Vellalar College for Women (Autonomous), Erode - 12.

Bachelor of Science in Biochemistry

2017- 2018 Batch onwards

Course Content and Scheme of Examinations (CBCS Pattern)

Semester I

Part	Study Component	Subject Code	Title of the Paper	Inst.Hrs. / Week	Exam. Dur. Hrs.	Max. Marks			Credits	Total Credits
						CIA	ESE	Total		
I	**Language I**	15TAMU101/ 14HINU101	Tamil /Hindi	6	3	25	75	100	3	**18**
II	**Language II**	17ENLU101/ 17ENHU101	English	6	3	25	75	100	3	
III	**Core**	16BCUC101	Biomolecules	3	3	25	75	100	3	
		17BCUCP01	Core Biochemistry Practical I	3	3	40	60	100	4	
	Allied I	13BCUA101	Basics of Biotechnology I	4	3	20	55	75	3	
		16BCUAP01	Allied Practical I - Biotechnology	3	–	–	–	–	–	
IV	**Foundation Course**	09FOCU1ES	Environmental Studies	2	3	–	100	100	2	

Semester II

I	**Language I**	15TAMU202/ 14HINU202	Tamil /Hindi	6	3	25	75	100	3	**22**
II	**Language II**	17ENLU202/ 17ENHU202	English	6	3	25	75	100	3	
III	**Core**	13BCUC202	Analytical techniques	6	3	25	75	100	3	
		13BCUCP02	Core Biochemistry Practical II	3	3	40	60	100	4	
	Allied I	13BCUA202	Basics of Biotechnology II	4	3	20	55	75	3	
		16BCUAP01	Allied Practical I - Biotechnology	3	3	20	30	50	4	
IV	**Value Education**	14VEDU2HR	Value Education and Human Rights	2	3	–	100	100	2	

Bachelor of Science in Biochemistry

2017- 2018 Batch onwards

Semester III

Part	Study Component	Subject Code	Title of the Paper	Inst.Hrs./ Week	Exam. Dur. Hrs.	Max. Marks			Credits	Total Credits
						CIA	ESE	Total		
I	**Language I**	14TAMU303 / 14HINU303	Tamil /Hindi	6	3	25	75	100	3	**17**
II	**Language II**	13ENLU303	English	6	3	25	75	100	3	
III	**Core**	13BCUC303	Enzyme and Enzyme Technology	4	3	25	75	100	3	
		17BCUCP03	Core Biochemistry Practical III	3	-	-	-	-	-	
	Allied II	15MCUA301	Basic Mathematics	6	3	20	55	75	3	
IV	**Skill Based Subject I**			3	3	25	75	100	3	
	Basic Tamil			2	_	100	_	100	2	
	Advanced Tamil				3	25	75			
	Non – Major Elective I				3	_	100			
Semester IV										
I	**Language I**	14TAMU404/ 14HINU404	Tamil /Hindi	6	3	25	75	100	3	**26**
II	**Language II**	13ENLU404	English	6	3	25	75	100	3	
III	**Core**	13BCUC404	Intermediary Metabolism	3	3	25	75	100	4	
		16BCUCP03	Core Biochemistry Practical III	3	6	40	75	100	4	
	Allied II	15BCUA402	MS office 2010	5	3	20	55	75	3	
		15BCUAP02	Allied practical II - MS Office 2010	2	3	20	30	50	4	
IV	**Skill Based Subject II**	13BCUS402	Multiskill development paper	3	1	40	60 (online)	100	3	
	Basic Tamil			2	_	100	_	100	2	
	Advanced Tamil				3	25	75			
	Non – Major Elective II				3	-	100			

Bachelor of Science in Biochemistry										
2017- 2018 Batch onwards										
Semester V										
Part	**Study Component**	**Subject Code**	**Title of the Paper**	**Inst. Hrs./ Week**	**Exam. Dur. Hrs.**	**Max. Marks**			**CREDITS**	**Total Credits**
						CIA	ESE	Total		
III	**Core**	13BCUC505	Cell and cancer Biology	4	3	25	75	100	4	**28**
		16BCUC506	Human Physiology with Medical Terminology	5	3	25	75	100	4	
		13BCUC507	Molecular Biology	4	3	25	75	100	4	
	Elective	13BCUE501	Clinical Biochemistry	5	3	25	75	100	5	
		13BCUE502	Plant Biochemistry and Plant therapeutics	4	3	25	75	100	4	
	Core	16BCUCP04	Core Biochemistry Practical IV	5	6	40	60	100	4	
IV	**Skill Based Subject III**			3	3	25	75	100	3	
Semester VI										
III	**Core**	16BCUC608	Medicinal Chemistry	5	3	25	75	100	4	**29**
		13BCUC609	Genetic Engineering	5	3	25	75	100	4	
		13BCUC610	Immunology and Immunotechniques	4	3	25	75	100	4	
		16BCUC611	Hormonal biochemistry	4	3	25	75	100	4	
	Elective	11BCUE6PV	Project	4	3	_	100	100	5	
	Core	16BCUCP05	Core Biochemistry Practical V	5	6	40	60	100	4	
IV	**Skill Based Subject IV**			3	3	25	75	100	3	
V	**Extension Activity**		NSS/NCC/ Physical Education/YRC/ Green Society	–	–	–	–	100	1	
Total (I - VI Semesters)								**4000**		**140**

Bachelor of Science in Biochemistry		
2017- 2018 Batch onwards		
SKILL BASED SUBJECTS (CAFETERIA SYSTEM)		
S.No.	**Subject Code**	**Title of the Paper**
1	13BCUS301	Subject I : Health and fitness
2	11BCUS503	Subject III : Diet Therapy
3	11BCUS604	Subject IV : Natural Remedies
BASIC TAMIL/ ADVANCED TAMIL/ NON- MAJOR ELECTIVES		
S.No.	**Subject Code**	**Title of the Paper**
1	14TAMLU301	Basic Tamil*
	14TAMLU402	
2	14ADTU301	Advanced Tamil**
	14ADTU402	
3	17BCUN301	Elective I : Health and Hygiene
	12BCUN402	Elective II : Health and Healing
* For Students whose Part I in Secondary Education is not Tamil		
** For Students whose Part I in Higher Secondary Education is not Tamil		
SELF LEARNING PAPERS (Optional)		
S.No.	**Subject Code**	**Title of the Paper**
1	13AUGSL05	General Awareness (online)
2	13BCUSL04	Counseling Psychology

SEMESTER - I

CORE PAPER – I

BIOMOLECULES

Instructional Hrs.: 90 **Sub. Code: 16BCUC101**

Max. Marks : CIA -25; ESE -75 **Credits: 3**

SUBJECT DESCRIPTION: This course emphasizes on various bio-molecules and their significance.

OBJECTIVE: On successful completion of the course, the students should have understood the significance of the complex Biomolecules.

- Carbohydrates, Lipids , Proteins, Nucleic acids
- Vitamins and minerals.

UNIT-I **18Hrs.**

Carbohydrates – classification, stereochemistry, cyclic structure, anomeric forms and Haworth projections.

Structure, chemistry and functions of Monosaccharides - Reactions of monosaccharides - characteristics of aldehyde and ketone groups, action of acids and alkalies on sugars, reactions of sugars due to hydroxyl groups.

Disaccharides - classification, structure and functions of sucrose, lactose and maltose.

Polysaccharides – Definition and Types - Homo polysaccharides - structure and functions of starch, glycogen and cellulose.

Heteropolysaccharides - structure and functions of chitin and heparin.

UNIT-II **18Hrs.**

Lipids – Definition and classification - simple, compound and derived lipids.

Simple lipids - Physical and chemical properties of fats.

Compound lipids - structure and functions of phospholipids, glycolipids and lipoproteins.

Derived lipids - structure of saturated and unsaturated fatty acids.

Essential fatty acids.

Steroids – structure and functions of cholesterol.

UNIT-III **18Hrs.**

Amino acids - Definition, amino acids as *ampholytes*.

Structure and classification of amino acids based on side chain composition.

Chemical reactions of amino acids due to carboxyl and amino groups.

Protein - Definition and Classification.

Structural organization of proteins - Primary, secondary, tertiary and quaternary structure based on amino acid sequences.

UNIT-IV **18Hrs.**

Nucleic acids - structure of purine and pyrimidine, nucleosides and nucleotides.

DNA - Double helical structure.

Denaturation and renaturation of DNA.

RNA – Types, structure and functions of mRNA, rRNA and tRNA.

UNIT-V **18Hrs.**

Vitamins and minerals:

Vitamins – Definition and classification

Fat soluble vitamins - sources, structure, physiological functions and deficiency conditions.

Water soluble vitamins - sources, structure, physiological functions and deficiency conditions.

Minerals - essential macro and micro minerals - sources, functions and deficiency conditions.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1.**Ambika Shanmugam,** *Fundamentals of Biochemistry for Medical Students*, Ambika Shanmugam,Madras, edition 2004.

2.**Sathyanarayana.U.,** *Biochemistry*,Books and Allied(P) Ltd,Calcatta,1st edition,1999.

3. **Jain J.L.,** Fundamentals of Biochemistry, S.Chand & Company Ltd, Multicolour Illustrative Edition. 2005.

REFERENCE BOOKS

1. **Deb A.C.,** *Fundamentals of Biochemistry*, New Central Agency, Calcutta, 3rd edition, 2004.

2.**Lehninger.A.L.,Nelson.D.L., COX .M.M.,** *Principles of Biochemistry*, CBS publishers,New York, 3rd edition, 2003

3.**Stryer L ,** *Biochemistry*, Freeman and Company, New York, 4th edition,1995.

4.**Voet and Voet**, *Biochemistry* ,John Wiley and Sons publications,New York, 2nd edition. 1995.

SEMESTER – I

CORE BIOCHEMISTRY PRACTICAL – I

Instructional Hrs. : 45 **Sub. Code : 17BCUCP01**

Max. Marks : CIA -40; ESE -60 **Credits: 4**

1. Qualitative analysis of Carbohydrates:

a) Monosaccharides – Glucose, Fructose, Xylose.

b) Disaccharides – Sucrose, Lactose.

c) Polysaccharides – Starch.

2. Qualitative analysis of Amino acids:

a) Histidine b) Tyrosine c) Tryptophan

d) Cysteine e) Arginine.

3. Lipid Analysis (Demonstration)

1. Determination of Acid number.

2. Determination of Iodine number.

REFERENCE BOOKS

1. An introduction to Practical Biochemistry by David T. Plummer.
2. Laboratory Manual in Biochemistry by Pattabiraman.
3. Practical Biochemistry by J.Jayaraman.

DISTRIBUTION OF MARKS

Internal evaluation: 40 marks

1) CIA : 20 marks
2) Model : 15 marks
3) Record : 05 marks

External evaluation: 60 marks

1) Analysis – I : 25 marks
2) Analysis – II : 25 marks
3) Record : 07 marks
4) Viva-voce : 03 marks

SEMESTER - I

ALLIED PAPER – I

BASICS OF BIOTECHNOLOGY - I

Instructional Hrs. : 75 hrs **Sub. Code: 13BCUA101**

Max. Marks : CIA -20; ESE -55 **Credits: 3**

SUBJECT DESCRIPTION: The subject presents the basics of biotechnology, plant and animal tissue culture methods.

OBJECTIVES:

Provides information on

- Plant tissue culture – methods and applications.
- Animal tissue culture – methods
- Assisted reproductive technology in humans.

UNIT I **15 Hrs.**

Plant tissue culture - Media composition, nutrients and growth regulators, MS medium and B_5 medium. Callus and suspension culture. Initiation and differentiation of PTC. Regeneration of plants from callus – Organogenesis and *embryogenesis.*

UNIT II **15 Hrs.**

Micropropagation – Methods and applications.

Somaclonal variation.

Artificial seeds – Types, production and *applications*

Cryopreservation – Techniques.

Germplasm storage – Applications.

UNIT III **15Hrs.**

Protoplast culture- isolation, fusion of protoplasts, selection and regeneration of plantlets.

Gene transfer in to plant cells – Electroporation and *Biolistics.*

Production of secondary metabolites.

UNIT IV **15 Hrs.**

Animal Tissue Culture – Definition, Lab requirements for *in vitro* growth, Media composition – Natural animal ingredient and Complex natural media.

Culture of explants, Basic steps in cell culture technique. *Transgenic mice.*

UNIT V **15 Hrs.**

Assisted reproductive technology in humans - Artificial insemination, *in vitro* fertilization (IVF), GIFT, ICSI and *embryo transfer*.

Stem cells – Types and characterization.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. Dubey. R.C., *A textbook of Biotechnology*, S. Chand and company Ltd,New Delhi, 4th edition, 2006.

2. Kumaresan. V., *Biotechnology*, Saras Publication **,** Kanyakumari**,** Revised edition**,** 2005 .

3. Sathyanarayana. U., *Biotechnology,* Arunabha Sen Publication.

REFERENCE BOOKS

1. Balasubramanian.D., *Concepts in Biotechnology*, Universal press, India, Reprint, 1996.

2.Butterworth-Heinemann, *Invitro Cultivation of animal cells,* University of Greenwich,United Kingdom,London,Reprint, 1995.

3. Singh B.D., *Biotechnology,* Kalyani Publishers, India,1st edition Reprint, 2002.

SEMESTER – I &II

ALLIED PRACTICALS – I: BIOTECHNOLOGY

Instructional Hrs: 90 Hours **Sub. Code: 16BCUAP01**

Max. Marks: CIA -20; ESE -30 **Credits: 4**

EXPERIMENTS I

1) Sterilization

a) Physical Sterilization b) Chemical Sterilization

2) Media preparation & methods of streaking.

3) Isolation of bacteria from curd.

4) Staining methods

i) Simple staining

ii) Gram's staining

iii) Negative staining

5) Sterilization of culture rooms, glass wares, equipments.

6) Antibiotic sensitivity test.

EXPERIMENTS II

1) Preparation of MS medium.

2) Collection of Explant, surface sterilization, Inoculation of explants.

3) Isolation of genomic DNA from plant tissue.

4) Isolation of genomic DNA from animal cell.

5) Preparation of artificial seed.

DEMONSTRATION EXPERIMENTS:

1) Hanging drop technique.

2) Biometric measurements of plants grown in the presence of biofertilizers :

i) Root length ii) Shoot length iii) Fresh weight iv) Dry weight

Internal evaluation:- 20 marks:-			**External evaluation :- 30 marks**		
1) CIA	:	8 marks	1) Experiment I	:	15marks
2) Model	:	8 marks	2)Experiment II	:	10marks
3) Record	:	4 marks	3)Record	:	05 marks

SEMESTER - II

CORE PAPER II

ANALYTICAL TECHNIQUES

Instructional Hrs. : 30 **Sub. Code : 13BCUC202**

Max. Marks: CIA -25; ESE -75 **Credits: 3**

SUBJECT DESCRIPTION : This course presents the principles, instrumentations, working and applications of the instruments commonly used in the laboratories.

OBJECTIVES: On successful completion of the course the students would have learnt the principles and applications of the instruments.

UNIT I **6 Hrs.**

pH scale - methods of calculating pH from Henderson's equation, buffer solutions, buffer systems of blood - protein, bicarbonate and phosphate buffer system.

Various ways of expressing the concentrations of solutions - molality, molarity, normality and mole fraction.

Simple problems to be worked out.

UNIT II **6 Hrs.**

Chromatography - principle, instrumentation and applications - paper chromatography, thin layer chromatography, adsorption chromatography, *GLC, ion exchange chromatography*, affinity chromatography and molecular sieve chromatography.

UNIT III **6 Hrs.**

Electrophoresis - principle, instrumentation and applications of paper electrophoresis, agar gel, starch gel, SDS-PAGE and *isoelectric focusing* .

Ultracentrifuge- principle and description of analytical centrifuge, equilibrium density gradient centrifugation, *separation of cell organelles by differential centrifugation.*

UNIT IV **6 Hrs.**

Colorimetry - colour and absorption spectra, Beer and Lambert's law , working of a single cell photoelectric colorimeter, measurement of extinction coefficient, calibration curve.

Spectrophotometry - instrumentation, applications of photometry, comparison and advantage of spectrophotometer over colorimeter.

Fluorimetry – principle and *applications* - determination of thiamine and riboflavin.

Flame photometer - principle and *applications*

UNIT V **6 Hrs.**

Tracer and other techniques - Radioactive decay, units of radioactivity, $t_{1/2}$, detection and measurement of radioactivity, G.M counter, scintillation counters, auto radiography.

Applications of radioisotopes in biological and medical sciences.

Hazards and safety aspects of radioactivity.

Note: *Italics* denote Self Study Topics

TEXT BOOKS

1. **Asokan.P.,** *Analytical biochemistry*, Chinnaa Publications, Vellore, 2nd edi., 2006.

2. **Khandpur .R.S.,** *Hand book of biomedical instrumentation,*TATA McGraw Hill, New Delhi, 2nd edi., 2005.

3. **Upadhyay.A et al.,** *Biophysical Chemistry* **–** Principles and techniques, Himalaya Publising House, Mumbai, 3rd edi., Reprint, 2005.

REFERENCE BOOKS

1. **David T. Plummer.,** *An introduction to practical Biochemistry,*Tata McGraw-Hill Publications, New Delhi, 3rd edi., 1988.

2. **KeithWilson, Keneth , H ., Goulding** , *A Biologist's Guide to principles and techniques of practical biochemistry*, Cambridge University Press,UK, 3rd edition, 1992.

3. **KeithWilson and Walker .J.,** Principles and techniques of practical biochemistry, Cambridge University Press,UK, 4th edition, 1995.

4. **Leslie .C., Fred J.W., Erich A.P.,** *Biomedical instrumentation and measurement*, 2nd edition, 1995.

SEMESTER – II

CORE BIOCHEMISTRY PRACTICAL – II

Instructional Hrs. : 45 Hrs **Sub. Code : 13BCUCP02**

Max. Marks : CIA -40; ESE -60 **Credits: 4**

I. COLORIMETRY:

1. Estimation of Glucose – O - Toluidine method.
2. Estimation of Phosphorus – Fiske and Subbarow method.
3. Estimation of Urea – DAM-TSC method.
4. Estimation of Uric acid – Caraway method.
5. Estimation of Creatinine – Picric acid method.
6. Estimation of Protein – Lowry's method.

II. SPOTTERS:

1. Paper chromatogram
2. TLC
3. SDS – PAGE
4. Colorimeter
5. Spectrophotometer

DISTRIBUTION OF MARKS

Internal evaluation: 40 marks		**External evaluation: 60 marks**	
a) CIA	: 20 marks	a) Analysis	: 35 marks
b) Model	: 15 marks	b) Spotters	: 15 marks
c) Record	: 05 marks	c) Record	: 05 marks
		d) Viva-voce	: 05 marks

SEMESTER - II

ALLIED –A: PAPER – II

BASICS OF BIOTECHNOLOGY - II

Instructional Hrs: 75 Hours **Sub. Code: 13BCUA202**

Max. Marks: CIA -20; ESE -55 **Credits: 3**

SUBJECT DESCRIPTION: The subject presents the applications of biotechnology, and an introduction to fermentation biotechnology.

OBJECTIVES:

Provides information on the basic applications of Biotechnology

- Biofertilizers and Biopesticides.
- Bioprocess technology
- Biofuels.
- Biological waste treatment & Reuse.
- Bioremediation, Biodegradation& Biomining.

UNIT I **15 Hrs.**

Biofertilizers - Rhizobium – Production and *applications.*

Blue Green Algae - Production and *applications.*

Biopesticides - Biological control of crop pests:- Predators: Birds, Insects –Asian red *weaver ant,* Parasitoids: Proropsa nasuta, Bacterial Pesticides: BT, Fungal Pesticides : Beauveria bassiana,Viral pesticides: GV, Nematodes.

UNIT II **15 Hrs.**

Bioprocess technology – fermentation, design of a commercial fermenter, Solid substrate fermentation,

Media for industrial fermentations

Batch culture and fed - batch culture.

Down - stream processing.

Production of Amino acids and *SCP*.

UNIT III **15 Hrs.**

Biofuels:- Definition.

Ethanol:- Production and applications.

Biogas:- Production and applications.

Biological Hydrogen Production:- Photo production of Hydrogen, cell-free 'H' production, 'H' production from marine organisms & *Microbial production of 'H', uses of 'H' producing technology*.

UNIT IV **15 Hrs.**

Biological waste Treatment:- Definition.

Sewage Treatment – methodology & reuse of sewage. Reuse of waste as raw material.Compost-Definition, Methods of composting:- Indore method, Bangalore method & *vermi composting and its advantages.*

UNIT V **15 Hrs.**

Bioremediation:- Definition, insitu bioremediation, Digestion in above ground reactors.

Biodegradation:- Definition, xenobiotics, Biodegrading agents, modification of Bacterial strain, Advantages of Biodegradation.

Biomining:- Definition, Leaching, micro organisms involved in bioleaching, Advantages of Biomining.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. Dubey. R.C., *A textbook of Biotechnology*, S. Chand and company Ltd,New Delhi, 4th edition, 2006.

2. Kumaresan. V., *Biotechnology*, Saras Publication **,** Kanyakumari**,** Revised edition**,** 2005 .

REFERENCE BOOKS

1. Balasubramanian.D., *Concepts in Biotechnology*, Universal press, India, Reprint, 1996.

2.Butterworth-Heinemann, *Invitro Cultivation of animal cells*, University of Greenwich,United Kingdom,London,Reprint, 1995.

3. Singh B.D., *Biotechnology*, Kalyani Publishers,India,1st edition Reprint, 2002.

SEMESTER - III

CORE PAPER III

ENZYME AND ENZYME TECHNOLOGY

Instructional Hrs.: 60 Hours **Sub. Code:13BCUC303**

Max. Marks: CIA -25; ESE -75 **Credits: 3**

SUBJECT DESCRIPTION : To enable the students to understand the techniques of isolation and purification of enzymes, kinetics of the enzymes and the enzymes that are used in medicine and industry.

OBJECTIVES:

On successful completion of the course the students will acquire knowledge about

- Techniques of isolation and purification of the enzymes.
- Kinetics of the enzymes
- Enzymes that are used in medicine and industry.

UNIT I **12 Hrs.**

Introduction to enzymes, international classification of enzymes, enzyme units.

Enzyme Structure :- Primary, Secondary, Tertiary & Quaternary structure of enzymes.

Active sites, theories proposed –lock and key, Induced fit model.

Specificity of enzymes.

Extraction and purification of enzymes.

UNIT II **12 Hrs.**

Enzyme Kinetics- Michelis-Menton equation – derivation, transformation of MM equation – LB plot.

Factors influencing the rate of enzyme activity.

Enzyme inhibition-competitive, non-competitive and un-competitive. Multi enzyme complex, *Ribozymes and Isozymes.*

UNIT III **12 Hrs.**

Co- enzymes - definition, structure and functions of thiamine pyrophosphate, NAD, NADP, FMN, FAD, CoA, Lipoate, *Biotin* and TH_4.

Mechanism of action of lysozyme.

Allosteric enzymes – Aspartate transcarbamylase.

UNIT IV **12 Hrs.**

Enzyme Technology - immobilized enzymes, methods of immobilization,

Applications of Immobilized enzymes:- Textile, Pharmaceutical, Leather & *Food and Beverage industries.*

UNIT V **12 Hrs.**

Enzyme biosensors:- colorimetric, potentiometric, optical and immuno sensors (principles and techniques only).

Artificial enzymes, recent advances and future prospects of enzyme engineering.

Enzymes in medical diagnosis – *Lactate dehydrogenase*, Creatinine phosphokinase, Aspartate transaminase, Alanine transaminase and Acid phosphatase.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Asokan.P.,** *Enzymes*, Chinnaa Publications, Vellore, 2nd edition,2006.

2.**Tripathi.G.,***Enzyme biotechnology*,TechnoScience Publications, Jaipur,1st edition,1999.

REFERENCE BOOKS

1. **Alan Wiseman**, *Hand book of Enzyme Biotechnology*, 2nd edition.

2. **Chapline & Buck**, *Enzyme Technology.*

3. **Dixon and Webb**, *Enzymes*

4. **Sridhar**, *Enzyme Biotechnology*, A.S. Saini for Dominant publishers, New Delhi,1st edition, 2005.

5. **Trevor Palmer**, *Understanding Enzymes*, Ellis Horwood limited, New Delhi, 3rd edition, 1991.

SEMESTER – III & IV

CORE BIOCHEMISTRY PRACTICAL – III

Instructional Hrs: 90 Hrs. **Sub. Code: 17BCUCP03**

Max. Marks: CIA -40; ESE -60 **Credits: 4**

I. ENZYME KINETICS

1. Preparation of Buffer solution – Phosphate and citrate buffer.
2. Determination of pH of buffer solution using pH meter.

A. TITRIMETRY

1. Effect of pH on the activity of Catalase.
2. Effect of substrate concentration on the activity of Catalase.
3. Effect of temperature on the activity of Catalase.
4. Effect of enzyme concentration on the activity of Catalase.

B. COLORIMETRY/ SRECTROPHOTOMETRY

1. Effect of pH on the activity of Acid phosphatase.
2. Effect of substrate concentration on the activity of Acid phosphatase.
3. Effect of temperature on the activity of Acid phosphatase.
4. Effect of enzyme concentration on the activity of Acid phosphatase.
5. Effect of pH on the activity of Salivary amylase.
6. Effect of substrate concentration on the activity of Salivary amylase.
7. Effect of temperature on the activity of Salivary amylase.
8. Effect of enzyme concentration on the activity of Salivary amylase.

II. GROUP EXPERIMENTS

1. Circular chromatography – (Amino acids)
2. TLC - (Lipids)
3. Phytochemical analysis of plant extract.

III. KIT METHOD (GROUP EXPERIMENTS)

. SGOT 2. SGPT 3. ALP

DISTRIBUTION OF MARKS

Internal evaluation: 40 marks		**External evaluation: 60 marks**	
a) CIA	: 20 marks	a) Analysis I	: 25 marks
b) Model	: 15 marks	b) Analysis II	: 25 marks
c) Record	: 05 marks	c) Record	: 7 marks
		d) Viva-voce	: 3 marks

SEMESTER – III

SKILL BASED SUBJECT - I

HEALTH AND FITNESS

Instructional Hrs. : 45 Hrs. **Sub. Code: 13BCUS301**

Max. Marks: CIA -25 , ESE – 75. **Credits: 3**

SUBJECT DESCRIPTION: This course discusses the concepts, philosophies, Nutrition, Mental being, Environment aspects, Maternal and child care in terms of health and fitness.
OBJECTIVES: On successful completion of the course the students will acquire knowledge about

- The concepts of health and disease.
- Ayurvedic view of nutrition
- Nutrition and Health.
- Maternal and child health care.

UNIT I **9 Hrs**

Improving health of the individual:

Personal health.

Food: Balanced diet and Ayurvedic view of nutrition.

Physical fitness: Exercise, Aerobics and *yoga.*

Stress management- Sleep and relaxation.

UNIT – II **9 Hrs**

Nutrition and Health – Definition of Food and Nutrition. Nutrients – Sources and functions of Proteins, fats, carbohydrates, vitamins and minerals.

Nutritional Profile of principle foods – Cereals, Millets, Vegetables, Fruits, Milk, and Milk products, Fish, meat, *alcoholic beverages, egg and soft drink*.

UNIT – III **9 Hrs**

Environment and Health – Basic health requirements in the environment.

Water – Sources and uses of water.Water pollution and its related diseases. Purification of water.

Air – Composition. Air pollution – *Sources and need for proper ventilation.*

UNIT – IV **9 Hrs**

Maternal and child Health-Mother and child-Intra natal and Post natal care.

Complications of post portal period, restoration of mother to optimum health.

Breast feeding; Family planning methods –definition, Natural methods (BBT, Cervical and mucous methods). Artificial methods – Hormonal contraceptives, gonodal steroids, *oral pills and Depot formulations.*

UNIT – V **9 Hrs**

Mental Health – Types and causes of mental illness – *Preventive aspects*;

Alcoholism, Drug dependence – Commonly abused drugs.

Health in Old age – Aging, caring for older people, *care of bedridden*.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Ahmed. M. N**., *Hygiene and health*, Anmol publications, New Delhi, 15th edi., 2005.
2. **Ashtekar. S.,** *Health and Healing –A Manual of Primary health care*, Orient Longmans publishers. 2001.
3. **Park. K.,** *Social and preventive medicine* , Bhanot publishers, Japalpur, 18th edition, 2005.

REFERENCE BOOKS

1. **Patil. R.S.,** *Practical Community Health*, Vora medical publishers, New Delhi, 1st edi 1995.
2. **Prabhakara. G. N.,** *Preventive and social medicine*, Jaypee Publications., New Delhi, 1st edi, 2003.
3. **Sridhar Rao. B.,** *Community Health Nursing*, A.I.T.B.S. Publishers, New Delhi, 1st edi 2006, Revised reprint 2009.

SEMESTER – III

NON – MAJOR ELECTIVE PAPER – I

HEALTH AND HYGIENE

Instructional Hrs. : 30 Hours **Sub. Code : 17BCUN301**

Max. Marks: ESE -100 **Credits: 2**

SUBJECT DESCRIPTION: This course discusses the concepts, philosophies, Nutrition, Mental being, Environment aspects, Maternal and child care in terms of health and hygiene.

OBJECTIVES: On successful completion of the course the students will acquire knowledge about

- The concepts of health and disease.
- Nutritional profile of principle foods.
- Environmental health and mental health.
- Dental health and Dental care.
- Maternal and child health care.

UNIT I **6 Hrs**

Introduction , General health, Signs of good health, Personal Hygiene, Hygiene specificities, Handling common Illnesses, Choosing a doctor.

UNIT II **6 Hrs**

Nutrition and Health – Definition of Food and Nutrition. Nutrients – Sources and functions of Proteins, fats, carbohydrates, vitamins and minerals. Balanced Diet.

Nutritional Profile of principle foods – Cereals, Millets, Vegetables, Fruits, Milk, and Milk products, Fish, meat, *alcoholic beverages, egg and soft drink*.

UNIT III **6 Hrs**

Maternal and child Health-Mother and child-Intra natal and Post natal care.

Complications of post portal period, restoration of mother to optimum health.

Breast feeding; Family planning methods –definition, Natural methods (BBT, Cervical and mucous methods). Artificial methods – Hormonal contraceptives, gonodal steroids, *oral pills and Depot formulations.*.

UNIT IV **6 Hrs**

Dental Health – Tooth development, Developmental tooth anomalies , Promotion of Oral health, Viral infections, Oral ulcerations, Dental caries – Diagnostic methods, Non- surgical management and prevention.

UNIT V **6 Hrs**

Mental Health – Types and causes of mental illness – *Preventive aspects*;

Alcoholism, Drug dependence – Commonly abused drugs.

Health in Old age – Aging, caring for older people, *care of bedridden*.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Ahmed. M. N**., *Hygiene and health*, Anmol publications, New Delhi, 15th edi., 2005.
2. **Ashtekar. S.,** *Health and Healing –A Manual of Primary health care*, Orient Longmans publishers. 2001.
3. **Park. K.,** *Social and preventive medicine* , Bhanot publishers, Japalpur, 18th edition, 2005.
4. **Edmund Benson .,** *Health and Hygiene* , Arise foundation
5. **Suzanne Noble.,***Clinical text book of hygiene and therapy*, 2nd edition , Wiley – Blackwell,2012

REFERENCE BOOKS

1. **Patil. R.S.,** *Practical Community Health*, Vora medical publishers, New Delhi, 1st edi 1995.
2. **Prabhakara. G. N.,** *Preventive and social medicine*, Jaypee Publications., New Delhi, 1st edi, 2003.
3. **Sridhar Rao. B.,** *Community Health Nursing*, A.I.T.B.S. Publishers, New Delhi, 1st edi 2006, Revised reprint 2009.
4. **Deirdre Englehart.,** *Health, Hygiene and Nutrition* , Carson – Dellosa Publishing LLC, 2005.
5. P.K.Ray., *Health, Hygiene and Nutrition – 3 Tiers of a good living*, Notion Press , 2017.

SEMESTER – IV

CORE PAPER IV

INTERMEDIARY METABOLISM

Instructional Hrs. : 45 Hrs **Sub. Code : 13BCUC404**

Max. Marks : CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course provides knowledge about the basic functions, principles and concepts of metabolism.

OBJECTIVES: Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body.

- Interrelationship between carbohydrates, lipids and protein metabolism
- Role of Purine and Pyrimidines in nucleic acid metabolism.
- Various disorders related to each metabolism.

UNIT I **9 Hrs.**

Metabolism of carbohydrates.

Glycolysis – pathway and energetics, oxidation of pyruvate to acetyl Co-A, TCA cycle – pathway and energetics, anaplerosis, gluconeogenesis, glycogenesis, glycogenolysis, HMP shunt.

Metabolism of fructose and galactose.

UNIT II **9 Hrs.**

Metabolism of lipids.

Oxidation of fatty acids - β – oxidation of odd, even , saturated and unsaturated FAs, α - oxidation and ω –oxidation.

Biosynthesis of saturated fatty acids - extra mitochondrial, mitochondrial and microsomal system.

Biosynthesis of unsaturated fatty acids - mono and poly unsaturated fatty acids.

Biosynthesis and *degradation of lecithin, cephaline*, inositol, phosphatidyl serine and glycolipids.

Biosynthesis and degradation of cholesterol.

UNIT III **9 Hrs.**

Metabolism of proteins:-

Catabolism of amino acids- oxidative and non - oxidative deamination, transamination, decarboxylation and urea cycle.

Fate of carbon skeleton of amino acids – Glucogenic and ketogenic amino acids.

Catabolism of glycine, phenylalanine and tyrosine.

UNIT IV **9 Hrs.**

Interrelationship between carbohydrate, protein and lipid metabolism.

Electron Transport Chain – Organization, transport of electrons, energy capture and respiratory control.

Oxidative phosphorylation - mechanism of oxidative phosphorylation, Chemiosmotic theory, *uncouplers hand inibitors* of oxidative phosphorylation.

UNIT V **9 Hrs.**

Metabolism of purines - biosynthesis of purine nucleotides and *salvage pathway*.

Regulation and degradation of purine nucleotides.

Metabolism of pyrimidines - biosynthesis of pyrimidine nucleotides and *salvage pathway*.

Regulation and degradation of pyrimidine nucleotides.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Murray.R.K.,Granner.D.K.,Mayes.P.A.,Rodwell.V.W.**, *Harper's Illustrated Biochemistry*, Mc Graw Hill Companies, Boston, 26th edition, 2003.

2. **Sathyanarayana.U,** *BioChemistry*, Books and Allied (P) Ltd, Calcatta, 1st edition, 1999.

REFERENCE BOOKS

1.Garrett and Grisham, *Biochemistry*, Saunders College Publishers,New York, 2nd edition, 1995.

2.**Lehninger L.S. *et.al.,*** *Principles of Biochemistry*, CBS Publishers,New Delhi, 3nd edition, 1998.

3. Mathews, Freeland and Miesfled, *Biochemistry*, John Wiley and Sons, U.K., 1st edition, 1996.

SEMESTER IV

ALLIED PAPER – II

MS OFFICE 2010

Instructional Hrs: 75 Hours **Sub. Code : 15BCUA402**

Max. Marks: CIA – 20; ESE : 55 **Credits : 3**

UNIT – I **5 Hrs**

MS Word 2010 : Starting Word, Opening a saved Word document , The Word 2010 Window Entering text , Preview, Save, Print and Closing a document. Creating a folder and exiting Word. Editing a Document : Navigation, insert, delete, editing a data. Undo, redo, drag and drop to move text, Copy, cut and paste, Clear formatting.

Formatting A Document: Format and align text, Line and paragraph spacing, *Add bulleted and numbered lists,* Add borders and shading.

UNIT II **5 Hrs**

Editing and Proofing Tools: Document views, Spell and grammar check, Find and replace text.

Layout of a Document : Adjust page margins, Change page orientation, Create headers and footers.

Inserting Elements to Word Documents : Insert a page break, page numbers, special characters (symbols), picture from a file, Resize and reposition a picture.

Working with Tables: Insert a table, Convert a table to text, Resize parts of a table, Align, Format, *Insert and delete columns and rows*, Borders and shading.

Creating Mail Merge.

UNIT III **5 Hrs**

MS Excel 2010 : Introduction to MS Excel 2010, Workbook creation • Entering, Editing & Formatting data, Adding cell borders and shading, working with ranges, managing and printing workbooks, Perform simple calculations, *Chart creation*.

UNIT IV **5 Hrs**

MS PowerPoint 2010 : Introduction, Slide Creation, Editing & Formatting slides, Insert Graphics (Tables, Charts, Shapes, Clip-Art), Work with Videos, Movie-Clips, Animations, *Transitions and sounds*, Photo Album creation.

UNIT V **5 Hrs**

Internet Basics: Introduction to Internet • WWW • Browsers • Web site • E-Mail : Creation of E-Mail-id – Compose and send a Mail – *Replay and Forward* – attachment – download the attached document – cc & bcc - upload your resume with any one job portal • Search Engine.

TEXT BOOKS:

1) Joan Lambert, **MOS *2010 Study Guide For Microsoft Word Excel Powerpoint & Outlook***
PHI LEARNING PVT LTD.

2) Bott E,K. Krishnaswamy, Ponni Bala, ***Microsoft Office 2010 Inside Out,*** Publisher: PHI Learning Pvt. Ltd.

SEMESTER - IV

Allied Practicals- II : MS OFFICE 2010

Instructional Hrs.: 30 **Sub. Code: 15BCUAP02**

Max. Marks: CIA -20; ESE -30 **Credits: 4**

I. MS-WORD

1. Using MS word, perform the following program Change the font size to 20.

- Change the font type.
- Align the text to left, right, justify and center.
- Underline the text
- Table manipulation.

2. Illustrate the Mail merge concept to apply for a suitable job for at least 5 companies.

3. By using Equation Editor , type a context containing mathematical symbols, equations and formula.

II. MS-EXCEL

4. Worksheet preparation for electricity bill payment

5. Draw graphs to illustrate class performance.

III. MS – POWER POINT

6. Prepare an organization chart for a college environment in Power point.

7. Prepare a Power point presentation with all the slide transition facilities.

IV. INTERNET BASICS

8. Create an email-id.

9. Online Reservation of Railway Ticket.

10. To verify a university/college details by opening their websites.

DISTRIBUTION OF MARKS:

External evaluation: 30 marks		**Internal evaluation: 20 marks**	
a) program	: 15 marks	a) CIA	: 08marks
b) Output	: 10 marks	b) Model	: 08 marks
c) Record	: 5 marks	c) Record	: 04 marks

SEMESTER – IV

SKILL BASED SUBJECT II

MULTISKILL DEVELOPMENT PAPER

Instructional Hrs: 45 Hrs. **Sub Code:13BCUS402**

Max.Marks :ESE – 60 ; CIA – 40 **Credits: 3**

Aim: To equip the students with knowledge on all topics as desirable from the point of view of brilliant success in the competitive examinations.

Objective: To familiarize the students with various types of tests that are employed by the diverse examining bodies.

UNIT I **9 Hrs.**

Communication: Question tag – Gerund and Infinitives – Spotting the errors – Vocabulary – Synonyms – Antonyms - Prepositions – Articles – One word substitution – Sentence completion.

UNIT II **9 Hrs.**

Numerical Aptitude : Problems on numbers - Problems on Ages – Percentage - Profit and loss - Ratio & Proportion - Time & Work - Time & Distance - *Simple Interest* - Compound Interest.

UNIT III **9 Hrs.**

Critical Reasoning : Logical Inference Questions and Syllogism.

Analytical Reasoning : Arrangement problems – Family / Blood Relation Qualms – Sense of Directions – Age Doubts.

Verbal Reasoning : Verbal Analogy (Letter series and number series only) – Coding and Decoding.

UNIT IV **9 Hrs.**

Preparing CV/ Resume:

Introduction-Meaning-difference among Bio-data, CV and resume –The terms-The purpose of CV writing- Types of resumes –Interesting facts about resume-CV writing tips-CV/Resume preparation-the dos-CV/Resume preparation-the don`ts-Resume checkup- Design of a CV-entry level resume-The content of the resume-Electronic resume tips-References –Power words-Common resume blunders-key skills that can be mentioned in the resume-Cover letters- cover letters tips.

UNIT V **9 Hrs.**

Interview skills: Introduction-Types of questions asked-Reasons for selecting and rejecting a candidate-Interview tips.

Body language: Types and developing confidence with correct body language.

Etiquette and manners: Introduction-Classification-Corporate grooming manners.

Group discussion: Introduction-characters tested in GD –Skills required in GD-Essential elements of GD.

TEXT BOOKS:

1.**Alex.K.,** *Soft Skills-Know Yourself and Know the World,* S.Chand Company Ltd., 2011.

2.**Prasad,** How to prepare for Group Discussions and Interview(With Audio CD) Tata McGraw Hill, New Delhi,2007.

3.**Hari Mohan Prasad & Uma Rani Sinha. 2011.** Objective English for Competitive Examinations. New Delhi: Tata McGraw Hill Education Private Ltd. (Unit – I)

4.**R.S. Aggarwal**, *Quantitative Aptitude*, S.Chand 2010. (Unit - II)

5.**R.S. Agarwal**, A Modern Approach to Verbal Reasoning (Fully Solved) **–**Revised Edition, S.Chand Company Limited, New Delhi, 2012. (Unit – III)

REFERENCE BOOKS:

1. **M. S. Rao,** *Soft Skills Enhancing Employability-Connecting Campus with Corporate,* IK International Publishing House, NewDelhi, 2010. (Unit – IV)

2.**Edgar Thorpe**, *Test of Reasoning for Competitive Examinations –4th edition*, Tata McGraw-Hill Publishing Company Limited, New Delhi. (Unit – III)

3.**Wallace Hr and Masters LA**, Personality Development, Cengage learning India Pvt .ltd, New Delhi

SEMESTER – IV

NON – MAJOR ELECTIVE PAPER – II

HEALTH AND HEALING

Instructional Hrs. : 30 Hours **Sub.Code : 12BCUN402**

Max. Marks: ESE -100 **Credits: 2**

SUBJECT DESCRIPTION: This course emphasizes the students to understand that health is necessary to deal with their health related problems.

OBJECTIVES: On successful completion of the course the students will acquire knowledge about

- Personal health and Basic diagnosis
- Illness of commonly affected and less commonly affected system
- Emergency care and special care

UNIT I 6 Hrs

Improving health of the individual:

Personal health.

Food: Balanced diet and Ayurvedic view of nutrition.

Physical fitness: Exercise, Aerobics and *yoga.*

Stress management- Sleep and relaxation.

UNIT II 6 Hrs

Symptoms and illness:

Basic diagnosis: Essential steps in diagnosis.

Fever: Types, Measurement and treatment. Dengue fever.

Pain: Types and *treatment.*

Headache: Migraine and *treatment.*

UNIT III 6 Hrs

Illness of commonly affected system:

Eye: Eye care, testing vision, sore eye, visual defects in children and adults.

Skin: Scabies, Allergy, Skin sores, Boils.

Digestive system: Nausea and vomiting, Constipation, Peptic ulcer, Appendicitis, *Measures for avoiding digestive problems.*

UNIT IV 6 Hrs

Illness of less commonly affected system:

Heart: Myocardial Infarction, Hypertension.

Urinary system: Urinary tract infection.

Nervous system: Paralysis, *Rabies*, Brain tumors.

Reproductive system: *Fertility awareness*, Pregnancy - General check up, Care, common complaints, medicines to avoid.

UNIT V 6 Hrs

Emergency care and special care:

Accidents and first aid: Drowning, Burns and scalds, Road accidents, Snake bite.

Special care: Hair, Teeth, Eyes, *Seasonal health care.*

Note: *Italics* denote Self Study Topics

TEXT BOOKS:

1)Aarathi.S. and Swati.T.,*Nutrition in nutshell – a must for everyone*, Agrotech publishing academy, Udaipur, 2008.

2) Ashtekar. S., *Health and Healing – A Manual of Primary health care*, Orient Longmans publishers. 2001.

3) Saritha.S., *mother and child health care – A handbook* , Shree Niwas Publications, Jaipur, 2009.

REFERENCE BOOKS:

1)Park. K., *Social and preventive medicine,* Bhanot publishers, Japalpur, 18th edition, 2005.

2) Patil. R.S., *Practical Community Health*, Vora medical publishers, New Delhi, 1st edi 1995.

3) Prabhakara. G. N., *Preventive and social medicine*, Jaypee Publications., New Delhi, 1st edi, 2003.

4) Sridhar Rao. B., *Community Health Nursing*, A.I.T.B.S. Publishers, New Delhi, 1st edi 2006, Revised reprint 2009.

SEMESTER - V

CORE PAPER – V

CELL AND CANCER BIOLOGY

Instructional Hrs. : 60 Hours **Sub. Code: 13BCUC505**

Max. Marks : CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course helps to identify the range of cellular activities and also the basic ways that cells associate to form the tissues.

OBJECTIVES: On successful completion of the course the students should have

- Understood the relationship between cellular organization and biological functions of normal cell, prokayotic and eukaryotic cells.
- Learnt about the various cell organelles with their functions and actions.
- Learnt the applications of cell biology in research.

UNIT I **12 Hrs.**

Cell theory, classification of cells- prokaryotes and eukaryotes.

Cell membrane - fluid mosaic model of membrane structure.

Membrane lipids.

Membrane proteins and their properties.

Membrane carbohydrates and their functions.

Transport across membrane - diffusion, active and passive transport.

UNIT II **12 Hrs.**

Types, structure and functions of endoplasmic reticulum.

Structure and functions of golgi bodies.

Structure and functions of lysosomes.

Structure and functions of ribosomes.

UNIT III **12 Hrs.**

Structure and functions of mitochondria.

Structure and functions of peroxisomes and glyoxysomes.

Cytoskeleton - types of filaments and their functions.

Microtubules - chemistry and functions.

Structure and functions of chloroplast.

UNIT IV **12 Hrs.**

Structure and functions of nucleus.

Cell cycle – phases of cell cycle, mitosis.

Cell – Cell Interactions:- Tight junctions, Gap junctions and Desmosomes.

Cell adhesion molecules.

UNIT V **12Hrs.**

Cancer Biology - Distinction between normal and cancer cell (Cytological and molecular changes in cancer)

Cancer - types, characteristics, causes, early detection of cancer and latest treatments.

Genes and Cancer - Oncogenes, Activation of proto- oncogenes, Tumour suppressor genes- p53.

Role of carcinogens in inducing cancer.

Note: *Italics* denote Self Study Topics

TEXT BOOKS

1. **Arumugam .N.,** *Cell biology and Molecular biology,* Saraspublications, Kanyakumari, 7th Revised edition,2010.
2. **Dalela .RC, Verma. SR.,** *Text book of cytology,* Jai Prakashnath& Co., Meerut, 12th edition,1991
3. **Ajoy Paul.,** *Text book of Cell and Molecular biology,*Books and Allies (P) Ltd.,Kolkata, 3rd edition,2011.

REFERENCE BOOKS

1. **Bruce Albert *et al*.,** *Molecular biology of the cell,* Garland publications, New York & London, 3rd edition, 1994.
2. **Cooper,** *The cell molecular approach*, ASM Press, 1st edition, 1995.
3. **Derobertis, E.D.P., Robertis E.M.F.,***Cell and Molecular Biology*, Saunders Company, Philadelphia, 7th edition, 1980.
4. **Johnson E.K.,** *Histology and Cell Biology,* Williams and Wilkins Publishers, Hong kong, 2ndedition, 1991.
5. **Lodish.H, Baltimore, Bert.A *et.al*.,** *Molecular cell biology*, 3rd edition. 1995.

CORE PAPER VI

HUMAN PHYSIOLOGY WITH MEDICAL TERMINOLOGY

Instructional Hrs: 75 Hrs. **Sub.Code :16BCUC506**

Max. Marks: CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course presents an introduction and provides a comprehensive, balanced introduction to this exciting evolving and multi- disciplinary field.

OBJECTIVES: On successful completion of the course the students should have
Understood clearly on various alimentary parts of human body

- Learnt more specific on the endocrinal activities
- Learnt the mechanisms and actions of vital organs.

UNIT I **15 Hrs**

Digestive system - secretion of digestive juices, digestion and absorption of carbohydrates, proteins and fats.

Respiratory system - transport of gases, exchange of gases between lungs and blood, between blood and tissue.

Terminology : (Definitions only)

Digestive disorders - Achlorhydria, **hematochesis, achalasia, diverticular, intussusception, ulcerative colitis, volvulus, anal fistula, colonic polyposis, Abdominoperineal resection, Anastomosis, Aneurysm, Banding and Colostomy.**

Respiratory disorders – Croup, pertussis, cystic fibrosis, atelectasis, emphysema, pneumoconiosis, pulmonary abscess and embolism, mesothelioma, pleural effusion, bronchoscopy, thoracotomy, tracheostomy and mediastinoscopy.

UNIT II **15 Hrs**

Blood - composition and functions, structure and functions of RBC, leucocytes and platelets, hematopoeisis , Blood coagulation, blood groups and blood transfusion.

Body fluids - ECF and ICF, ionic composition of body fluids.

Heart – Structure of Heart. Cardiac cycle.

Terminology : (Definitions only)

Blood- Aplastic Anemia, Erythrocytapheresis, Hematocrit, Thrombosis, Hemostasis, Hypoxemia, Neoplastic Disease, Thrombocytopenia and Von Willebrand Disease.

Heart – arrhythmias, flutter, fibrillation, varicose vein, hemorrhoids, tetralogy of fallot, coronary artery disease, endocardilis, endarte rectomy, extracarponeal circulation, thrombolytic therapy and coronary bypass surgery (CABG).

UNIT III **15 Hrs**

Nervous system - structure of neuron, resting membrane and action potential, propagation of nerve impulse. Synaptic transmission [electrical and chemical theory], neuromuscular junction, neurotransmitters.

Eye - structure of eye, photo pigments, physiology of vision and neural pathways for vision.

Terminology : (Definitions only)

Nervous system – Alzheimer's disease, amyotrophic lateral sclerosis (ALS), Bell's palsy, cerebral thrombosis, cryothalamotomy, electroencephalogram (EEG), encephalitis, Guillain-Barré syndrome, lumbar puncture, myelogram, pallidotomy, positron emission tomography (PET) scan and subarachnoid hemorrhage.

Eye – opthamology, chalazion, glaucoma, hordeolum, macular degeneration, retinal detachment, retinitis pigmentosa, strabismus (3 types), astigmatism, hyperopia, myopia, presbyopia, tonometry, goldmann perimeter and slit lamp ocular examination.

UNIT IV **15 Hrs**

Skeletal muscle - myosin, actin and regulatory proteins, sarcomere unit, *mechanism of muscle contraction.*

Kidney - structure of nephron, mechanism of urine formation, micturition, Renal regulation of acid - base balance.

Terminology : (Definitions only)

Skeletal muscle – Muscular Dystrophy, Cerebral Palsy, Dermatomyositis, Myasthenia Gravis, Mitochondrial Myopathies, Rhabdomyolysis, Myotonia,

Kidney – Nephritis, Nephrosis, Vesicoureteral Reflux, Cystitis, Urethritis, Urethral Stricture, Cystometry,

UNIT V **15 Hrs**

Male reproductive system - structure and functions of testis, sperm and prostate gland, spermatogenesis, causes of male infertility.

Female reproductive system - structure of ovaries, ovarian cycle, menstrual cycle, hormones of pregnancy and lactation, *causes of female infertility.*

Terminology : (Definitions only)

Male reproductive system – Bartholin's glands, Coitus interruptus, Exenteration, Gonadal dysgenesis, Hypoestrogenism, Varicocele, Vasectomy

Female reproductive system - Abruptio placentae, Adnexa, Amenorrhea, Psychogenic, Amniocentesis, Antepartum, uteroplacental, Chorioamnionitis, Hysterectomy and Colpocytogram.

Note :*Italics* denote Self Study Topics

TEXT BOOKS

1. **Chatterjee, C.,**,*HumanPhysiology* , Medical Allied Agency Calcutta., 11th edition, (1992).

2**. Muthayya.N.M**, *Human Physiology*, Jaypee publications, New Delhi, 3rdedi., 2002.

3.**Sathyanarayana, U**. *Text book of Biochemistry*, Books and Allied Ltd, Kolkatta, 2ndedi.,1999.

REFERENCE BOOKS

1. **Carola.R. *et al,***Human Anotomy and Physiology*, International edi.

2. **Guyton**, *Text book of Medical Physiology*, W. B. Saunder's Company, 8th edition, (1991).

3. **Murray, R. K., Granner Mayes and Rod Well**, **Appleton and Lange,***Harper's Biochemistry*, 24thedition(1996).

4. **Barbara A. Gylys Mary Elen Wedding** *Medical Terminology Systems*, Davis plus International. 6th edition. 2008.

SEMESTER –V

CORE PAPER VII

MOLECULAR BIOLOGY

Instructional Hrs. : 60 Hrs. **Sub. Code : 13BCUC507**

Max. Marks: CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course presents the mechanism of synthesis of DNA, RNA and proteins, gene regulation and gene mutation techniques used in molecular biology.

OBJECTIVES: On successful completion of the course the student should have

- Understood the synthesis of genetic material, RNA and proteins.
- Learn about gene repair mechanism and gene mutation.
- Learn about the techniques used in identifying gene mutation.

UNIT I **12 Hrs**

DNA as genetic material.

Semi conservative mechanism of DNA replication, RNA priming, Bidirectional replication, theta mode, rolling circle model.

Prokaryotic DNA replication, initiation, elongation and termination, Fidelity of replication. *Inhibitors of replication (names only).*

DNA repair mechanism - excision repair, mismatch repair, photo activation and SOS repair.

UNIT II **12 Hrs**

Prokaryotic transcription - central dogma, RNA polymerases;

Initiation, elongation and termination of transcription.

RNA splicing and processing of mRNA, tRNA and rRNA.

Reverse transcription.

UNIT III **12 Hrs**

Genetic code - experimental evidence - features of genetic code. Composition of prokaryotic and eukaryotic ribosomes.

tRNA – structure, activation of amino acids, coding and non - coding strands of DNA.

Translation - Initiation, elongation and termination. Post - translational modifications of proteins.

Inhibitors of protein synthesis.

UNIT IV **12 Hrs**

Recombination in bacteria -transformation, transduction and conjugation.

Recombination in eukaryotes - *Holliday model.*

Prokaryotic gene regulation - operon model.

Basic features of Lac operon – positive and negative control.

trp operon - repression and attenuation.

UNIT V **12 Hrs**

Gene mutations –Types, nutrional , lethal, conditional mutants. Missense mutation and other point mutation.

Spontaneous mutations - chemical and radiation – induced mutations, reversion techniques, selection of mutants, auxotrophs, replica plating and penicillin cycling.

Bacterial transposons -Insertion sequences, mechanism of transposition in bacteria.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Asokan.P.,** *Molecular biology*, Chinnaa Publications, Vellore, 1nd edition,2007.

2. Paul.A.,*Text book of cell and molecular biology*,Books and Allied (P) Ltd , Kolkata ,1st edi., 2007

REFERENCE BOOKS

1. **David Freifelder**., *Molecuiar Biology*., Jones and Bartlett Publishers, Narosa Publishing House., New Delhi, 2nd edition, Reprint, 1993.

2. **Gardner.E.J., Simmons.M.J and Snustad.P.D.,** *Principles of Genetics*., John Wiley & Sons, New York, 8st edi, 1991.

3. **Lehninger .A.L., Nelson.D.L and Cox .M.M.,** *Principles of biochemistry*, Macmillan Worth Publishers, NewYotk,3rd edi.,2003

4. **Rastogi.S.C**. *Molecular Biology*, India Binding House, U.P., 1st edi. 2006.

5.**Weaver,F.,Robert,Hedrick.W.,Philip**.,Genetics,W.C Brown Publishers.3 rd ed,1997.

SEMESTER – V

ELECTIVE PAPER-I

CLINICAL BIOCHEMISTRY

Instructional Hrs. : 60 Hrs **Sub. Code : 13BCUE501**

Max. Marks : CIA -25; ESE -75 **Credits: 5**

SUBJECT DESCRIPTION: This course emphasizes the students to realize the diagnostic importance of various metabolic disorders.

OBJECTIVES: This course would have made the students to understand

- The significance of diagnostic biochemistry.
- The metabolic disorders of carbohydrates, lipids , proteins and nucleic acids.

UNIT I **12 Hrs**

Disorders of carbohydrate metabolism:

Normal sugar level in blood, renal threshold and regulation of blood glucose concentration. Hypoglycemia- definition and causes. Hyperglycemia- definition and causes. Diabetes mellitus- aetiology, types, primary and secondary complications – diabetic keto acidosis and diabetic coma.

Different types of glycosuria – fructosuria, pentosuria and galactosuria. Glycogen storage diseases.

UNIT II **12 Hrs**

Disorder of lipid metabolism:

Plasma lipids and lipoproteins – Hyper lipoproteinemia (Types I, II, III, IV and V) and hypolipoproteinemia (a beta lipoproteinemia, hypo beta lipoproteinemia, Tangier's disease).

Atherosclerosis, Fatty liver, hyper and hypo cholesterolemia.

Tay sach's disease, Niemann-pick's disease.

UNIT III **12 Hrs**

Disorders of protein metabolism:

Total plasma protein. Disorders of pre-albumin, albumin, globulin and fibrinogen.

Inborn errors of amino acid metabolism - Cystinuria, Phenyl ketonuria, *Maple syrup disease*, Alkaptonuria and *Albinism.*

Disorders of Nucleic acid metabolism:

Hyper and hypouricemia, *gout* and Orotic aciduria.

UNIT IV **12 Hrs**

Gastric function Test - Collection of gastric juice.

Diagnostic tests for gastric function – Insulin stimulation test, Determination of gastrin in serum and *Tubeless gastric analysis.*

Pancreatic function tests - Determination of serum amylase and lipase.

Intestinal function Test - xylose excretion test.

UNIT V **12 Hrs**

Liver disease and liver function tests - Bilirubin metabolism and jaundice. Liver function tests- estimation of conjugated and total bilirubin in serum (diazo method), Detection of bilirubin and bile salts in urine (*Fouchet's test and Hay's sulphur test).* Measurement of Prothrombin time.

Kidney function tests - Inulin clearance, Creatinine clearance and Urea clearance tests.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1. **Chatterjee.M.N., Rana Sinde**, *Text Book of Medical Biochemistry*, Jaypee Publications, New Delhi, 5th edi., 2002.

2. **Rajagopal.G.** *Concise Text Book of Biochemistry,* Ahuja Publishing House, New Delhi, 1st edi. 2006.

3. **Vasudevan.D.M.,Sreekumari.S.,** *Text Book of Biochemistry,* Jaypee Publications, New Delhi, 4th edi., 2005.

REFERENCE BOOKS

1. **Montgomery, Conway, Spector**, *Biochemistry- A case oriented approach*., The CV Moshby Company, New Delhi, 5th edition, 1990.

2. **Philip D Mayne**, *Clinical Biochemistry in diagnosis and treatment*. ELBs Publication,U.K, 6th edition, 1999.

3. **Carl A Burtis and ER Ashwood,** *Tietz Fundamentals of Clinical Biochemistry,* Saunders, WB Co.Philadelphia, 5th edition, 1999.

SEMESTER - V

ELECTIVE PAPER-I I

PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS

Instructional Hrs: 45 Hrs **Sub. Code: 13BCUE502**

Max. Marks: CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: Biochemistry unique to photosynthetic organisms. Photosynthetic and respiratory electron transport, nitrogen fixation, carbon dioxide fixation, mechanism of plant hormones.

OBJECTIVES: On successful completion of the course the student should have understood

- Physiology of plants and mechanism of photosynthesis.
- Metabolic pathways in plants
- Plant hormones and secondary metabolites.

UNIT I **9 Hrs**

Plant cell:-Structure and functions.

Transpiration, imbibition and *osmosis.*

Photosynthesis:-Photosynthetic pigments– chlorophyll, carotenoids and phycobillin.

Light reactions–two kinds of chemical system–photo system I and II. Evidences in support of Light reaction–Hill's reaction, Arnon's work and *Emerson effect.*

UNIT II **9Hrs**

Dark reaction – Calvin's cycle (C_3 plants)

Hatch – Slack cycle (C_4 cycle) and CAM plants.

Photo respiration.

Nitrogen cycle, Nitrogen fixation – symbiotic and non-symbiotic nitrogen fixation.

UNIT III **9Hrs**

Plant growth regulators: Chemistry, biosynthesis, mode of action and Practical applications of auxins, gibberellins, cytokinins, absicic acid and *Ethylene*.

Plant growth inhibitors and retardants.

UNIT IV **9Hrs**

Photomorphogenesis: Photo periodism. Phytochrome – Function in growth and development of plant.

Biochemistry of seed germination.

Fruit ripening, *seed dormancy*.

Senescence: Biochemical changes during senescence. Senescence, process in life cycle of plants.

UNIT V **9Hrs**

Secondary metabolites:

Nature, distribution and biological functions of alkaloids, terpenes, flavonoids, polyphenols, tannins and steroids.

Role of secondary metabolites in pathogens, Insects, *animals and mankind.*

Note: Italics denote Self Study Topics

TEXT BOOKS

1.**Verma S.K.,** A textbook of Plant physiology and Biochemistry, S.Chand & Company Ltd, New Delhi, 4th Edition, 2003.

2. **John. W.Anderson and John Brardall.**, Molecular activities of plant cell–An Introduction to Plant Biochemistry, Black well Scientific Publications, 1994.

REFERENCE BOOKS

1. **Lea and Lea wood.,** Plant Biochemistry and Molecular Biology, John Wiley and sons, 1997.

2. **Devlin N. Robert and Francis H. Witham.,** Plant Physiology, CBS Publications.

3. **Hans Walter Heldt.,** Plant Biochemistry and Molecular Biology, Oxford University Press, NewYork, 1997.

4. **William G. Hopkins.,** Introduction to Plant Physiology, John Wiley and sons.

5. **C.K.John, Rajani, S. Nady and AF.Mascarenhas.,** Tissue culture of economic plants, Niscom, NewDelhi, 1997.

SEMESTER– V

CORE BIOCHEMISTRY PRACTICAL –IV

Instructional Hrs: 75 Hours **Subject code : 16BCUCP04**

Max.Marks: CIA-40; ESE-60 **Credits : 4**

CLINICAL PRACTICALS:-

1. URINE ANALYSIS

1. Estimation of Creatinine by Picric acid method.
2. Estimation of Urea by DAM – TSC method.
3. Estimation of Uric acid by Caraway's method.
4. Estimation of Reducing sugar by Benedict's method

II. BLOOD ANALYSIS:

1. Estimation of Urea in serum by DAM-TSC method.
2. Estimation of Uric acid in serum by Caraway method.
3. Estimation of Glucose in serum by O-Toluidine method.
4. Estimation of Alkaline phosphatase in serum.
5. Estimation of Acid phosphatase in serum.

III. KIT METHODS

1. VLDL
2. HDL
3. LDL
4. Total cholesterol
5. Triglycerides

DISTRIBUTION OF MARKS

Internal evaluation: 40 marks

a) CIA : 20 marks
b) Model : 15 marks
c) Record : 05 marks

External evaluation: 60 marks

a) Analysis : 25 marks
b) Kit method I : 10 marks
c) Kit method II : 10 marks
d) Record : 08 marks
e) Viva-voce : 07 marks

SEMESTER-V

SKILL BASED SUBJECT-III

DIET THERAPY

Instructional Hrs : 45 Hrs **Sub.code : 11BCUS503**

Max.Marks : CIA-25; ESE-75 **Credits : 3**

SUBJECT DESCRIPTION : This course enables the students to acquire knowledge about healing power of foods and medicinal uses of commonly used foods.

OBJECTIVES: On successful completion of the course the student should have understood

- Basics of Nutrition
- Routine hospital diets
- Therapeutic diet
- Community Nutrition

UNIT I **9Hrs**

Basics of Nutrition:

Energy: Components and measurement of energy expenditure.

Balanced diet: Definition, principles of planning diet, basic five food groups, RDA for different age groups and physiological conditions.

Diet therapy – Definition and purpose of therapeutic diet .

Planning and preparation of balanced diet

UNIT II **9Hrs**

Routine hospital diets – Regular, light , soft ,full and clear liquid diets .

Therapeutic diet under febrile conditions –causes, clinical symptoms and dietary modifications of typhoid and malaria.

Planning and preparation of any one routine hospital diet.

UNIT III **9Hrs**

Diet therapy for Nutritional deficiency diseases : Anemia and Marasmus- signs , symptoms and dietary modifications.

Diet therapy for Obesity and Underweight : Aetiology, assessment, types and dietary modifications.

Planning and preparation of protein rich diets.

UNIT IV **9Hrs**

Gastrointestinal disorders : Peptic ulcer, Constipation and Dyspepsia - causes, symptoms , dietary modifications and foods recommended.

Diabetes mellitus - types , symptoms, dietary modifications and foods recommended.

Planning and preparation of low calorie and high fiber diet .

UNIT V **9Hrs**

Community Nutrition:

Nutritional needs for special groups –adolescent, pregnant and lactating women.

Substitutes for Non-vegetarian foods.

Selection of cheap and nutritious foods.

Planning and preparation of cheap nutritious menu.

Note: *Italics* denote Self study topics.

TEXT BOOKS:

1) **Paul SA**, *Text book of Bio - nutrition – curing diseases through Diet* ,CBS publishers ,New Delhi ,2005.

2) **ShubhanginiJoshi** , *Text book of Nutrition and Dietetics*, Tata McGraw Hill publishers, 2002.

3) **Sunita PB**, *Diet in Diseases -Therapeutic foods that cure and prevent diseases*, Pustak mahal, New Delhi, 2003.

REFERENCE BOOKS:

1) **Srilashmi. B**, *Dietetics*, New Age International publisher, New Delhi, 2006.

2) **Maurice, Eshills and Vormon RY** , *Modern Nutrition in health and disease* , Lea and Febiger publications ,Philadelphia ,1988.

3) **Mahtab SB, Parthed NR, Vinodhini Reddy** , *Text book of Human Nutrition* , Oxford and PBH publishing company, New Delhi 2003.

4) **Kathleen ML & Sylvia ES**, *Krause's Food, Nutrition and Diet therapy* , 11th Edition, Saunders publication, Philadelphia, 2004.

SEMESTER – VI

CORE PAPER - VIII

MEDICINAL CHEMISTRY

Instructional Hrs. : 75 Hours **Sub. Code : 16BCUC608**

Max. Marks : CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course presents focus on chemical principles used for drug discovery and it also covers human biology where ever relevant.

OBJECTIVES: On successful completion of the course the students should have:

- Understood the development of the traditional and modern methods used for discovery; of how molecules interact.
- Learnt the fact that the pharmaceutical industry is by far largest employer of medicine.
- Learnt and developed skills in the use of reaction mechanisms and how knowledge of reaction mechanisms can aid in understanding the mode of action of drugs; and the method by which it can be synthesized, and developed.

UNIT I **15 Hrs**

Introduction to drugs and receptor concept – Definition and classification of drugs. Routes of administration of drugs, Passage of drugs across biological membrane, absorption and distribution of drugs, binding of drugs to proteins.

Drug receptor interaction, *binding forces, Types of receptors*. Receptor theories.

UNIT II **15 Hrs**

Drug metabolism and elimination: Phase I and Phase II metabolism. Microsomal drug metabolism - hydroxylation, conjugation reactions, deamination, N–oxidation, azo and nitro reduction.

Non-microsomal oxidation, oxidative deamination, purine oxidation, dehalogenation, hydrolysis, action of choline esterase.

Elimination of drugs from the body with reference to renal system.

UNIT III **15 Hrs**

Antibacterial drugs - mode of action of sulfonamides, penicillin and streptomycin.

Antiviral drugs – acyclovir and interferons.

Antimalarial drugs – Chinchona alkaloids and primaquin.

Anti-TB drugs – INH, rifampicin and ethambutol.

UNIT IV **15 Hrs**

Drugs acting on CNS and cardio-vascular system.

CNS - structure and mode of action of barbiturates, MAO inhibitors and drugs for Parkinson's disease.

Cardio-vascular disease - structure and mode of action of cardiac glycosides, *heparin and coumarin.*

UNIT V **15 Hrs**

Cancer chemotherapy - alkylating agents and anti-metabolites of folates, purines and *pyrimidines.*

Therapeutic enzymes – Streptokinase and Trypsin

Therapeutic gases – Oxygen and Hyperbaric oxygen

Note :*Italics* denote Self Study Topics

TEXT BOOKS

1.**Satoskar. R.S., Bhandarkar. S.D. and Rege.N.N.**, *Pharmcology and pharamacotherapeutics.* Popular Prakashnan, Bombay, 19th edition, 2005.

2. **Tripathi. K.D**., *Essentials of Medical Pharmacology*, Jaypee Brothers, New Delhi, 5thedi., 2003.

REFERENCE BOOKS

1. **Foye, W.O. et al.,***Principles of medicinal chemistry*, 1986.

2. **Grahame, D.G.Smith and Aronson, J, K.***Oxford T.B of clinical pharmacology and drug therapy.*

3.**Howland.R.D., Mycek. M. J.,***Pharmacology*, Lippincotts William and Wilkins Publications, New Delhi, 3rdedi., 2006.

SEMESTER – VI

CORE PAPER - IX

GENETIC ENGINEERING

Instructional Hrs: 75 Hours **Sub. Code: 13BCUC609**

Max. Marks : CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course presents the basis of gene cloning, vectors, genetic engineering techniques and their applications.

OBJECTIVES: On successful completion of the course the student should have understood

- The basics, vectors, methods of gene cloning.
- Techniques and applications of gene cloning.

UNIT I **15 Hrs**

Basis of gene cloning - restriction endonucleases - types and features, ligations, linkers and adaptors.

Vectors of gene cloning - plasmid vectors - basic feature, pBR322.

Bacteriophage vectors - cosmids.

Viral vectors - pSV plasmids and *Retro viral vectors*.

Cloning hosts.

UNIT II **15 Hrs**

Introduction of DNA into bacterial cells - transformation of E.Coli, selection of transformed cells, identification of recombinants.

Introduction of phage DNA into bacterial cell, identification of recombinant phage.

Genomic library and cDNA library.

Hybridization probes, Southern, Northern and Western blotting techniques.

UNIT III **15 Hrs**

DNA sequencing - outline of Sanger's method - applications.

DNA finger printing - applications.

DNA foot printing – *applications.*

PCR - technique and *applications.*

In vitro mutagenesis - oligonucleotide directed mutagensis.

UNIT IV **15 Hrs**

Gene Transfer in plants - Ti plasmid vectors, Vir genes, Mechanism of T- DNA transfer.

Transgenic plants - herbicide, virus and *pest resistance plants.*

Plant viruses as vectors – CaMV and Tobacco mosaic virus.

Selectable markers and reporter genes.

UNIT V **15 Hrs**

Fusion proteins -recombinant insulin and recombinant growth hormones.

Cloning HBV surface antigen in yeast.

Insect cells as host system.

Gene therapy.

Safety aspects and hazards of genetic engineering.

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1.**Balasubramaniam,D., Bryce. C. F. A., Dharmalingam. K., Green. J., Kunthala Jayaraman**, *Concepts in Biotechnology*, COSTED -IBN University press, Hyderabad,1st edi., 1996.

2. **Kumaresan. V.,** *Biotechnology*, Saras Publication **,** Kanyakumari**,** Revised edition**,** 2005 .

3. **Sathyanarayana, U**. *Text book of Biotechnology*, Books and Allied Ltd, Kolkatta, 2nd edi.,1999.

REFERENCE BOOKS

2. **Brown**, **T.A**. *Gene cloning - An introduction*, Chapman and Hall, 3rd ed, 1995.

3**. Glazier. N., Alexander, Hiroshnikaido,** *Microbial biotechnology*, W.H. Freeman & co., New York,1st edi., 1995.

4**. Glick. R, Bernard and Pasternak J. Jack,** ,*Molecular Biotechnology*, Asm press, Washington D .C. 1st edi., 1994.

SEMESTER – VI

CORE PAPER - X

IMMUNOLOGY AND IMMUNO TECHNIQUES

Instructional Hrs. : 60 Hrs **Sub. Code : 13BCUC610**

Max. Marks : CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course will provide the basic concepts of immunology which follows the course of immune response. The course will introduce the various mechanisms by which microbial pathogens cause disease

OBJECTIVES: On successful completion of the course the students should have

- Understood the foundation for the future subjects in microbiology and immunology.
- Leant the basic technology and techniques in microbiology and immunology.
- Learnt on how much immune system is important to the humans.

UNIT I **12 Hrs**

History of immunology. Innate and acquired immunity. Antibody mediated and cell mediated immune response and immuno tolerance.

Primary and secondary lymphoid organs. Structure of T, B and NK cells.

Receptors on the surface of lymphocytes.

Structure and functions of neurtrophils. Macrophages - *phagocytosis and inflammation.*

UNIT II **12 Hrs**

Antigen - properties, specificity, and cross reactivity, antigenicity, immunogenecity, antigenic determinants, haptens, adjuvants and self antigens.

Antibodies – properties, classes and subclasses.

Immunoglobulin - structure, specificity and distribution. Clonal selection theory of antibody formation.

Antigen and antibody interactions - *precipitation and agglutination*.

Complement components. Cytokines and their functions.

UNIT III **12 Hrs**

Precipitation in gel – Single and Double immunodiffusion, Radial immunodiffusion and Electro immunodiffusion.

Immuno electrophoresis.

Agglutination - *Slide agglutination, Widal test.*

Principle and applications of RIA, ELISA, fluorescent antibody technique.

UNIT IV **12 Hrs**

Allergy and hypersensitivity - Type I, II, III and IV and *their clinical manifestations*.

Auto Immune diseases - *Rheumatoid arthritis,* Myasthenia gravis.

Transplantation - Allograft rejection, graft Vs host diseases.

Immuno suppressors - mechanism of graft rejection.

UNIT V **12 Hrs**

Resistance to Tumors - NK cell, tumor immunotherapy, lymphoid tumors. Recombinant vaccines, DNA vaccines.

Benefits and adverse effects of vaccination.

AIDS virus- Structure, abnormality of cells, disease, diagnosis and *prevention.*

Note : *Italics* denote Self Study Topics

TEXT BOOKS

1**. Dulsy Fatima, Arumugam, N.,** *Immunology,* Saras Publication, Nagercoil,revised edi. 1996.

2. **Tizard I.R.,** *Immunology - An Introduction,* Thomson, USA, 4th edi,1995.

3. **Ananthanarayanan, R. and Jayaraman panikar,** *Text book of microbiology,* 1996.

REFERENCE BOOKS

1. **Janis Kuby et al.,** *Immunology* ,W.H.Freeman and Company, New York, 5 th edi. 2003.

2. **Roitt Ivann, Jonathan Brostoff, David male,** *Immunology,* Mosby Publication, London, 6th edi. 2001.

3. **Roitt Ivann,** *Essential immunology***,** Black well Scientific Publication, 8th edi. 1994.

SEMESTER –VI

CORE PAPER VI

HORMONAL BIOCHEMISTRY

Instructional Hrs: 60 Hrs. **Sub.Code : 16BCUC611**

Max. Marks: CIA -25; ESE -75 **Credits: 4**

SUBJECT DESCRIPTION: This course presents an introduction and provides a comprehensive, balanced introduction to this exciting evolving and multi- disciplinary field.

OBJECTIVES: On successful completion of the course the students should have understood clearly on various functions, mechanism of action and pathophysiology.

- Learnt more specific on the endocrinal activities.

UNIT I **15Hrs**

Introduction to hormones - Classification of hormones, Hormones and Homeostasis, Mechanism of action- Steroid and Protein hormones.

Second messenger concept - G proteins, cAMP and signal transduction, lipid derived second messengers – DAG and IP_3 and *role of calcium as an intra cellular second messenger.*

UNIT II **15Hrs**

Hypothalamus : Hypothalamic – Hypophysial Portal System, *feedback mechanism*.

Pituitary : Adenohypophysial and Neurohypophysial hormones, Pathophysiology of posterior and anterior pituitary glands.

Pituitary : Pars intermedia hormone – Control, physiological roles of MSH.

UNIT III **15Hrs**

Pancreatic hormones - Insulin and Glucagon - Physiological role, Mechanism of action and Pathophysiology.

Gastro intestinal hormone - Gastrin, Secretin and Cholecystokinin - Physiological role, Mechanism of action and Pathophysiology.

Para Thyroid Hormone : Parathoromone, Calcitonin - Physiological role, *Mechanism of action and Pathophysiology*.

UNIT IV **15Hrs**

Thyroid hormone : Thyroxine, Tri-iodothyronine – Synthesis, Physiological role, Mechanism of action and Pathophysiology.

Adrenocortical hormones : Glucocorticoids – Cortisol, Corticosterone, cortisone and Mineralcorticoids – aldosterone , Physiological roles, Mechanism of action and Patho physiology.

Adreno medullary hormones : Catecholamines – Norepinephrine and Epinephrine - Physiological roles, *Mechanism of action and Pathophysiology*.

UNIT V **15Hrs**

Ovarian Hormones - Progesterone and Estrogen, Structure, Physiological role and Pathophysiology.

Gonadal Hormone – Androgens, Structure, Physiological role and Pathophysiology.

Hormonal changes during pregnancy, parturition and lactation.

Pineal – Melatonin Structure, pineal rhythms and *biological clock* and Pathophysiology.

TEXT BOOKS

1. **NM Muthaya MBBS MSC PhD-** *Human Physiology-3rd edition*, Jaypee Brothers, Medical publishers (P) Ltd, New Delhi.
2. **C.C. Chatterjee** *Human Physiology Vol-II* - Medical Allied Agency, Culcutta.
3. **Talwar Srivastava** *Text book of Biochemistry and Human Physiology* - 3rd edition, Prentice Hall, India.

REFERENCE BOOKS

1. **Mac. E. Hadley**, *Endocrinology*, Prentice Hall International. Inc, 4th edition
2. **Warner M. Bruch, M.D** *Endocrinology* - 3rd edition . Williams & Wilkins by Waverly Company.
3. **Cyril A. Keele, Eric Neil and Norman Joels,**Samson Wright's applied Physiology - 13rd edition by published by Oxford University Press, Delhi.
4. **Murray**, **K. Robert,** *et al*., - *Harper's Biochemistry*. 26st edition, 2003.

SEMESTER – VI

ELECTIVE III – PROJECT

Instructional Hrs.: 60Hours **Sub. Code: 11BCUE6PV**

Max. Marks: ESE -100 **Credits: 5**

Objectives : To enable the students to gain knowledge in basic research methodology. Research And Development Aspects In Clinical Biochemistry / Environmental Biochemistry / Plant Biochemistry / Nutritional Biochemistry / Microbiology

Distribution of marks :

Report submission & presentation - 80 marks

Viva voce - 20 marks

SEMESTER –VI

Core Biochemistry Practical – V

Instructional Hrs: 75 Hrs. **Sub. Code: 16BCUCP05**

Max. Marks: CIA -40; ESE -60 **Credits: 4**

I IMMUNO TECHNIQUES: (Qualitative Kit Method)

1. RA factor.
2. Pregnancy test.
3. WIDAL test.
4. VDRL test.
5. CRP test.
6. Identification of Blood group and Rh factor.
7. Single Radial Immunodiffusion
8. SDS – PAGE.

II PLANT BIOCHEMISTRY:

1. Estimation of Chlorophyll.
2. Estimation of Starch

III PHYSIOLOGY (Demonstration experiments):

1. Determination of Bleeding time.
2. Determination of Clotting time.
3. Identification of Glucose in urine.
4. Identification of Albumin in urine.

DISTRIBUTION OF MARKS

Internal evaluation	**: 40marks**	**External evaluation**	**: 60 marks**
a) CIA	: 20 marks	a) Analysis	: 25 marks
b) Model	: 15 marks	b) Kit method	: 20 marks
c) Record	: 5 marks	c) Record	: 08 marks
		d) Viva-voce	: 07 marks

SEMESTER – VI

SKILL BASED SUBJECT – IV

NATURAL REMEDIES

Instructional Hrs.: 45 Hours **Sub. Code: 11BCUS604**

Max. Marks: CIA -25; ESE -75 **Credits: 3**

SUBJECT DESCRIPTION: This course emphasizes the students to understand the medicinal values of natural foods.

OBJECTIVES: On successful completion of the course the students will acquire knowledge on

- Medicinal values of vegetables and Fruits
- Medicinal values of Species and Green leaves
- Medicinal values of Cereals and Pulses
- Home remedies

UNIT I **9 Hrs**

Medicinal values of vegetables:

Introduction,Origin, Description, composition and curative properties of Onion, Ginger, Garlic, Ash guard, Cabbage, Drum stick, *Bitter guard and Radish*.

UNIT II **9 Hrs**

Medicinal values of Fruits:

Introduction, Origin, Description, composition and curative properties of Gooseberry, *Lemon, Orange*, Banana, Papaya , Pomegranate and Guava.

UNIT III **9 Hrs**

Medicinal values of Species and Green leaves:

Introduction ,Origin, Description, composition and curative properties of Cumin, Clove, Cardamom, Coriander, Fenugreek, *Pepper and Curry leaves*.

UNIT IV **9 Hrs**

Medicinal values of Cereals and Pulses:

Introduction, Origin, Description, composition and curative properties of Wheat, *Barley, Millet*, Corn, Oats, Soya beans and Bengal grams.

UNIT V **9 Hrs**

Miscellaneous remedies:

Introduction ,Origin, Description, composition and curative properties of Almond, Coconut, Cheese, Honey, *Tea, Coffee,* Vegetable oils.

Note: *Italics* denote Self Study Topics

TEXT BOOKS:

1) Dr. Aziz Ahmad Syed & Dr. Shiv Charan Sharma, *Herbal Cure,* Pustak Mahal**,** New Delhi, 2004.

2. Sunitha Pant Bansal, *Healing power of Foods,* Pustak Mahal**,** New Delhi, 2002.

REFERENCE BOOKS:

1) H.K.Bakhru, *Herbs That Heal Natural Remedies For Good Health*, Orient Paperbacks, New Delhi,2005.

2) Dr. S.Suresh Babu, *A Treatise on Home Remedies***,** Pustak Mahal**,** New Delhi, 2004.

SEMESTER – VI

SELF LEARNING SUBJECT

COUNSELING PSYCHOLOGY

Sub. Code: 13BCUSL04

Max. Marks: ESE - 100 **Credits: 5**

SUBJECT DESCRIPTION: This course emphasizes the students to understand the nature, theories and techniques of counseling.

OBJECTIVES: On successful completion of the course the students will acquire knowledge on

- Introduction to Counseling
- Counseling Relationship
- Theories and Techniques in Counseling
- Family and Behavioral Therapy

UNIT I

Introduction to Counseling:- Meaning, Definition of counseling psychology; Difference between guidance and counseling; Major goals of counseling.

Professional and Ethical Issues of counselor:- Professional Issues of counselor; Ethical issues (Principles) of counselor; Characteristics of an effective counselor.

UNIT II

Counseling Relationship:- Definition & Nature; Counseling content; Steps in counseling process; Types of communication patterns of the client.

Counseling Interview: - Definition - attending skills & influencing skills; Integrating positive skills; Influence strategies in counseling interview.

UNIT III

Psychological Testing:- Definition, limitation and uses of psychological test; Types of psychological test; Factors affecting psychological test results; Test interpretation and non-test appraisal techniques.

Theories and Techniques in Counseling: - Psycho analytic therapy; Person centered and Adlerian therapy; Transactional Analysis and RET; Yoga and Meditation.

UNIT IV

Counseling Application:- Family, Child and Parent counseling; School and Career counseling; Group counseling; Pre-marital and Marriage counseling.

UNIT V

Family and Behavioral Therapy:- Multigenerational, Strategic and Structural approach of family therapy; Family therapy techniques; Techniques of Behavior Therapy; Four point programme of relapse Prevention.

TEXT BOOKS

1.**Gregory .R.J.,** *Psycholog*ical *Testing*, Pearson education, New Delhi,2nd edi.,2005.

2.**Hegodson.V.S.,** *Psychology of gender* **,** Pearson education, New Delhi,2nd edi.,2005.

REFERENCE BOOKS

1.**Friedman.H.S.,Schustack.M.H.,** *Personality- Classic Theories and Modern research,*Pearson education, New Delhi,3rd edi.,2009.

2.**Gladding.S.T.,** *Counseling,* Pearson education, New Delhi,2nd edi.,2005.

3.**Gibson.R.L.,Mitchell.M.H.,** *Introduction to Counseling and guidance* ,PHI Learning Pvt Ltd, New Delhi,7nd edi.,2008.