hypersensitivity Reactions (HS): Mechanism and pathogenicity - **Type I:** Allergies and anaphylaxis; **Type II:** Antibody mediated HS reactions; **Type III:** Immune complex mediated HS reactions, **Type IV:** Delayed type (or) cell-mediated HS reactions; **Type V:** Stimulatory HS reactions.

Auto immunity: Introduction, Auto recognition, classes of auto immuno diseases. (Hashimoto disease, thyrotoxicosis, Systemic lupus erythematosus, Autoimmune haemolytic anemia, Rheumatoid arthritis).

UNIT - V

Transplantation: Types and Graft Rejection; Immunosuppressant drugs (azathioprine, methotrexate, cyclophosphamide, cyclosporin-A, Steroids).

Hybridoma Technology: Production of monoclonal antibodies.

Textbook

1. Kuby, J, 2000. Immunology, WH Freeman & Co.
2. Weir, D.M, 1992. Immunological Techniques. Blackwell Scientific Publications, London

References

1. Roitt, I, 2002. Essential Immunology, (VI Edn.) Blackwell Scientific, Oxford.
2. Pathak, S. 2005. Immunology, (II Edn.) Capital Publishing Company, New Delhi.

15OEU501 OPEN ELECTIVE - I

SERICULTURE TECHNOLOGY 0H- 3C

Total hours/week: L:0 T:0 P:0 Marks: Internal: 00 External: 00 Total:100

Course Objectives

The main objectives of the course are,

- To train the students in mulberry cultivation, farm maintenance, seed Technology, Silkworm rearing, Silk Reeling.
- To know Technology of Mulberry cultivation and basic inputs of water, irrigation, fertilizers, and pest management
- To guide and give counseling to become entrepreneur.
- To know technology of Mulberry cultivation and basic inputs of water, irrigation, fertilizers, and pest management.
- To study the biology and varieties of mulberry silkworms and the basic techniques of silk production and construction of cocoons
- To follow proper technology of rearing silkworm larvae and using disinfection methods so that to get healthy cocoons.

Course Outcomes

The learners will be able to,

1. Acquire knowledge on the physiological aspects of mulberry
2. Know the physical agents like temperature and water, Growth and development
3. Understand the concept and establishment of separate mulberry garden for chawki and late age worms
4. Gather information about the primary, secondary and micronutrients in mulberry
5. Know the impact of nutrient deficiency on silkworm growth and development
6. Understand the genetics and inheritance of voltinism

UNIT – I

General Sericulture – Introduction to Sericulture-Origin and history of Sericulture, Components of Sericulture, Sericultural practices, Employment generation.

UNIT- II

Silkworm Biology - Characteristic features, Classification, Life cycle.

UNIT –III

Mulberry cultivation –soil, Importance, soil pH, organic carbon and NPK level, Propagation of mulberry-seedling, sapling, grafting and layering, other cultivation practices.

UNIT -IV

Silkworm rearing - Rearing house, Rearing appliances, Selection of silkworm races/breeds, Incubation-stgaes, Chawki rearing, Late age silkworm rearing, Identification, Harvesting.

UNIT – V

Silk technology and biotechnology - textile fibres, Physical and commercial characteristics of cocoons, marketing, sorting, Reeling, Raw silk properties, testing, grading. Introduction to by-products of sericulture industry, by- product utilization in mulberry; types of silk waste and pupal waste-oil extraction and cake preparation, Entrepreneurship Development

Textbook:

1. Dandin, S.B. Jayant Jayaswal and Giridhar, K. (Eds.) 2003. Handbook of Sericulture Technologies. CSB, Bangalore.

Reference:

1. Madan Mohan Rao, M. 1999. Comprehensive Sericulture Manual. PS Publications, Hyderabad.
2. Morohoshi, S. 2000. Development Physiology of Silkworms. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi and Calcutta
3. Simon R. Charlsley, 1982. Culture and Sericulture. Academic Press Inc. London.

15BTU411 GENETICS AND IMMUNOLOGY– PRACTICAL IV 5H – 3C
Total hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To learn about prokaryotic and eukaryotic genetic system using modern techniques.
- To inculcate knowledge on Karyotype analysis
- To develop skills on immunodiffusion.
- To understand the fundamentals of genetics and immunology that deals with the practical aspects
- To gain knowledge on Mutagenecity testing
- To study the application of Mono and Dihybrid Cross

Course Outcomes

The learners will be able to

1. Gain rich knowledge on genetic model system used in research
2. Acquire basic knowledge on Karyotype analysis
3. Get Ideas on pedigree analysis for detection of genetic disorders
4. Assess immunodiffusion
5. Have hands on training for various immunological techniques
6. Describe the DOT-ELISA

Genetics

1. Peripheral blood lymphocyte cultures and metaphase preparation
2. Karyotype analysis of Human or Plant chromosomes.
3. Micronucleus test in Plant or animal
4. Comet assay
5. Mutagenecity testing in Tester Strains of *E. Coli*
6. Test for Mono and Dihybrid Cross

Immunology

7. Preparation of serum from blood.
8. Methods of immunization and bleeding.
9. Hemolysis.
10. Single radial immunodiffusion.
11. Double immunodiffusion.
12. Immunoelectrophoresis
13. DOT-ELISA

Textbooks:

1. Brown, T.A, 2007. Genomes III. Garland Science, London.
2. Friedfielter, D, 2007. Molecular Biology. Narosa Publishing House, New Delhi.

References:

1. Gardner, G, 2001. Principles of Genetics. John Wiley and Sons Inc, New York.
2. Louise, G, 2004. Genetic Engineering. Gale Group Farmington Hills, NewYork.
3. Hay, F.C. and M.R. Westwood, 2004. Practical Immunology. Blackwell Science Publishers, London.

4. Janeway, C.A, and P. Travers, 1994. Immunobiology. Current Biology Ltd., Garland Publishing Inc. Churchill Livingstone. London.
5. Kuby, J, 1994. Immunology. W.H. Freeman and Company, New York.
6. Talwar, G. P. and S. K. Gupta, 1992. A Handbook of Practical and Clinical Immunology. Vol 1 and 2, CBS Publications. India.
7. Weir, D.M, 1992. Immunological Techniques. Blackwell Scientific Publications, London.

15BTU403A ALLIED ELLECTIVE – II FUNDAMENTALS OF COMPUTER 4H – 3C

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

Course Objectives

The main objectives of the course are,

- To understand the basic Fundamentals of Computer
- To expose students to use hardware and softwares for interpretation of data
- To gain the information about the C language
- To identify the various program tools for analyzing the data
- To describe the roles of the programs in both maintaining data and interpreting data
- To demonstrate a decision capacity for problem-solving about C programing

Course Outcomes:

The learners will be able to,

1. Gain about the various tools and programs involved in the Computer
2. Understand the hardware and software specifications for data interpretation
3. Know C programs for Decision making for various problems
4. Learn the theoretical basis for the various Arrays
5. Apply C Programing to understand the uniqueness of data
6. Use different test to study how programs are good at decision making with the data provided

UNIT -I

Introduction to computers: What is computer- Brief history of computers- Evaluation of computers- Organization/Components of computers- Computer languages- what is hardware and software? - Types of software- Processing of a computer program- what is operating system? - Classification of computers- Data representation- Algorithms and flow-charting.

UNIT -II

Hardware components: Input devices, output devices and memory devices- Hardware and software- Programs- Machine language- Assembly language- High-level language- Translators Operating system: DOS- UNIX- WINDOWS Computer languages: Low level and High-level languages.

UNIT- III

Overview of C: Introduction- Importance of C- Basic structure of C programs- Executing a C program- Constants- Variables and data types - Operators and expressions: Arithmetic- Relational- Logical- Assignment-Increment/Decrement- Conditional- Bit wise and special operators- Precedence of arithmetic expressions- Managing input and output operators.

UNIT -IV

Arrays: One-dimensional, Two-dimensional arid Multidimensional arrays- Handling of character string- Decision-making and branching- IF- IF ELSE- Nesting of IF ELSE- ELSE IF ladder- SWITCH- Conditional operator- GOTO statement.

UNIT- V

Decision making and looping: WHILE statement- DO statement- FOR statement- Jumps in loops- Structures and unions- User defined functions- Return values and their types- Calling a function- Category of functions- no arguments and no return values- Arguments but no return values- Arguments with return values- Recursion.

References:

Govindaraju, S., M.Chandrashekaran, A. Abdul Haq and T. R. Narayanan,1996. Introduction to Computer Science. New Age International Publishers (P) Ltd, New Delhi.

Xavier, C., 1997. Introduction to Computers and Basic Programming. New Age International Publishers (P) Ltd, New Delhi.

Agor, R., 1999. Elements of Computer Science. V Edition, Birla publications, Calcutta.

Balagurusamy, E., 2000. Programming in ANSI C, III Edition, Tata McGraw- hill publishing company LTD, New Delhi.

Holmes, BJ., 1996. Programming with ANSI C, DP Publications LTD, England.

SEMESTER IV

15BTU403A ALLIED ELLECTIVE PRACTICAL – II C PROGRAMMING PRACTICAL 3H – 2C

Total hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To understand the basic characteristics of C programming practical
- To understand structure of C programming
- To acquaint the students with various aspects of C programming
- To understand the ways to write C programming
- To develop practical skills of C programming
- To develop operations of C programming

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in basics of operating C programming in system
2. Have outline knowledge on development of C programming
3. Gain experience in practicing C programming
4. Develop skills to prepare C program
5. Use of Solving problems with C programming
6. Learn to use the quadratic equation using C programming

Practical

1. Find the Fibonacci series for a given limit.
2. Write a program to find the given number is prime or not.
3. Write a program to solve the given expression (A^2+B^2) *C
4. Write a program to find the given string is palindrome or not.
5. Write a program to find the roots for a given quadratic equation.
6. Write a program for arranging numbers in Ascending order using Bubble sort
7. Write a program for arranging names in alphabetical order.
8. Write a program to illustrate Switch statement.
9. Assume student's marks and Calculate grade for a student's mark.
10. Calculate the factorial value for a given number using function.
11. Find the given number is Armstrong or not.

REFERENCES

1. Govindaraju, S., M. Chandrashekaran, A. Abdul Haq and T. R. Narayanan, 1996.Introduction to Computer Science. New Age International Publishers (P) Ltd, New Delhi.
2. Xavier, C., 1997. Introduction to Computers and Basic Programming. New Age
3. International Publishers (P) Ltd, New Delhi.
4. Agor, R., 1999. Elements of Computer Science. V Edition, Birla publications, Calcutta. Balagurusamy, E., 2000. Programming in ANSI C. III Edition, Tata McGraw-hill
5. publishing company LTD, New Delhi.
6. Holmes, BJ., 1996. Programming with ANSI C. DP Publications LTD, England.

15BTU403B ALLIED ELLECTIVE – II BIOPHYSICS 4H – 3C

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

Course Objectives

The main objectives of the course are

- To understand the basic principles of Bioseperation
- To understand various concepts of Chemical Equilibrium
- To acquaint the students with various aspects of Crystallography.
- To understand the Structural Studies of biomolecules.
- To develop practical instrumentation skills on Spectrometry.
- To develop skills on advance microscopy

Course Outcomes

On completion of the course, students are able to

1. Develop basic skill in aseptic techniques
2. Have outline knowledge on Bioseperation
3. Gain experience in practices and skills in Crystallography
4. Develop skills on Structural Studies of biomolecules.
5. Use of handling of glass wares, minor equipment for conducting experiments.
6. Learn safety and precautionary measures for practical instrumentation skills on Spectrometry.

UNIT -I

Separation Techniques: Bioseperation – batch filtration – continuous filtration – centrifugation – sedimentation velocity and equilibrium methods – reverse osmosis – ultra filtration – micro filtration.

UNIT -II

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

UNIT- III

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

UNIT -IV

Structural Studies: NMR spectra – experimental arrangement – chemical shift – two-dimensional NMR- electron spin resonance technique – hyperfine structure – mass spectrometry.

UNIT- V

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

Textbooks

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

References

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

15BTU403B ALLIED ELLECTIVE PRACTICAL– II BIOPHYSICS - PRACTICAL 3H – 2C

Total hours/week: L:0 T:0 P:3 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To know about Internal friction of low liquids
- To expose students to know Interfacial surface tension
- To gain the information about Surface tension of liquids
- To identify the Specific rotatory power of biological solution
- To describe Specific heat capacity of liquids
- To understand how to verify Newton's law
- To understand the concepts of Thermal conductivity

Course Outcomes

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

1. Gain about the concepts in Biophysics
2. Perform Thermal conductivity test
3. Know the resolving power of telescope
4. Learn the theoretical basis for Emissivity of a surface
5. Apply the concepts of Interfacial surface tension
6. Use different test to study how the Specific rotatory power of liquids

Practical

1. Internal friction of low liquids by Poiseullie's flow method
2. Internal friction of high viscous liquids by Stokes method
3. Interfacial surface tension between two liquids
4. Surface tension of liquids by capillary rise / drop weight method
5. Specific rotatory power of sugar solution using polarimeter
6. Specific rotatory power of biological solution using polarimeter
7. Specific heat capacity of liquids
8. Refractive index of liquids using spectrometer
9. Verification of Newton's law of cooling
10. Wave length of prominent lines of mercury spectrum using a plane transmission grating
11. Resolving power of a telescope
12. Emissivity of a surface - spherical calorimeter
13. Thermal conductivity of bad conductor by Lee's method
14. Thermal conductivity of rubber tubing
15. Thermal conductivity of good conductors.

References:

1. Ouseph C.C, U.J. Rao and V. Vijayendran 2007, Practical Physics and Electronics, S.Viswanathan
2. (Printers & Publishers) Pvt. Ltd., Chennai
3. Singh S.P., 2003, Advanced Practical Physics - 1, 13th Edition, Pragathi Prakashan, Meerut
4. Singh S.P., 2000, Advanced Practical Physics - 2, 12th Edition, Pragathi Prakashan, Meerut
5. Gupta S.L. and V. Kumar, 2002, Practical Physics, 25th Edition, Pragathi Prakashan, Meerut

SEMESTER IV

15BTU403B ALLIED ELLECTIVE – II MEDICAL MICROBIOLOGY 4H – 3C

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

Course Objectives

The main objectives of the course are

- To identify common infectious agents and the diseases that they cause.
- To evaluate methods used to identify infectious agents in medical microbiology lab.
- To recall microbial physiology including metabolism, regulation and replication of pathogenic microbes.
- To explain general and specific mechanisms by which an infectious agent causes disease.
- To recognize and diagnose common infectious diseases from the clinical presentation and associated microbiology.
- To describe the epidemiology of infectious agents including how infectious diseases are transmitted.

Course Outcomes

On completion of the course, students are able to

1. Apply the biotechnology concept for controlling infectious agents.
2. Expertise on the concepts of metabolism, regulation and replication of pathogenic microbes.
3. Able to get knowledge on the toxins released by microbes.
4. Able to enter into a wide range of biotechnology industries with research enterprises.
5. Develop of non-toxic therapeutic agents from microbes
6. Able to get knowledge on Fungal and Protozoan infections

UNIT-I

Bacteriology Morphology, cultural characteristics, antigenic property, pathogenecity, laboratory diagnosis and Treatment. *Staphylococcus* sp., *Streptococcus* sp., *Bacillus* sp., *E. coli, Klebsiella sp., Proteus sp., Pseudomonas sp.*

UNIT-II

General Properties of Fungi - Medically important fungi - diagnosis of fungal disease -routine mycological techniques - antifungal agents.

UNIT-III

Superficial mycosis ~ Cutaneous mycosis - Systemic mycosis _ Opportunistic mycosis- Subcutaneous mycosis

UNIT-IV

Protozoan infections - *Entamoeba histolytica, Plasmodium falciparum, Leishmania donovani – Giardia intestinalis, Trichomonas vaginalis.*

UNIT-V

Helminthic infections - *Taenia solium. Trematodes - Schistosoma haematobium,* Nematodes- *Trichuris trichiura - Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria Bancrofti.*

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Brook,G.F.,J. S. Butel, A. Stephen and Morse, 2003. Medical Microbiology, 22nd Edition. Mc Graw Hill.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
5. Chatterjee, K.D., 1980. Parasitology in relation to medicine. 1th Edition, Chatterjee Medical Publishers, Calcutta.
6. Chunin, j., 2000. Parasitology. New York Publishers, London.

7. Dismukes, W.E., P.G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press, UK.
Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.

15BTU403B ALLIED ELLECTIVE PRACTICAL– II MEDICAL MICROBIOLOGY - PRACTICAL 3H – 2C
Total hours/week : L :0 T :0 P :3 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To obtain basic concepts of Identification of pathogenic bacteria
- To ascertain the diagnostics tools for infectious diseases
- To achieve a complete knowledge about staining and mounting
- To understand the observation of various Fungi
- To understand the observation of various parasites
- To recognize the importance of proper specimen collection and preparation.

Course Outcomes

On completion of the course, students are able to

1. Get hold of the knowledge on fundamentals of medical microbiology techniques.
2. Expertise on the concepts of infection, diagnosis and control assortment.
3. Acknowledge on the qualitative studies based on biomarker observations.
4. Apply methodologies of laboratory diagnostics to relevant states of health.
5. Be aware of characteristics signs of clinical manifestations.
6. Comprehend and analyse the mounted strains.

Practical

1. Identification of clinically important fungi - *Candida albicans*
2. Lacto phenol cotton blue mounting.
3. Identification of *Aspergillus sp.*
4. Identification of *Mucor sp*
5. Identification of *Rhizopus sp.*
6. Identification of *Fusarium sp.*
7. Identification of *Penicillium sp.*
8. Observation of parasites - *Entamoeba sp. Plasmodium sps. Ascaris sp. Taenia sp.*
9. Observation of parasites - Blood smear examination

References

1. Ananthanarayanan, R. and C.K.J. Panicker, 2005. Text Book of Microbiology 7th Edition. Orient Longman, New Delhi.
2. Brook,G.F.,J. S. Butel, A. Stephen and Morse, 2003. Medical Microbiology, 22nd Edition. Mc Graw Hill.
3. Chakraborty, P., 2003. A Text book of Microbiology. 2nd Edition. New Central Book Agency (P) Ltd., Calcutta.
4. Chander, J., 2002. A Text book of Medical Mycology. Interprint Mehta Publishers, New Delhi.
5. Chatterjee, K.D., 1980. Parasitology in relation to medicine. 1th Edition, Chatterjee Medical Publishers, Calcutta.
6. Chunin, j., 2000. Parasitology. New York Publishers, London.
7. Dismukes, W.E., P.G. Pappas and D. Sobel, 2003. Clinical Mycology. Oxford University Press, UK.
8. Jawetz, E., J.L. Melnic and E.A. Adelberg, 2001. Review of Medical Microbiology. 22nd Edition. Lange Medical Publishers. New York.

15SSD401 SOFT SKILL DEVELOPMENT - II 2H – 1C

Total hours/week: L:1 T:1 P:0

Course Objectives

The main objectives of the course are

- To impact knowledge on both aptitude and soft skills to the students
- To critically evaluate and demonstrate Time, Speed and Distance
- To adopt new faster methods of Data Sufficiency
- To acquire knowledge on Synonyms, Antonyms, Verbal Analogy
- To get knowledge on Resume Writing, Introduction to HR rounds
- To develop interpersonal skills

Course outcome

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

1. Acquire knowledge in facing the interviews
2. Obtain acquaintance of time management
3. Imply new faster methods for calculating data sufficiency
4. Do Verbal Analogy
5. Perform best resume writing
6. Improve interpersonal skills

UNIT- I

Time, Speed and Distance, Time and Work, Pipes and Cisterns, Geometry, Data Arrangement

UNIT-II

Analogy, Logic based Venn diagram, Probability, Permutation and Combination, Logarithms

UNIT-III

Data Sufficiency, Clocks, Calendar, Reading Comprehension, Sentence Correction, Sentence Completion, Spotting the Errors, Jumbled Sentences

UNIT-IV

Synonyms, Antonyms, Verbal Analogy, Statements and Assumptions, Group Discussion

UNIT – V

Resume Writing, Introduction to HR rounds, Time Management, Attitude and Behavior

15BTU501 RECOMBINANT DNA TECHNOLOGY 5H – 5C

Total hours/week: L:4 T:1 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To learn the procedure for isolation nucleic acids and Protein.
- To learn the strategies for gene transfer in plants and animals.
- To acquire knowledge on genome mapping.
- To familiarize the student with emerging field of biotechnology
- To acquaint the students to versatile tools and techniques employed in recombinant DNA technology.
- To learn the history and recent developments in rDNA technology, Enzymes used in rDNA technology.

Course Outcomes

On completion of the course, students are able to

1. Outline the fundamental steps in a genetic engineering procedure.
2. Describe the mechanism of action and the use of restriction enzymes in biotechnology research and recombinant protein production.
3. Explain the usefulness of plasmid preparations, how they are performed, and how the concentration and purity of plasmid samples can be determined.
4. Discuss cloning strategies and techniques used to probe DNA for specific genes of interest.
5. Conceptualize PCR technique in medical and forensic science.
6. Summarize various applications of rDNA technology in human health care and safety regulations.

UNIT - I

Introduction to r-DNA technology: Basic techniques – isolation and purification of nucleic acids. Restriction Enzymes, Enzymes used in cloning - DNA polymerases, RNA Polymerases, Reverse Transcriptase, Ligases, Taq polymerase, kinases, phosphatases, transferases, DNase, RNase.

UNIT - II

Cloning vectors – Plasmids: bacteriophage based, M13 phage based, phagemids. Cosmids, yeast artificial chromosomes, bacterial artificial chromosomes, Covalent linkage of DNA fragments to vector molecules: Linkers, Adapters, homopolymer tailing. Generation of genomic and cDNA libraries, Solid phase synthesis of DNA.

UNIT - III

Selection and screening of recombinant clones: Probe preparation - radiolabelled and non radiolabelled, Guessmers and degenerate probes. Sequence dependent and independent screening, southern-western, colony and plaque hybridization, *in situ* chromosomal hybridization, chromosome walking.

UNIT – IV

Expression and characterization of cloned DNA: Expression vectors, optimization of protein expression in heterologous systems, Fusion proteins, *In vitro* translation systems. RNAi vectors. Restriction mapping. DNA sequencing, PCR, VNTRs, DNA fingerprinting, SNPs, RFLPs.

UNIT - V

Applications of recombinant DNA technology: Production of recombinant proteins in bacterial and eukaryotic cells. Identification of genes responsible for human diseases, diagnostics, gene therapy. Genetically modified plants. Ethical, legal and social issues.

Textbook:

1. Winnacker, E.L, 2003. Genes to Clones. Panima Publishing House, New Delhi, India.
2. Brown, T.A. 2001. Gene Cloning. Blackwell Science, Germany.

References:

1. Glick, B.R. and J.J. Pasternak, 2002. Molecular Biotechnology. Panima Publishing House, New Delhi, India.
2. Primrose, S.B. 2001. Molecular Biotechnolgy. Panima Publishing House, New Delhi, India.

15BTU502 BIOPROCESS TECHNOLOGY 5H – 5C

Total hours/week: L:4 T:1 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To learn the procedure for isolation, screening of industrial important microbes
- To derive industrially important products from microbes
- To acquire knowledge on proteins
- To learn the principle and applications of bioprocess technology
- To learn the fundamental calculation in bioprocessing
- To learn the schematic diagram of upstream and downstream processing for product recovery and purification

Course Outcomes

The learners will be able to

1. Gain overall knowledge of industrial biotechnology
2. Obtain information about the application of industrially important microbes
3. Know the screening, extraction and purification of enzymes
4. Designing of bioreactors and control necessary for maximizing production
5. Select and optimize media for maximum production of microbial metabolites
6. Designing of protocols for strain improvement and separation of molecules after fermentation process

UNIT - I

Industrially important microbes: Isolation, Screening, Strain improvement – mutation and recombination. Substrates for industrial fermentation.

UNIT - II

Concepts of basic modes of fermentation - Batch, Fed batch and Continuous fermentation. Bioreactor designs, Media formulation. Air and media sterilization, Aeration & agitation in bioprocess.

UNIT - III

Bioprocess control and monitoring: Temperature, pH, agitation, pressure, online measurement, on / off control, PID control, computers in bioprocess control system.

UNIT - IV

Downstream processing – Filtration, Centrifugation, cell disruption, chromatography, Liquid – liquid extraction, membrane process, drying crystallization, broth processing. Effluent treatment – disposal, treatment process, by- products.

UNIT - V

Bioprocess production: Amino acids, organic acids, nucleotides, nucleosides and related compounds, enzymes, vitamins, antibiotics and SCP. Fermentation economics, Immobilization of enzymes and microbial cells.

Textbooks:

1. Allman, A.R, 2007. Fermentation Microbiology and Biotechnology, Taylor and Francis, New York, USA.
2. Crueger, W. and A. Crueger, 2004. Biotechnology – A TextBook of Industrial Microbiology, Panima Publishing Corporation, New Delhi, India.

References:

1. Brian, M. and L. Harvey, 2008. Practical Fermentation Technology, John Wiley & Sons Inc., New Jersey, USA.
2. Frazier, W.C, 2004. Food Microbiology, TataMcGraw – Hill Publication, New York, USA.
3. Charles, W.B, 2010. Food Fermentation and Microorganisms. John Wiley & Sons Inc., New Jersey, USA.

15BTU503 FOOD BIOTECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To offer students a good command of basic principles of food science and technology
- To Understand the various processes and protocols involved in the food industry.
- To Understand about food borne pathogens detection and enumeration
- To impart in-depth knowledge on the cutting-edge techniques and glimpse on food production techniques
- To Impart practical skills to the students to preserve the food materials
- To learn the nutritive value of foods

Course Outcomes

The students will be able to

1. Demonstrate a level of comprehension of concepts of food science
2. Critically evaluate issues or problems pertaining to food science
3. Perform the production of dairy products
4. Intensive knowledge acquisition in food borne pathogens
5. Have a grasp knowledge in food preservation
6. To identify the Nutritive value of foods

UNIT - I

Introduction: History and Scope of Food Biotechnology, Nutritive value of food, Role of microbes in food biotechnology – bacteria, fungi and yeast. Fermented foods – Types, Changes during Fermentation, Nutritive value of fermented foods.

UNIT - II:

Food Microbiology: Primary Sources of Microorganisms in food. Food borne Bacteria, Molds and Yeasts. Intrinsic and Extrinsic Parameters of food affecting microbial count. Detection of Microorganisms in food - SPC, Membrane filters, Dry films. Bacterial Toxin - Botulism and Staphylococcal toxin. Fungal Toxins - Aflatoxin.

UNIT - III

Dairy Biotechnology: Milk - Definition, Composition and Types. Fermented Milk Products - Butter, Yoghurt and Cheese. Preservation of milk by heat treatment - Pasteurization and Ultra High Temperature. Physicochemical characterization of milk. Milk Tests - Dye Reduction (MBRT and Resazurin)

UNIT - IV

Food Production: Food safety - HACCP System to food protection, Responsibility for food safety. Food Additives - Definition, Types and Functional characteristics. Natural Colors -Types, Applications, Advantages of natural colours. Sweeteners - Types and Applications.

UNIT - V

Food Spoilage and Preservation: Causes of Food Spoilage, Spoilage of Fruits, Vegetables, Meat, Soft Drinks, Eggs, Dairy products. Food Preservation through chemicals - Acids, Salts, Sugars, Antibiotics, Ethylene oxide, Antioxidants. Other Methods of Food Preservation -Radiations, Low and High temperature and Drying.

Textbooks

1. Adam, M.R. and Moss, M.O, 2003. Food Microbiology, New Age International Pub.New Delhi, India.

2. Frazier, W.C. and Westhoff, D.C, 2005. Food Microbiology, IV Ed.,Tata Mc Graw Hill Pub. Company Ltd. New Delhi, India.

References:

1. Harrigan, W. F, 1998. Laboratory methods in Food Microbiology, III Ed. Academic Press, New York, USA.

2. Jay, J.M, 1992. Modern Food Microbiology, IV Ed. Chapman and Hall, New York, USA.

SEMESTER-V

15BTU504 ENVIRONMENTAL BIOTECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To obtain basic concepts of biotechnology to solve the environmental problems
- To ascertain the knowledge about solid waste management and wastewater treatment.
- To achieve a novel treatment strategy for waste to Bioenergy.
- To gain knowledge about the biological and biotechnological measures for restoring environment.
- To involve in the present scenarios and find valuable solutions for remedy
- To update about the management strategies followed up by the industries and government.

Course Outcomes

On completion of the course, students are able to apply their knowledge on

1. Bio-management of soil
2. Pollution and pollution control
3. Environmental significance of genetically modified microbes, plants and animals
4. Biofuel production
5. Treatment of municipal waste and Industrial effluents
6. Genetic engineering of bacteria and their potential for bioremediation

UNIT - I

Introduction: Introduction to Biotechnology. Role of Environmental Biotechnology. Market for Environmental Biotechnology. Microbes and metabolism. Fundamentals of biological intervention.

UNIT - II

Pollution and pollution control: Classifying pollution - toxicity; persistence; mobility; ease of control; bioaccumulation; chemistry. Pollution control strategies – dilution and dispersal, concentration and containment. Practical applications to pollution control – biofilters, biotrickling filters, bioscrubbers. 'Clean' Technology - process changes, biological control, bio-substitutions.

UNIT - III

Contaminated land and bioremediation: Remediation Methods - generalised categories, biological, chemical, physical, solidification/vitrification, thermal, Intensive and Extensive technologies. *In situ* techniques – Biosparging, Bioventing, Biofuel, Injection recovery. *Ex situ* techniques - Land farming, Soil banking, Soil slurry reactor. Bioenergy, use of bioremediation, Factors affecting the use of bioremediation.

UNIT - IV

Aerobes and effluents: Biological decomposition of organic carbon, Nitrogen and Phosphate removal. Biological removal, biotransformation, and biosorption of metal ions. Aerobic and Anaerobic Degradation of Xenobiotics. Bioaugmentation for degradation of Xenobiotics. Industrial sources of waste water. Waste management, Treatment strategies.

UNIT - V

Phytotechnology and Photosynthesis: Terrestrial phyto-systems (TPS) - Metal phytoremediation, Organic phytoremediation. Hydraulic containment. Aquatic phyto-systems (APS), Macrophyte treatment systems (MaTS), Nutrient film techniques (NFT), Algal treatment systems (ATS).

Textbooks:

1. Evans, G.M. and J. C. Furlong, 2003. Environmental Biotechnology: Theory and Applications. John Wiley & Sons Ltd, West Sussex, England.
2. Jördening, H.J. and J. Winter, 2005. Environmental Biotechnology. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany.

References:

1. Agarwal, S.K, 2002. Environmental Biotechnology. APH Publishing Corporation, New Delhi, India.
2. Mara, D, 2003. The Handbook of Water and Wastewater Microbiology. Academic Press, London, England.

SEMESTER-V

15BTU505A CORE ELECTIVE – I BIOINFORMATICS 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To give knowledge on Bioinformatics and its application
- To offer knowledge to assess biological databases
- To understand and to analyze protein/nucleotide sequences and to predict its 3D structure
- To understand the various online databases for submitting and retrieving data's
- To understand how the phylogeny plays a vital role in finding ambiguities.
- To get practiced with the tools and techniques for analyzing the data.

Course Outcomes

On completion of the course, students are able to

1. Understand The relationship between sequence - structure - function of genes
2. Familiarize with the algorithms required to compare sequences and require to know the phylogenetic relationship between the gene sequences
3. Inculcate knowledge on building 3D structures of genes.
4. Locate and use the main databases at the NCBI and EBI resources
5. Know the difference between databases, tools, repositories and be able to use each one to extract specific information
6. Use selected tools at NCBI and EBI to run simple analyses on genomic sequences

UNIT - I

Introduction: Definitions, Objectives, Scope, Applications of Bioinformatics, History and milestones of bioinformatics, Genome sequencing projects – Steps, Human Genome Project and other genome projects.

UNIT - II

Basic concepts of biomolecules and computers: Basic concepts of biomolecules – Protein and amino acid, DNA and RNA - Sequence, Structure and function.

Basic computer components - Hardware, software, operating systems, computer networks, programming, internet, browsers, search engines, email, databases.

UNIT - III

Biological databases: Types of databases, Sequence databases, Nucleic acid sequence databases - Primary (GenBank, EMBL, DDBJ), Secondary (UniGene, SGD, EMI Genomes, Genome Biology), Protein sequence database – Primary (PIR, SWISS-PROT), Secondary (PROSITE, Pfam), Structural databases (PDB, SCOP, CATH), Bibliographic databases and Organism specific databases.

UNIT - IV

Database searching and Sequence Alignment: Similarity searching programs-BLAST, Sequence alignment - Pair-wise and Multiple-sequence alignment (Methods and Algorithms), CLUSTAL-W, Protein structure alignment (Methods, algorithms- DALI) Phylogenetic analysis (Methods, algorithms).

UNIT - V

Gene prediction: Gene prediction in prokaryote and eukaryotes. Extrinsic approaches and Ab initio approaches. Predicting the protein secondary structure (Domain, blocks, motifs), Predicting protein tertiary structure (Homology, Ab-initio, threading and fold recognition) and visualization of predicted structure.

Textbooks:

1. Jin Xiong, 2006. Essential Bioinformatics, Cambridge University Press. UK.

2. Attwood, K. and J. P. Smith, 2003. Introduction to Bioinformatics. Pearson Education, Singapore.

References:

1. Rajaraman. V, 2003. Introduction to information technology. Prentice Hall of India Pvt. Ltd, New Delhi.

2. Lesk, A. M, 2002. Introduction to Bioinformatics. Oxford University Press, London.

3. Web resources: http://www.ncbi.nlm.nih.gov/ ; http://www.ebi.ac.uk/2can/databases/

15BTU505B CORE ELECTIVE – I BIO-NANOTECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To demonstrate the application of the unique properties of biomolecules at nano-scale level in different fields of biotechnology.
- To understand the principles that governs the structure at nano-scale level.
- To comprehend the function of biomolecules at nano-scale level.
- To conceptualize the biomolecules-based nanostructures
- To get a keen insight on applications of nanotechnology in medicine
- To foster the scientific knowledge in future of nanotechnology

Course Outcomes

On completion of the course, students are able to

1. Demonstrate a level of comprehension of concepts in nanotechnology
2. Critically analyze the concept of atoms
3. Analyze clusters formation in Nano synthesis
4. Gain sound knowledge in nanomedicine
5. Intensive knowledge acquisition in biomedical fields
6. Have a grasp knowledge in Molecular nanotechnology

UNIT I: Definition of Nanoscale system – Feymann theory of Nanotechnology – Types of nanotechnology – Molecular Nanotechnology – Molecular and atomic size – Surface and dimensional space – Scope and opportunities at the Nanoscale.

UNIT II: Forces between atoms and molecules, particles and grain boundaries – Vander Waals and electrostatic forces between surface – Nano and Mesopores – size dependent variation in magnetic, electronic transport, resistivity, optical and etc – Misnomers and misconception of Nanotechnology.

UNIT III: Biomolecules based nanostructures - DNA based Nanostructures- DNA-protein nanostructures-Methods- Self assembled DNA nanotubes—Nucleic acid Nanoparticles, DNA as a Biomolecular template-DNA branching-Metallization- Properties.

UNIT IV: Applications of nanobiotechnology in early medical diagnostics, drug targeting, drug delivery, nanosurgery and other biomedical field.

UNIT V: Future of bio-nanobiotechnology - advances for Molecular Nanotechnology, Nanotube synthesis - nanoscale assembler, applications.

Textbooks:

1. Niemeyer and Mirkin (ed). 2004. Nanobiotechnology: concepts, applications & perspectives. WILEY-VCH Verlag GmbH & Co. K aA, Weinheim
2. Jain, KK. 2005. Nanobiotechnology in molecular diagnostics: current techniques and applications. Taylor & Francis, UK.

References:

1. Wilson, M, Kannangara, K, Smith, G, Simmons, M, Raguse, B. 2005. Nanotechnology: Basic Science and Emergic Technologies. Overseas press, Taylor & Francis, UK.
2. Michael Wilson, 2007. Nanotechnology: Basic Science and Emerging Technologies. Cambridge University Press, UK.

15BTU505C CORE ELECTIVE – I BIOFERTILIZER TECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To understand the concepts of biological fertilizer production and entrepreneurs.
- To develop with the specific objective to acquaint and enrich the students with the basic knowledge of microbial inoculants production.
- To get trained to apply the aspects of fertilizer application
- Understanding basics of microbial fertilizers and its mechanism
- Visionary approach on students to make entrepreneur
- This paper helps to make the students to understand the microorganisms as potential biofertilizer organisms and the technology of inoculum production.

Course Outcomes

On completion of the course, students are able to

1. Understand the concept of biofertilizer productions
2. Perform the production of microbial biofertilizers
3. Have a grasp knowledge in isolation of microbes
4. Get knowledge in mass cultivation of microbes
5. Having a chance to become an entrepreneurship
6. Get knowledge in composting waste

UNIT-I: Introduction to fertilizers - natural fertilizers, synthetic fertilizers, inorganic fertilizers, organic fertilizers, Liquid fertilizers, bio-fertilizers - importance, advantages and constraints.

UNIT-II: Characters of biofertilisers- Morphology of *Rhizobium, Azospirilium, Azotobacters*, blue green algae and phosphate solubilisers and maintenance - inoculant preparation.

UNIT-III: Isolation, culturing methods, enumeration and identification of microbial species - *Rhizobium, Azospirillum Azotobacters*, blue green algae and phosphate solubilisers.

UNIT-IV: Preparation of microbial inoculants - large-scale production of microbes - their application as biofertilizers - crop responses to biofertilizers.

UNIT-V: Azolla - distribution, morphological and biochemical characteristics - cyanobacterial symbionts - Azolla biofertilizer technology - organic matter and composting - method of processes, applications and limitations.

Textbook:

1. Jeswani, L.M. and Balddev, B. 1990. Advances in Pulse Production Technology. ICAR, New Delhi.
2. Daniel Sundararaj, D. and G. Thulasidas. 1993. Botany of Field Crops. (2nd Ed.) Macmilan India Ltd.

References:

1. Malsen, L.J.G.V. Somaatmadja, S. 1993 PROSEA - Plant Resources of South East Asia. No.1. Pulses. International Book Distributors, Dehradun, India.
2. Subba Rao, N.S. 2000 Biofertilizers in Agriculture. Oxford & IBH publishing Co., New Delhi, India.

SEMESTER V

15BTU511 RDNA, BIOPROCESS, FOOD AND ENVIRONMENTAL BIOTECHNOLOGY - PRACTICAL V

5H – 3C

Total hours/week: L:0 T:0 P:5 **Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course are

- To know the practical understanding of nucleic acid (DNA and RNA) isolation and their quantification
- To focus on cloning, construction of genomic DNA libraries followed by the library screening
- In-depth understanding of various techniques involved in gene amplification, DNA fingerprinting, labelling and detection of nucleic acid sequences
- To Concentrate on the importance of E. *coli* organisms and its growth, maintenance and isolation & amplification of nucleic acids
- To know about the fermentation, bioprocess development of recombinant DNA (rDNA) products
- To train in rDNA Techniques

Course Outcomes

On completion of the course, students are able to

1. Acquire practical knowledge of nucleic acids isolation
2. Acquire the knowledge about the methodology for biomolecule quantification separation in prokaryotes and eukaryotes.
3. Comprehend the basics of cloning which are necessary large-scale processing of rDNA products, southern blotting and hybridization.
4. Analyze the determination of water quality for a particular experiment
5. Understand different types of important enzymes production
6. Trained to get placed in Laboratory

List of Practicals

rDNA Technology

1. Estimation of DNA
2. Agarose Gel Electrophoresis
3. SDS-Polyacrylamide gel Electrophoresis method
4. Isolation of total DNA from plant tissue
5. Isolation of total DNA from microbes (*E. coli*)
6. Isolation of total DNA from animal tissue
7. Isolation of plasmid DNA
8. Isolation of RNA from yeast
9. Restriction digestion of DNA
10. Ligation of DNA
11. Amplification by PCR-Demonstration

Environmental Biotechnology

1. Water quality tests for pH
2. Determination of total solids
3. Determination of Chemical Oxygen Demand
4. Determination of Biological Oxygen Demand
5. Analysis of heavy metals (Iron/Chromium)

Food and Bioprocess Techniques

1. Isolation and identification of microbes from food samples
2. Wine production
3. Citric acid production
4. Production of Industrially important enzymes – protease, amylase
5. Immobilization of enzymes
6. Working of fermenters

Textbooks:

1. Aneja, K.R., 2004. Experiments in Microbiology, Plant Pathology and Biotechnology, IV Ed., New Age International Pvt. Ltd. Publishers, New Delhi, India.
2. Glover, D.M. and Hames, B, D., 1995. DNA Cloning – A Practical Approach, IRL Press, Oxford, England.

References:

1. Brook, S. J, E.F. Fritsch and T. Maniatis, 2000. Molecular Cloning – A Laboratory Manual, Cold Spring Harbor Laboratory Press, New York, USA.
2. Dubey, R.C. and E. Maheshwari, 2004. Practical Microbiology, S. Chand & Co. Publishers, New Delhi, India.

15BTU506 ANIMAL HOUSE MANAGEMENT 0H-4C

Total hours/week: L:0 T:0 P:0 Marks: Internal: 00 External: 100 Total:100

Course Objective

The main objectives of the course are

- To manifest the significance of CPCSEA guidelines to the student
- Acquiring the depth knowledge in developing animal houses with superior facilities
- Understand and adapt to the policies pertaining to animal house management.
- Learning the record keeping and practicing SOP guideline in house management services
- To gain adequate knowledge on production of transgenic animals
- To emphasize the molecular genetics in animal production.

Course Outcomes

On completion of the course, students are able to

1. Conceptualize the CPCSEA guidelines
2. Able to accomplish animal houses with adequate knowledge
3. Portfolio the policies and adhere to the governance of animal house management
4. Follow the SOP in animal houses
5. Understand the production methodology of transgenic animals
6. Get vast idea on molecular genetics of animal production

UNIT - I

Animal procurement: Committee for the Purpose of Control and Supervision on Experiments on Animals (CPCSEA) guidelines. Methods of transportation, quarantine and stabilization according to species.

UNIT - II

Physical Facilities: Building materials - efficient and hygienic operation of animal facilities. Corridor(s) - movement of personnel as well as equipment. Utilities - water lines drain pipes, electrical connections - service panels. Animal room doors, exterior windows, floors and floor drains, walls and ceilings, storage areas, sanitizing equipment and experimental area. Environment: Temperature and humidity, ventilation, power and lighting, noise control.

UNIT - III

Animal husbandry: Caging/Housing system, Sheltered or Outdoor housing, social environment, food, bedding, water, sanitation and cleanliness, waste disposal, pest control. Precautions while handling animals - common injuries and ailments in animals. Emergency situations: escaping animals - use of fire extinguishers

UNIT - IV

Record keeping: Animal house plans, staff, technical and non-technical, health record of staff &animals, Standard Operating Procedures (SOPs) for animals, Breeding stock, purchase or sales records, Animal Ethics Committee Meetings, Death record, Clinical Record of sick animals, Training record of staff involved in animal activities, water reports.

UNIT - V

Laboratory animal ethics: Transgenic animals, maintenance, disposal, breeding and genetics.

References:

CPCSEA Guidelines for Laboratory Animal Facility, Govt. of India. www.cpcsea.com

SEMESTER V

15OEU501 SERICULTURE TECHNOLOGY 0H-3C

Total hours/week: L:0 T:0 P:0 Marks: Internal: 00 External: 100 Total:100

Course Objective

The main objectives of the course are

- To manifest the significance of Sericulture guidelines to the student
- Acquiring the depth knowledge in developing rearing houses with superior facilities
- Understand and adapt to the policies pertaining to rearing house management.
- Learning the record keeping and practicing SOP guideline in house management services
- To gain adequate knowledge on production of good quality silk threads
- To emphasize on production of good quality mulberry plants.

Course Outcomes

On completion of the course, students are able to

1. Conceptualize the sericulture guidelines
2. Able to accomplish rearing houses with adequate knowledge
3. Portfolio the policies and adhere to the governance of rearing house management
4. Follow the SOP in rearing houses
5. Understand the production methodology of mulberry plants
6. Get vision on production of good quality mulberry plants.

UNIT – I

Introduction: Sericulture: Definition, history and present status; Silk route, Types of silkworms, Distribution and Races, Exotic and indigenous races, Mulberry and non-mulberry Sericulture.

UNIT – II

Biology of Silkworm – Life cycle of *Bombyx mori,* Structure of Silk gland and Secretion of silk.

UNIT -III

Rearing of Silkworms: Selection of mulberry variety and establishment of mulberry garden, Rearing house and rearing appliances, Disinfectants: Formalin, bleaching powder, RKO, Silkworm rearing technology; Early age and Late age rearing, Types of mountages, Spinning, Harvesting and storage of cocoons.

UNIT -IV

Pests and Diseases: Pests of silkworm: Uzi fly, dermestid beetles and vertebrates, Pathogenesis of Silkworm diseases; protozoan, viral, fungal and bacterial control and prevention of pests and diseases.

UNIT -V

Entrepreneurship in Sericulture: Prospectus of Sericulture in India; sericulture industry in different states, employment, potential in mulberry and non- mulberry sericulture. Visit to various sericulture centers.

References:

1. Ullal, S. R. and Narasimhnna, M. N. 1981. Handbook of Practical Sericulture: Bangalore.
2. Handbook of silkworm rearing: Agriculture and Technical Manual-1, 1972. Fuzi Pub. Co. Ltd., Tokyo, Japan
3. Narasimhnna, M. N. 1988. Manual of Silkworm Egg Production; CSB, Bangalore.

SEMESTER VI

15BTU601 ANIMAL BIOTECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are

- To impart the knowledge on basic tissue culture techniques
- To apply the state of art knowledge of subject for the production of transgenic animals and production modern drug delivery or vaccination methods.
- To become familiarize with the ethical practices in animal biotechnology
- To understand the concept of transgenic animal production
- To grasp knowledge on molecular techniques in animal reproduction
- The students will learn overall the basic concept in cell culture.

Course Outcomes

On completion of the course, students are able to

1. To understand principles of animal culture, media preparation.
2. To explain Invitro fertilization and embryo transfer technology.
3. To get insight in applications or recombinant DNA technology in
4. production of therapeutic proteins in transgenic animals.
5. To explain the Organ culture and its types
6. To handle and maintain the animal in animal houses

UNIT - I

Scope of Animal Tissue Culture: Laboratory design: aseptic techniques – handling instruments: Microscopes, Clean-bench, etc., and bio safety.

UNIT - II

Animal Cell Culture Media: Natural and artificial media – their constituents; Physicochemical properties of media; Serum supplemented and serum-free media; Sterilization methods.

UNIT - III

Primary Cell Culture: Methods of tissue disaggregation - isolations of tissues from chick embryo, mouse and human; Continuous and established cell cultures; Cell separation and characterization; Organ culture- types.

UNIT - IV

Specialized techniques: Cytotoxic assays; cell fusion methods; *in situ* hybridization; somatic cell fusion; Microinjection – DNA transfer; lipofection; electroporation.

UNIT - V

Transgenic Animals: Production and applications; transgenic animals: mouse, cow, sheep, fish, hen; Expression of bovine growth hormone; production of human proteins in milk and meat.

Textbooks:

1. Freshney, R.I, 2004. Animal Cell Culture: A Practical Approach (V Edn.), John Wiley & Sons, NY.
2. Davies, J.M, 2002. Basic Cell Culture, Oxford University Press, Oxford.

References:

1. Ranga M.M, 2002. Animal Biotechnology, Agrobios India Limited.
2. Primrose, S.B, R.M. Twyman & R.W. Old, 2000. Principles of Gene Manipulation, Blackwell Scientific Publications, London.

15BTU602 PLANT BIOTECHNOLOGY 5H – 5C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To introduce biotechnological methods for production of transgenic plants.
- To give knowledge about various methods of gene transfer in plants.
- To cognize and get the knowledge on micro propagation to protect endangered plants.
- To explain the basics of the physiological and molecular processes that occur during plant growth and development and during environmental adaptations
- To use basic biotechnological techniques to explore molecular biology of plants
- To understand the processes involved in the planning, conduct and execution of plant biotechnology experiments

Course Outcomes

On completion of the course, students are able to

1. Understand the growth conditions required to culture the plants in *invitro* conditions.
2. Inculcate the deep understanding of Gene expression system of plants
3. Acquire knowledge on producing Transgenic plants
4. Inculcate the deep knowledge the processes involved in the planning, conduct and execution of plant biotechnology experiments
5. Learn the structure and organization of plant genome
6. Learn the basic techniques for hybridization in producing transgenic plants

UNIT - I

Theory and methods: Introduction of plant tissue culture and cell suspension culture; Physico-chemical conditions for propagation of plant cells and tissues; Composition of media, nutrient and hormone requirement, Continuous culture, techniques for immobilization of plant cells, continuous product recovery system using immobilized plant cell system.

UNIT - II

Product and recovery: Primary and secondary metabolic products (phytochemicals) of plant cells, biosynthesis of secondary metabolites of biotechnological importance, biotransformation for product development and selection of cell culture, process technology with salient features for specific products.

UNIT -III

Genetic engineering A: Structure and organisation of plant genome, regulation of plant genome expression, transcriptional, translational and post transcriptional regulation of plant genome. Transposons, chloroplast and mitochondrial genome.

UNIT - IV

Genetic engineering B: Transfer of nucleic acid to plant cells - Direct transformation by electroporation and particle gun bombardment. - Agrobacterium, Ti plasmid vector Theory and techniques for the development of new genetic traits, conferring resistance to herbicide, pesticide, plant pathogens. Plant engineering towards development of enriched food products, plant growth regulators.

UNIT - V

Applications: Transgenic plants, herbicides and pest resistant plants; Molecular farming / pharming: carbohydrates, lipids, therapeutic proteins, edible vaccines, purification strategies; Oleosin partition technology.

Textbooks:

1. Singh, B.D. 1998. Text Book of Biotechnology, Kalyani Publishers, India.
2. Neal Stewart, C. 2008. Plant Biotechnology & Genetics. John Wiley & Sons Inc., NJ.

References:

1. Slater, A., W. Nigel & M.R. Fowler. 2008. Plant Biotechnology, Oxford University Press, Oxford.

15BTU603A CORE ELECTIVE – II TISSUE ENGINEERING 5H – 4C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- Students obtain deeper knowledge and understanding about the subject tissue engineering and tissue engineering
- Students will learn about key technologies used in tissue engineering and regenerative medicine
- Students will deal with the basic and clinical aspects of stem cell research
- To analyze the conversion of stem cell types into a variety of suitable tissues
- To understand the potential of stem cells for the regeneration of a wide range of tissues and organs
- To make acumen in biomaterials in tissue engineering

Course Outcomes

On completion of the course, students are able to

1. To isolate the stem cells
2. To demonstrate the Stem cell differentiation
3. To grasp knowledge on extra cellular matrix
4. To understand the production of bioreactors
5. To theorize the biomaterials used in tissue engineering
6. To have a grasp knowledge in nerve regeneration

UNIT - I

Tissue engineering – Introduction, organization and complexity of vertebrate body. Elements of tissue development – Tissue types, dynamics, repair.

UNIT - II

Biochemical process in cells – cell biology, cell growth, cell culture: primary cells vs. cell lines, sterile techniques, plastics, enzymes, reactors and cryopreservation, cell differentiation and migration. Cell morphology, number, viability, motility, and division – mitotic cell cycle, cell death – biological apoptosis.

UNIT - III

Cell-extracellular matrix interactions; cell-cell interactions: Different cell types, staining, growth factors (receptor- ligand binding) and chemokines in signaling (eg. G-proteins). Growth factor delivery and applications (angiogenesis) in tissue engineering. Cell junctions in tissues, malfunctions in direct cell-cell contact signaling and response to stimuli.

UNIT - IV

Isolation of cells: methods of cell separation and their characteristics. Stem cells. **Biomaterials for tissue engineering:** metals, ceramics, polymer (synthetic and natural) and polymer scaffold processing, biodegradable materials, native matrix.

UNIT - V

Bioreactors in Tissue engineering: Bone & Cartilage Tissue Engineering. **Cell & Tissue engineering case studies:** Basic wound healing, artificial skin, blood vessels, pancreas & liver. Regeneration of bone and muscle. Nerve regeneration.

Textbook:

1. Palsson, B.O. and Sangeeta N. Bhatia. 2003. Tissue Engineering. Prentice Hall, UK.

References:

1. Lanza, R., R. Langer & J. Vacanti. 2007. Principles of Tissue Engineering (3rd edn.), Academic Press, USA.
2. Ravi, B. 2014. Introduction to Tissue Engineering: Applications & challenges. Wiley Publishing, UK.
3. Fisher, J.P., A.G. Mikos, J.D. Bronzino & D.R. Peterson. 2012. Tissue Engineering: Principles and practices. CRC Press, UK.
4. Wong, J.Y., J.D. Bronzino & D.R. Peterson. 2012. Biomaterials: Principles and practices. CRC Press, UK.
5. Websites: http://web.mit.edu/langerlab/;
6. http://faculty.virginia.edu/laurencin/index.htm

SEMESTER VI

15BTU603B CORE ELECTIVE – II APPLIED BIOTECHNOLOGY 5H – 4C

Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To understand the fundamental basis of biotechnology
- To conceptualize the application of biotechnology in industrial sectors
- To comprehend the basic techniques in biofertilizers productions using fungi
- To get adequate knowledge on mushroom cultivation
- To acquire basic domain knowledge on dairy products manufacturing process
- To get exposure on beverages.

Course Outcomes

On completion of the course, students are able to

1. To perpetuate the formulation and production of biofertilizers
2. To demonstrate the mushroom cultivation
3. To perform the fermented drinks (alcoholic)
4. To execute the production of cheese, yoghurt
5. To theorize the biotechnological approaches in food biotechnology
6. To have a grasp knowledge in food canning and processing

UNIT – I

Biofertilizers: Definition and advantages, Strain selection – Inoculum development – Mass production – Packaging – Quality control of different Biofertilizer (Rhizobium, Phosphate solubilizers, Azotobacter, Mycorrhizae, Azolla)

UNIT - II

Mushroom cultivation: Spawning of edible mushrooms, methods of cultivation, Agaricus (button) and Plerotus (Dhingri, Oyster mushroom), Volvariella (paddy Straw mushroom), nutritive value of mushroom.

UNIT - III

Beverages: Definition and types, non alcoholic and alcoholic and natural, **Non alcoholic:** Processing of tea, coffee, cocoa. **Alcoholic**: Fermented and distilled, their preparation and sources.

UNIT - IV

Production of dairy products: Cheese. Yoghurt, buttermilk, Pickles – Dill pickles, slippery pickles, soft and black pickles.

UNIT - V

Fermented foods: Meat, Poultry and Sea Foods Food Preservation – Tin preservation, Salt preservation, Freeze preservation and food packing methods.

Textbooks:

1. Frazier, W.C., 2004. Food Microbiology. Tata McGraw Hill Publishing, New York.
2. Prescott, S.C. and C.G. Dunn, 1999. Industrial Microbiology. ABI-Publishing Company, West Port, New York.
3. Aneja, K.R., 2005. Experiments in Microbiology. Plant pathology, Tissue culture and Mushroom Production Technology. III Edition. New Age International Publishers, New Delhi.

15BTU603C CORE ELECTIVE - II HERBAL TECHNOLOGY 5H – 4C
Total hours/week: L:5 T:0 P:0 Marks: Internal: 40 External: 60 Total:100

Course Objectives
The main objectives of the course are,

- To understand the ethno pharmacological principles of plants
- To conceptualize the pharmacognosy of herbals
- To comprehend the basic techniques in phytochemical analysis of plants
- To get adequate knowledge on analytical evaluation of drugs
- To acquire basic domain knowledge on medicinal plant biotechnology
- To get exposure on plant tissue culture.

Course Outcomes
On completion of the course, students are able to

1. To perpetuate the natural product drug discovery process
2. To learn the ideology of siddha medicines
3. To identify the medicinally important plants and its pharmacological values
4. To elucidate the bioactive molecules from plant extracts
5. To theorize the biotechnological approaches in plant genetics
6. To have a grasp knowledge in plant tissue culture

UNIT-I: Herbal medicines: history and scope - definition of medical terms - role of medicinal plants in Siddha systems of medicine; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants.

UNIT-II: Pharmacognosy - systematic position - chemical constitution and medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka.

UNIT-III: Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs.

UNIT-IV: Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds, fatty acids, tannins, glycosides and volatile oils).

UNIT-V: Medicinal Plant Biotechnology: Genetics - mutation - polyploidy. Plant tissue culture source - Historical developments - types of cultures - phytopharmaceuticals in tissue cultures.

References:

1. Chopra, R.N, Nayar, S.L, Chopra, I.C. 1956. Glossary of Indian medicinal plants, C.S.I.R, New Delhi, India.
2. Kanny, Lall, Dey and Raj Bahadur, 1984. The indigenous drugs of India. International Book Distributors, India.
3. Agnes Arber, 1999.Herbal plants and Drugs Mangal Deep Publications, India.
4. Sivarajan, V.V, Balachandran Indra. 1994. Ayurvedic drugs and their plant source. Oxford IBH publishing Co, UK.

15BTU611 ANIMAL AND PLANT BIOTECHNOLOGY - PRACTICAL VI 5H-3C

Total hours/week: L:0 T:0 P:5 Marks: Internal: 40 External: 60 Total:100

Course Objectives

The main objectives of the course are,

- To understand the practical aspects of plant and animal biotechnology
- To familiarize the practical concepts in animal tissue cell culture
- To comprehend the basic techniques in plant tissue culture
- To get adequate hands on exposure in cell lines
- To get expertise in molecular techniques related to plants and animals
- To get knowledge on the use of cell lines and preservation methods

Course Outcomes

On completion of the course, students are able to

1. To demonstrate the plant tissue culture
2. To execute the DNA extraction from plants and animal
3. Perform the preparation of Culture media
4. To prepare primary cell culture from animal sources
5. To cryopreserve the cell lines
6. To quantify the cells by dye exclusion method

Animal Biotechnology

1. Preparation of Animal Tissue Culture Medium
2. Preparation of Primary culture
3. Quantification of cells by trypan blue dye exclusion method.
4. Identification of leukocyte subsets and total count
5. Cryopreservation of cell lines

Plant Tissue Culture Techniques

1. Culture media preparation
2. *In vitro* germination of seeds
3. Callus induction and differentiation
4. Isolation of protoplasts
5. Micro propagation
6. Artificial seed production

Textbooks

1. Aneja, K R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. IV Edition, New age international Pvt. Ltd. Publishers, New Delhi.

2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, New York.

References

1. Aneja, K R., 2004. Experiments in Microbiology Plant Pathology and Biotechnology. IV Edition, New age international Pvt. Ltd. Publishers, New Delhi.
2. Freshney, R.I., 2000. Animal Cell Culture: A Practical Approach. John Wiley and Sons, New York.

15BTU604 ENTREPRENEURSHIP BIOTECHNOLOGY 0H-4C

Total hours/week: L:0 T:0 P:0 Marks: Internal: 00 External: 100 Total:100

Course Objectives

The main objectives of the course are,

- To emphasize the introductory knowledge on marketing strategies in biological field
- To acquire Entrepreneurial spirit and resourcefulness
- To familiar with various uses of human resource for earning dignified means of living Understanding the concept and process of entrepreneurship
- To acquire entrepreneurial quality, competency and motivation
- To learn the process and skills of creation and management of entrepreneurial venture
- To expose the students in various bio-entrepreneurship and marketing approaches.

Course Outcomes

On completion of the course, students are able to

1. Gain rich knowledge on Bioentrepreneurship
2. Acquire basic knowledge on different biotechnological industries origin and development.
3. Get new vista on production of industrial fermented foods.
4. Instigate the use of natural resources for industrial production of foods
5. Understand the concept of biofertilizers.
6. Comprehend the basis of vaccine production

UNIT -I

Introduction to Biotechnology related industries – Immunological, Pharmaceutical and Agriculture based industries.

UNIT - II

Plant Tissue Culture industry, Food industries, Enzyme production industries, Biomedical industries.

UNIT -III

Preparation of wine, Beer, sauerkraut, pickle preparation – soft pickle preservation industries.

UNIT -IV

Biofertilizer – Rhizobium, azospirillum, blue green algae, Single cell protein.

UNIT -V

Vaccine- types of vaccine, dose of vaccine, duration of vaccine, production industries, scope and major requirements of vaccine production industries.

Text:

1. Aneja, K.R, 2005. Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom Production Technology. III Edition, New Age International Publishers, New Delhi.

References:

1. Ignacimuthu, S, 2004. Plant Biotechnology. Oxford and IBH Publishing House, New Delhi.
2. Prescott and Dunn's, 1984. Industrial Microbiology, 4th Edition, Gerald Reed, AVI Publishing Company Inc. Conneticut, USA.
3. Goldsby, R.A, Kindt, J.T, Osborne, B.A, Kuby, W.H.J. 2004. Immunology. V Edition, Freeman and Company, USA.

SEMESTER VI

15BTU691 **PROJECT – *VIVA VOCE*** **10H-6C**

Total hours/week: 10Hrs **Marks: Internal: 40 External: 60 Total:100**

Course Objectives

The main objectives of the course is

- The hands-on training through one full semester project with thesis gives special expertise within one of the research areas represented at The Department of Biotechnology.

Course Outcomes

On completion of the course, students are able to apply their knowledge on

1. This dissertation programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education and research