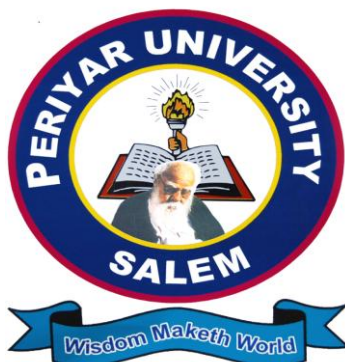


PERIYAR UNIVERSITY
PERIYAR PALKALAI NAGAR
SALEM – 636 011



**DEGREE OF BACHELOR OF
SCIENCE
CHOICE BASED CREDIT SYSTEM**

SYLLABUS FOR B.Sc. BIOCHEMISTRY

**FOR THE STUDENTS ADMITTED FROM THE
ACADEMIC YEAR 2012 – 2013 ONWARDS**

SCHEME OF EXAMINATION

SEM	PART	COURSE	TITLE OF THE PAPER	DURA	MAR
I	I		Tamil – I	3	100
	II		English – I	3	100
	III	Core – 1	Bio-organic Chemistry	3	100
	III	Allied - I	Chemistry – I	3	100
	IV	SBEC - I	Cytogenetics	3	100
	IV	Value Edn	Yoga	3	100
II	I		Tamil – II	3	100
	II		English – II	3	100
	III	Core – II	Enzymes	3	100
	III	Allied - II	Chemistry - II	3	100
	III	Core - III	Core Practical – I	6	100
	III	Allied Practical	Allied Practical – I	3	100
	IV	Envir. Studies	Environmental Science	3	100
III	I		Tamil – III	3	100
	II		English – III	3	100
	III	Core – IV	Intermediary Metabolism	3	100
	III	Allied - III	Biostatistics	3	100
	IV	SBEC- II	Plant Biochemistry	3	100
	IV	NMEC I		3	100
IV	I		Tamil – IV	3	100
	II		English – IV	3	100
	III	Core – V	Tools of Biochemistry	3	100
	III	Allied - IV	Computer Application in Biology	3	100
	III	Core - VI	Core Practical – II	6	100
	III	Allied practical	Allied Practical – II	3	100
	IV	NMEC II		3	100
V	III	Core - VII	Clinical Biochemistry	3	100
	III	Core - VIII	Molecular Biology	3	100
	III	Core - IX	Human Physiology	3	100
	III	Core - X	Nutritional Biochemistry	3	100
	IV	SBEC- III	Clinical Pathology	3	100
	IV	Elective – I	Genetic Engineering	3	100
VI	III	Core - XI	Immunology	3	100
	III	Core - XII	Hormonal Biochemistry	3	100
	III	Core - XIII	Microbial Biochemistry	3	100
	IV	Elective - II	Pharmaceutical Biochemistry	3	100
	IV	Elective – III	Industrial Biochemistry	3	100
	III	Core - XIV	Core practical – III	6	100
	III	Core - XV	Core practical – IV	6	100

Distribution of marks

Theory – 100 marks (External 75marks, Internal 25 marks)
Practicals 100 marks (External 60 marks, Internal 40 marks)

QUESTION PAPER PATTERN**Maximum marks – 75****Duration – 3 hours****Section –A (10 x 2 = 20 marks)****2 questions from each unit****Answer all the questions****Section –B (5 x 5 = 25 marks)****Internal choice from the same unit****Answer all the questions****Section –C (3x 10 = 30 marks)****1 question from each unit****Answer any three questions**

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
I	I		Tamil I	6	T	3	25	75	100
	II		English I	6	T	3	25	75	100
	III	12UBC01	Bio-organic Chemistry	5	T	5	25	75	100
	III		Allied Chemistry-I	5	T	4	25	75	100
	IV	12UBCS01	Cytogenetics	2	T	2	25	75	100
	III	12UBCP01	Core practical I	2	P				
	III		Allied practical I	2	P				
	IV		Val. Edn: Yoga	2	T	2	25	75	100
	TOTAL				30		19	150	450

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
II	I		Tamil II	6	T	3	25	75	100
	II		English II	6	T	3	25	75	100
	III	12UBC02	Enzymes	5	T	5	25	75	100
	III		Allied Chemistry II	5	T	3	25	75	100
	III	12UBCP01	Core practical I	3	P	5	40	60	100
	III		Allied practical I	3	P	3	40	60	100
	IV		Environ., Science	2	T	2	25	75	100
	TOTAL				30		24	205	495

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
III	I		Tamil III	6	T	3	25	75	100
	II		English III	6	T	3	25	75	100
	III	12UBC03	Intermediary Metabolism	6	T	5	25	75	100
	III		Allied : Biostatistics	5	T	4	25	75	100
	III	12UBCP02	Core Practical II	3	P	-	-	-	-
	IV	12UBCS02	SBEC II: Plant Biochemistry	2	T	2	25	75	100
	IV		NMEC I	2	T	2	25	75	100
	TOTAL				30		19	150	450

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
IV	I		Tamil IV	6	T	3	25	75	100
	II		English IV	6	T	3	25	75	100
	III	12UBC04	Tools of Biochemistry	5	T	5	25	75	100
	III		Computer Application in Biology	5	T	3	25	75	100
	III	12UBCP02	Core Practical II	3	P	5	40	60	100
	III		Allied Practical II	3	P	3	40	60	100
	IV		NMEC II	2	T	2	25	75	100
	TOTAL				30		24	205	495

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
V	III	12UBC05	Clinical Biochemistry	5	T	5	25	75	100
	III	12UBC06	Molecular Biology	5	T	5	25	75	100
	III	12UBC07	Human Physiology	5	T	5	25	75	100
	III	12UBC08	Nutritional Biochemistry	5	T	5	25	75	100
	IV	12UBCE01	Elective I: Genetic Engineering	2	T	2	25	75	100
	IV	12UBCS03	SBEC III: Clinical Pathology	2	T	2	25	75	100
	III	12UBCP03	Core Practical III	3	P	-	-	-	-
	III	12UBCP04	Core Practical IV	3	P	-	-	-	-
	TOTAL				30		24	150	450

SEM	PART	CODE	COURSE	Hrs		CREDIT	MARKS		
				Lecture	T/P		CIA	EA	TOTAL
VI	III	12UBC09	Immunology	5		5	25	75	100
	III	12UBC10	Hormonal Biochemistry	5		5	25	75	100
	III	12UBC11	Microbial Biochemistry	5		5	25	75	100
	IV	12UBCE02	Elective II: Pharamaceutical Biochemistry	2		2	25	75	100
	IV	12UBCE03	Elective III: Industrial Biochemistr y	2		2	25	75	100
	III	12UBCP03	Core Practical III	5		5	40	60	100
	III	12UBCP04	Core Practical IV	5		5	40	60	100
	V		Extension Activity	1		1	-	-	-
	TOTAL				30		30	205	495

PAPERS GIVEN BY THE BOARD AS NON-MAJOR ELECTIVES

Semester III

Biochemistry in Diagnosis (OR) Clinical Nutrition

Semester IV

Cell Biochemistry & Human physiology (OR) Biochemistry and Health

SEMESTER I

CORE-I

BIO-ORGANIC CHEMISTRY

UNIT-I

Carbohydrates: Introduction, classification, monosaccharide-structure, stereo isomers and structural isomers, mutarotation, and chemical reactions. Oligosaccharides-Dissaccharides-structure and importance of sucrose, Lactose, maltose, cellobiose. Polysaccharides-structure and importance of homopolysaccharides and heteropolysaccharides.

UNIT-II

Amino acids and Proteins: Amino acids-classification, structure and properties. Protein classifications and properties. Primary, secondary, tertiary structure of Proteins.

UNIT-III

Lipids: Introduction classification physical properties, and chemical properties of fats and oils. Structure and importance of saturated and unsaturated fatty acids, phospholipids and sterols.

UNIT-IV

Nucleic acids: Introduction, chemistry of nucleic acids, nucleoproteins, double helical structure and properties of DNA, RNA-types structure and functions.

UNIT-V

Vitamins: Introduction Structure, properties, functions and deficiency diseases of fat soluble and water soluble Vitamins.

RECOMMENDED BOOKS

- Lehninger's Principles of Biochemistry (2000) by Nelson, David I. and Cox, M.M. Macmillan/worth, NY.
- Fundamentals Of Biochemistry (1999) by Donald Voet, Judith G.Voet and Charlotte W Pratt, John Wiley & Sons, NY.
- Biochemistry 3rd (1994) by lubert stryer, W H freeman and co, Sanfrancisco.
- Biochemistry 4th edition (1988) by Zubay G L, W M C Brown Publishers.
- Principles of Biochemistry (1994) Garrette & Grisham, Saunders college publishing.
- Outlines of Biochemistry (1987) by Eric E.Conn, P.K. Stumpf, G.Brueins and Ray H.Do, John Wiley & Sons, NY.
- Text book of biochemistry (1997) 4th edition Thomas M devlin, A John Wiley, Inc publication, New york.

SKILL BASED ELECTIVE COURSE - I

CYTOGENETICS

UNIT I

Cell theory: Prokaryotic cell organization, Prokaryotic cell membrane structure-fluid mosaic model, structure of bacterial cell wall.

UNIT II

Eukaryotic cell organization: organelles structure and functions - mitochondria, chloroplast, endoplasmic reticulum, Golgi bodies, ribosomes and lysosome.

UNIT III

Nucleus-structure of chromatin, nucleosomes, beads-on-string model, chromosome structure and organization, Euchromatin & Heterochromatin, chromatids and centromere.

UNIT IV

Cell division: various stages of Mitosis and Meiosis. Difference between the two.

UNIT V

Genetics - Mendel's experiments with pea plants; Monohybrid cross, dihybrid cross, test cross and back cross. Principles and laws of genetics.

RECOMMENDED BOOKS

- Shukla Chandel 2000 Cytogenetics, Evolution, Biostatistics & Plant Breeding. S. Chand, New Delhi.
- Shukla Chandel 1990 Cytogenetics, Evolution & Plant Breeding. 3/e S Chand & Company, New Delhi.
- Aggarwal, V K 1990 Simplified Course in Cell Biology.
- VK Agerwal and PS Varma Cytology (Cell Biology and Molecular Biology), 2000 4/e S Chand & Company, New Delhi.
- Gupta PK, Sher Singh, and S. N. Sadhu 2000 Cytology, Genetics and Evolution S Chand & Company, New Delhi.

SEMESTER II

CORE-II

ENZYMES

UNIT - I

Enzyme: Introduction, IUB Classification and nomenclature of enzymes, holoenzymes, apo enzymes, coenzymes, cofactors, prosthetic group, activators, inhibitors. Definition and examples of metalloenzymes and metal activated enzymes. Active site-Characteristics, theories of ES complex-Lock and key, induced fit and substrate strain theory. Monomeric enzymes, Oligomeric enzymes- definition with examples, multienzymes complex, enzyme specificity and enzyme units.

UNIT - II

Enzyme Kinetics MM Equation, LB Plot, Eadie Hostsee Plot, Hanes Plot, Factors affecting enzyme activity. Isoenzymes-definition, LDH & CPK, diagnostic importance of isoenzymes.

UNIT - III

Coenzymes definition, structure and functions of TPP, Nicotinamide, FMN, Coenzyme A, Lipoic acid, Biotin & Folate (Mechanism not required). Mechanism of action of chymotrypsin & lysozyme. Enzymatic catalysis, Acid base catalysis, covalent catalysis, Metal ion catalysis.

UNIT - IV

Enzyme inhibition – Reversible inhibition, Competitive, Non competitive & Uncompetitive inhibition. Irreversible inhibition, Feedback inhibition. Allosteric enzymes- properties, types, models, Aspartate transcarbamylase. Covalent modification.

UNIT - V

Methods for isolation & purification, criteria of purity. Immobilised Enzymes-methods & applications.

RECOMMENDED BOOKS

- Enzymes By Dixon, E.C Webb, CJR Thorne and K.F. Tipton, Longmans, London.
- Fundamentals of Enzymology 2 ed., (1998) By Nicholas C.Price, Lewis Stevans, Oxford University Press, First Edition (1990).
- Understanding Enzymes, Trevor Palmer, Ellis Horwood Limited, Third Edition (1991).
- Protein Biotechnology, Gary Walsh and Denis Headon, John Wiley and Sons, 1994.
- Protein Biochemistry and Biotechnology, Gary Walsh and John Wiley and Sons Ltd. 2002.
- Enzyme kinetics and Mechanism –Paul F. Cook.

CORE - III

CORE PRACTICAL – I

I. Preparation of Buffers and Determination of pH

II. Qualitative Analysis.

- a. Analysis of carbohydrates
- b. Analysis of Amino acids
- c. Test for proteins
- d. Test for lipids – cholesterol

III. Biochemical preparation

- a. Starch from Potato
- b. Casein from milk
- c. Lecithin from egg yolk

IV. Quantitative Analysis

- a. Reducing Sugar – Benedict's method
- b. Amino acid – formal titration
- c. Determination of Acid Number
- d. Determination of Saponification Number.
- e. Ascorbic acid – using 2, 6 Dichloro phenol Indophenol method.

SEMESTER III

CORE COURSE – IV

INTERMEDIARY METABOLISM

UNIT - I

Carbohydrate metabolism: Introduction, glycolysis, TCA cycle, and its energy production. Glycogen metabolism: Glycogenesis & Glycogenolysis, Alternative pathways: HMP pathway, gluconeogenesis, glucuronic acid pathway, glyoxylate cycle and its importance.

UNIT - II

Lipid metabolism: Introduction, biosynthesis & degradation of fatty acids (alpha, beta, omega oxidation). Degradation of lipids, Biosynthesis of cholesterol and TG, Metabolism of ketone bodies.

UNIT - III

Protein metabolism: Degradation of proteins – Deamination, Transamination & Decarboxylation. Transport of ammonia. Urea cycle. Ketogenic & Glucogenic amino acids.

UNIT - IV

Biological oxidation: Introduction, Enzymes in biological oxidation, Redox potential, Mitochondrial E.T.C. & its inhibitors, structure of ATPase complex, chemiosmotic theory, Oxidative phosphorylation & its inhibitors, Mitochondrial shuttle system.

UNIT-V

Nucleic acid metabolism: Introduction, Biosynthesis & degradation of purine and pyrimidine nucleotides, inhibitors of nucleic acid metabolism.

RECOMMENDED BOOKS

- Fundamentals of Biochemistry, J.L. Jain, S.Chand publications, 2004.
- Harper's Biochemistry Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 24th edition, Prentice Hall International. Inc.
- Principles of Biochemistry, Geoffrey L. Zubay, 3rd edition William W. Parson, Dennis E. Vance, W.C. Brown Publishers, 1995.
- Principles of Biochemistry, David L. Nelson, Michael M.Cox, Lehninger, 4th edition, W.H. Freeman and company.
- Biochemistry, Lubert Stryer, 4th edition, W.H. Freeman & Co, 1995.

SKILL BASED ELECTIVE COURSE - II

PLANT BIOCHEMISTRY

UNIT - I

Plant cell wall, Mechanism of water absorption, Ascent of sap. Transpiration-types, stomatal opening, Mechanism and factors affecting transpiration.

UNIT - II

Photosynthesis – Photosynthetic pigments, Photosynthetic apparatus, Light reactions, cyclic and non cyclic phosphorylation. Calvin cycle, Hatch – Slack cycle, CAM plants.

UNIT - III

Cycles of elements – Nitrogen cycle, Biochemistry of symbiotic and nonsymbiotic nitrogen fixation, Sulphur cycle, Phosphorus cycle.

UNIT - IV

Plant growth regulators – chemistry, biosynthesis, mode of action, distribution and physiological effects of Auxins, Gibberellins, Cytokinins, ABA and Ethylene.

UNIT - V

Medicinal value of different parts of plants. Basic methods to identify the secondary metabolites. Role of secondary metabolites in Ayurvedha and Sidha treatment. Medicinal value of Amla, Stevia, Aswagandha and Turmeric.

RECOMMENDED BOOKS

- Plant physiology, Verma, 7th Revised edition, Emkay Publications 2001.
- Plant Physiology, S. N. Pandey and B.K. Sinha, Vikas Publishing Pvt. Ltd, 3rd ed, 1999.
- Plant Biochemistry and Molecular Biology, Peter Jheea, Richard C. Leegood,
- Introduction to plant physiology, William. G.Hopkins, Norman. P.A. Hunger, 3rd edition.
- A Handbook of Medicinal Plants –Prajapathi, Purohit, Sharma, Kumar.
- Medicinal Plants –a compendium of 500 species.
- Medicinal Plants –Chopra, Khana, Prasad, Malik, Bhutiani.

SEMESTER IV

CORE – V TOOLS OF BIOCHEMISTRY

UNIT - I

General principles of Biochemical investigation, *in vivo* and *in vitro* studies-organ and tissue slice techniques, buffer solution and media for tissue homogenization and separation. Methods of cell disruption, basic principles of cell. culture, cryopreservation, cell sorting, counting.

UNIT - II

Centrifugation techniques: Basic principles of sedimentation, types of centrifugation, types of centrifuges. Types of Rotors - swinging bucket fixed angle, vertical tube and zonal rotor. Differential and density gradient centrifugation with applications.

UNIT - III

Chromatographic techniques: Principles, materials, sample preparation, methods & applications of paper, column, ion exchange, gel filtration, affinity chromatography, GLC, TLC & HPLC.

UNIT - IV

Electrophoresis techniques: Principles techniques and applications of agarose, PAGE, SDS-PAGE, cellulose acetate, capillary electrophoresis, isoelectric focusing, Factors affecting electrophoresis. Colorimetric and spectroscopic techniques: Beer - Lambert's law, light absorption and its transmittance, principle. instrumentation and applications in enzyme assay and kinetic assay, protein and nucleic acid structural studies.

UNIT - V

Radioisotopic techniques: Atomic structure, types of radioactive decay, negatron, positron, alpha particle and gamma particle, rate of radioactive decay, units of radioactivity, detection and measurement of radioactivity based on ionization, excitation properties and autoradiography and its applications.

RECOMMENDED BOOKS

- Principles and techniques of practical Biochemistry, Keith Wilson and John Walker, 1995. Cambridge University Press.
- An Introduction to Spectroscopy for Biochemist, Brown. SB Academic Press.
- Introduction to Centrifugation, Ford T.C and Graham J.N., Bioscientific Publ. Ltd, Oxford.
- Biophysical chemistry Principles and Techniques - Avinash Upadhyaye and Nirmalendhe Nath, Himalaya Publishers.
- A Biologist Guide to Principles and Techniques of Biochemistry, Keith Wilson and Kenneth Goulding, Edward Arnold publishers.
- Tools of Biochemistry-David Cooper.

CORE VI
CORE PRACTICAL II
COLORIMETRY

1. Estimation of glucose – O T Method
2. Estimation of fructose –Seliwanoff's Method
3. Estimation of Pentose – Bial' s Method
4. Estimation of Protein – Biuret Method
5. Estimation of Phosphorus – Fiske Subbarow Method.

Techniques

6. Separation of sugar & amino acid by paper chromatography
7. Separation of lipid by thin layer chromatography
8. Separation of plant pigments by column chromatography
9. Separation of serum proteins by paper electrophoresis.

ENZYME ASSAY

Determination of activity, effect of pH, effect of temperature and substrate concentration of:

- a. Salivary Amylase
- b. Urease
- c. Acid phosphatase
- d. Alkaline phosphatase

SEMESTER V

CORE VII

CLINICAL BIOCHEMISTRY

UNIT – I

Approaches to clinical biochemistry: Concepts of accuracy, precision, sensitivity and reproducibility quality control, fixation of normal range. Collection and processing of samples, anticoagulants, preservatives for blood and urine, transport of biological samples.

UNIT – II

Disorders in carbohydrate metabolism: Introduction, blood glucose regulation, hypo and hyperglycaemia, Renal threshold value. Diabetes mellitus: Types, Clinical features, metabolic effects, complications, GTT, galactosaemia, fructosuria, and glycogen storage diseases.

UNIT – III

Disorders in protein metabolism: Introduction, aetiology & clinical features of phenylketonuria alkaptonuria, cystinuria, albinism and tyrosinemia, clinical significance of non – protein nitrogen – urea, uricacid and creatinine. Metabolism of bilirubin, types of jaundice and its clinical features.

UNIT – IV

Disorders in lipid metabolism: Introduction, hypertriacylglyceridemia, atherosclerosis – aetiology, clinical features and complication. Lipid storage diseases, fatty liver. Disorders in nucleic acid metabolism: Gout, types, aetiology and clinical features.

UNIT – V

Liver function tests: Detoxification and excretory function. Renal function test: Urea clearance and its interpretation. Enzymology: Clinical significance of SGOT, SGPT, ALP, ACP, CPK and LDH.

RECOMMENDED BOOKS

- Text book of medical Biochemistry, M.N. Chatterjee and Rane Sinda.
- Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. JohnWiley-Liss Inc. Publication.
- Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
- Principles of Internal Medicine, Harrison T.R. Fauci, Braunwald, Isselbacher 14th edition, MC-graw hill, Newyork. Volume I and II.
- Tietz Fundamentals of Clinical Chemistry- (5th edition) C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co.

CORE – VIII
MOLECULAR BIOLOGY

UNIT – I

Cell: Structural organization of prokaryotes and eukaryotic cells and its functions, physical and chemical structure of DNA, DNA as genetic material, properties, organization of DNA, special base sequences, left handed DNA helices, structure of RNA.

UNIT - II

DNA replication: Semiconservative replication, experimental evidence for semiconservative replication, replication in prokaryotes and eukaryotes, enzymes involved in replication, mechanism of replication, inhibitors of DNA replication. DNA damage and repair, types of mutation.

UNIT – III

Transcription: Basic features of RNA synthesis, E.Coli RNA polymerases, initiation, chain elongation and termination of transcription, types of RNA and their processing.

UNIT - IV

Translation: Genetic code and its features, tRNA and amino acyl tRNA synthetases. Initiation, elongation and termination of translation, post translational modifications. Differences in protein synthesis between prokaryotes and eukaryotes.

UNIT – V

Regulation of gene expression: General aspects, operon model in prokaryotes – lac operon, tryp operon and arab operon.

RECOMMENDED BOOKS

- Molecular biology, 3rd edition, Herylodish et al.
- Genes – IX, Benjamin Lewin, Oxford University.
- Concept of Genetics, 4th edition, William S. Klug and Micheal R. Cummings.
- Genetics, Peter J. Russell, 4th edition, Harper Collins College Publishers.
- Molecular biology of gene, James D. Watson, Nancy H.Hopkins, Jeffrey W. Roberts, Joan.
- Argetsinger Steitz, Alan M. Weiner, 4th edition, The Benjammin Cummings Publishing Company, Inc. 2002.

CORE IX

HUMAN PHYSIOLOGY

UNIT – I

Digestive System: Secretions of digestive tract, digestion, absorption, assimilation of carbohydrates, proteins, fats, nucleic acids, vitamins and minerals.

UNIT – II

Respiratory System: Transport and exchange of gases between lungs and tissues, Blood composition, function, mechanism of blood coagulation.

UNIT – III

Muscles: Types, functions and physiology of muscle contraction, physiology of cardiac muscle, cardiac cycle and the regulation of heart pumping, E.C.G, and blood pressure.

UNIT – IV

Anatomy of kidney: Mechanism of urine formation, outline of structure and function of the male and female reproductive organs, spermatogenesis, menstrual cycle, physiology of pregnancy, parturition and lactation.

UNIT – V

Neuron structure: Synaptic transmission, classification of nervous system, characteristics of sympathetic and parasympathetic function.

RECOMMENDED BOOKS

- Human Physiology, Chatterjee.C. 11th edition Medical agency allied, Calcutta.
- Text book of medical physiology, A.C. Guyton 10th edition.
- Human body, Atlas, Publication Garden cheers.
- Mammalian Biochemistry, White handler smith.
- Review of medical physiology, William. F. Ganong, 14th edition, A Lange Medical book.

CORE X

NUTRITIONAL BIOCHEMISTRY

UNIT – I

Introduction, Energy content of food, Measurement of energy expenditure, respiratory quotients of food stuffs, specific dynamic action. BMR, Measurement of BMR and factors influencing BMR. The daily energy requirement, importance of energy for various activities. Calorific equivalent of major nutrients.

UNIT – II

Dietary requirements, recommended dietary allowances for infants, children and adolescent, pregnant and lactating women. Role of dietary carbohydrates, proteins, fats, fiber and antioxidants.

UNIT-III

Essential aminoacids, Biological value of proteins and nitrogen balance. Protein content of diets in different parts of India. Protein calorific malnutrition – aetiology, management of kwashiorkor and marasmus.

UNIT – IV

Minerals - Nutritional significance of dietary macro minerals (Ca, P, Mg, S, K, Na, Cl) and trace minerals. (Iron, Iodine, Zinc and copper) Disorders related to the deficiency of minerals.

UNIT- V

Nutrition and body defenses: Effect of drugs on food and nutrients, drug - nutrient interaction nutritional therapy, food preparation and management. Role of diet and nutrition in the prevention and treatment of disease.

RECOMMENDED BOOKS

- Human nutrition and dietetics, S. Davidson and J.R. Passmore.
- Human nutrition and dietetics, IS Garraw, WPT James, 10th edition
- Food and nutrition, Narayanan.
- Modern nutrition in health and diseases, Whol and Good hart.
- Mechanism and theory in food chemistry, DWS Wong, CBS New Delhi, 1996.

ELECTIVE I
GENETIC ENGINEERING

UNIT - I

Introduction to genetic engineering: Basic steps of gene cloning, enzymes used in genetic engineering.

UNIT - II

Cloning vectors: Plasmids, Phages, Cosmids, Phagemids, Yeast vectors, Shuttle vectors, Ti Plasmids, Ri plasmids.

UNIT - III

Methods of gene transfer. Isolation and purification of cellular and plasmid DNA, Methods for labeling nucleic acids and probes. Methods of DNA sequencing.

UNIT - IV

Amplification of DNA by PCR technique and applications, insitu hybridization, analysis of DNA, RNA and protein by blotting techniques, Marker and Reporter genes.

UNIT - V

Applications of genetic engineering: Transgenic plants and animals, commercial applications, gene therapy.

RECOMMENDED BOOKS

- Principles of gene manipulation, Old and Primrose, Blackwell Science.
- Genetic engineering and its applications, P. Joshi, Botania Publishers & Distributors. Recombinant DNA: A short course, Watson et al, Scientific American Books.
- Gene Cloning and DNA analysis, T.A Brown, Blackwell Science Publishers, 2001.
- Biotechnology Fundamentals & Applications, S.S.Purohitt, Agrobios Publishers, 2001.

SKILL BASED ELECTIVE COURSE – III

CLINICAL PATHOLOGY

Unit I

Components of the blood (Plasma and Cellular elements) and their functions –Haemoglobin, PCV, ESR, RBC count, WBC count, Platelet count, Calculations of Anaemia using MCH, MCV & MCHC, Reticulocyte count, Absolute Eosinophil count, Differential count.

Unit II

Coagulation system- recalcification time, activated partial thromboplastin time and thrombin time, Clotting time, Bleeding time, Prothrombin time, Partial Prothrombin time. Osmotic fragility – Heinz body preparation, Blood parasites, Cell preparation – Cytochemical tests, Quality control and quality assessment.

Unit III

Chemical examination: Reducing sugar- Benedict test, protein: Heat and acetic acid test, and sulfosalicylic acid method, Ketone bodies - Rothera's test, Bile pigment (Fouchet method), bile salt (Hay's test), Urobilinogen-Ehrlich aldehyde test and Bence Jones protein test. Microscopical Examination: Microscopic examination, identification of casts, crystals and blood cells- RBC, WBC, SE epithelial cells.

Unit IV

Stool examination: Collection of fecal specimen, preservation, physical examination; volume, colour, odour and appearance. Chemical examination; reducing sugar, occult blood test Determination of fat in stool and detection of steatorrhea. Microscopic Examination of Feces: Concentration method, direct centrifuge floatation method and ether extraction method for ova and cysts. Identification of crystals, meat fibers, fat globules and blood cells. Culture especially for enriched group of organisms.

Unit V

Tissue processing-processing of histological tissues, dehydration, clearing, wax preparation, paraffin embedding and embedding media, decalcification and block preparation. Microtomes- various types, their working principle and maintenance. Microtomes knives and knife sharpening procedure, practical section cutting.

RECOMMENDED BOOKS

Sabitri sanyal-(1991):Text book of pathology, first edition.

June H.cella- (1994): manual of laboratory test, AITBS publishers.

Kanai L.Mukherjee, Medical Laboratory Technology Vol. I. Tata McGraw Hill 1996, New Delhi.

Gradwohl, Clinical Laboratory-methods and diagnosis, Vol-I.

SabitriSanyal, Clinical pathology, B.I.Churchill Livingstone(P)Ltd, New

Delhi.2000.

Judith Ann Lewis, Illustrated guide to diagnostic tests-students version, Springhouse Corporation, Pennsylvania, 1994.

SEMESTER VI

CORE – XI IMMUNOLOGY

UNIT-I

Introduction to immunology: Immunity, types, mechanism of immunity, immune response, types, cells involved in immune response.

UNIT-II

Antigens: Properties, Specificity, Immunogenicity, antigenic determinants, haptens, adjuvants. Antibodies: Properties, Structure, Classes, Subclasses of Immunoglobins, Monoclonal antibodies - Production and applications.

UNIT-III

Antigen Antibody interactions: Agglutination, Precipitation, Complement fixation, and Neutralization. Immunofluorescence, ELISA and RIA.

UNIT-IV

Hypersensitivity Types – I to V, Complement system –Classical and Alternative pathway. Cytokines and their functions.

UNIT-V

Transplantation Immunology: MHC, HLA- mechanism of graft acceptance and rejection, immune suppressors, auto immunity, auto immune disorders and immune deficiency disorders with special reference to AIDS.

RECOMMENDED BOOKS

- Immunology Roitt. Brostoff and David Mole, 4th edition, 1998 Mosby Times Mirror Int Pub Ltd.
- Immunology, An introduction: Tizard K, Saunders college Publishing (1984).
- Essential Immunology. Roitt. I.M. (1988). Blacwell Scientific Publishers.
- Immunology, KubyRichard. A. Goldsby, Thomas. J.Kint, Barbara. A. Osborne, 4th Edition, 2000, W.H. Freeman and Company, New York.
- Basic and Clinical Immunology. Stites D.P. Stobo, J.D. Fundanberg. H.A and Wells. J.V. (1990) 6th edition Los Atlas Lange.
- Immunology-Charles. A.Janeway. J.R. Paul Travels: Black well Scientific Publishers, 1994. (4th edition).

CORE – XII

HORMONAL BIOCHEMISTRY

UNIT – I

Introduction, classification of hormones. Role of second messengers in hormonal action Hormones of the hypothalamus and pituitary – chemical nature, secretion, release and their biological functions.

UNIT – II

Hormones of the thyroid & parathyroid-chemical nature, secretion, function & disorder of thyroid & parathyroid hormones.

UNIT – III

Pancreatic & G.I. Tract hormones – chemical nature & functions of Insulin, Glucagon. Secretion, release, chemical nature & functions of Gastrin, Enterogastin, Secretin & Cholecystokinin.

UNIT – IV

Hormones of the Adrenal gland – chemical nature & functions of Adrenal medullary & Cortex hormones.

UNIT – V

Hormones of the testes and ovaries –chemical nature & functions of Androgens, Estrogens, Progesterone.

RECOMMENDED BOOKS

- Fundamentals of Biochemistry, J.L. Jain, S. Chand publications, 2004.
- Biochemistry, Agarwal, GOBL publications, 1999.
- Textbook of Biochemistry, Edward Staunton West, Wilbert R. Todd, Howard S. Mason, John T. Van Bruggen, 4th edition, Oxford & IBH publishing Co.Pvt.Ltd., 1996.
- Principles of Biochemistry, David L. Nelson, Michael M.Cox, Lehninger, 4th edn, W.H. Freeman and company.
- Fundamentals of Biochemistry, Donald Voet, Judith G. Voet, Charlott W. Pratt, upgrade edition John Willey & Sons. Inc.
- Biochemistry, Lubert Stryer, 4th edition, W.H. Freeman & Co, 1995.
- Concepts in Experimental Biochemistry, Brooks / Cole Publishing company, 1999.
- Mammalian Biochemistry – White Handler Smith.
- Basic & Clinical Endocrinology – Francis Sreenspan, Gordon J. Strewler Prentice – Hall International Inc. 5th ed., 1997.

CORE XIII

MICROBIAL BIOCHEMISTRY

UNIT – I

Prokaryotes and eukaryotes cell organization, .Microscopy- Simple, Light, Dark, Phase Contrast, Fluorescence, SEM and TEM. Sterilization and disinfection, principles and methods. Staining – Principles and techniques. Microbial growth factors, Bacterial Growth – Lag Phase, Exponential Phase, Linear Phase, Continuous growth, Diauxic growth.

UNIT II

Collection, handling, transport, examination of clinical specimens. Morphology, cultural, Biochemical characteristics, pathogenicity, laboratory diagnosis and treatment of infections caused by Staphylococcus, Mycobacterium, Dermatophytes, Candidiasis.

UNIT III

Bacterial Membranes –Gram negative and gram positive bacteria – structure and biosynthesis of cell wall components, penicillin sensitivity, Cellular Permeability – Beta – galactoside permease, Functional relationship of galactosidase and galactoside permease, Amino acid permeases, peptide permeases, Phosphotransferases, Porins and Iron uptake.

UNIT IV

Entner Doudoroff pathway, Energy generation aerobic, anaerobic, Chemolithotrophy and Phototrophy, Bacterial Photosynthesis, Pectin and Aldohexuronate pathway, Cellulose degradation, Fermentative Diversity – Clostridium and propionic acid Fermentation - Stickland reaction. Fermentation without substrate level phosphorylation.

UNIT V

Methanogens & Methanogenesis and methylotrophs – Reaction and bioenergetics of Aerobic Methanotrophy..Syntrophy-Hydrogen consumption in Syntrophic reaction, Energetics of Syntrophic, Carboxydrotrophs and oxidation of Sulphur compounds-Biochemistry of sulphur oxidation.

RECOMMENDED BOOKS

- Microbiology, Pelczar. Jr.M.J.Chan, McGraw- Hill Inc. NY.
- Fundamental Principles of bacteriology, Salle.A.J 7 th edition, 1992. Mc.Graw.
- Textbook of Microbiology, Ananthanarayanan.R. and Jayaram Panicker.C.K.Orient Longaman, 1994.
- Textbook of medical parasitology, Parija.S.c, Orient Longmans, 1996
- Medical Parasitology, Chatterjee, TATA McGraw Hill, 1986.
- Mehrotra RS & KR Aneja (2006), An Introduction to Mycology. Reprinted and Published by New Age International (P) Limited, Publishers, New Delhi.
- Jagadish Chander(1996). A Text book of Medical Mycology,

Interprint, NewDelhi.

- Brock Biology of Microorganisms 12thEdition - Michael T.Madigan, John M.Martinko, Paul V. Dunlap, David P.Clark.
- Microbial Physiology -Albert G.Moat, John.W.Foster, Michael.P.Spector.

ELECTIVE – II

PHARMACEUTICAL BIOCHEMISTRY

UNIT I

Drugs: History of Drugs Classification of drugs, routes of drug administration, absorption and distribution of drugs, factors influencing drug absorption and elimination of drugs.

UNIT II

Drug - Receptor interactions involvements of binding forces in drug receptor interaction, drug action not mediated by receptors.

UNIT III

Drug metabolism: Mechanism of phase I and II enzyme reactions, biochemical importance of xenobiotic metabolism.

UNIT IV

Adverse drug reactions and drug induced side effects, biological effects of drug abuse and Drug dependence, drug tolerance and intolerance.

UNIT V

Cancer: Cancer and principles of cancer chemotherapy, mode of action of anticancer drugs , antimetabolites, antibiotics, alkylating agents and other agents.

RECOMMENDED BOOKS

- The Pharmacology volume I and II –Goodman and Gillman.
- Basic Pharmacology –Foxter Cox.
- Oxford text book of Clinical Pharmacology and Drug Therapy, D.G Grahme Smith and K.Aronson.
- Pharmacology and Pharmatherapeutics – R.S.Satoskar, S.D.Bhandhakarand.
- Essentials of Pharmacotherapeutics, Barav.F.S.K.
- Lippincotts illustrated review Pharmacology, Mary.J.Mycek, Richards, Pamela.

ELECTIVE – III

INDUSTRIAL BIOCHEMISTRY

UNIT-I

Introduction to fermentation technology. Isolation and screening of industrially important microbes, Inoculum preparation, strain improvement for better yield. Primary and secondary detection and assay of fermentation products. Advantages of bioprocess over chemical process.

UNIT-II

Fermentation-Submerged and solid state fermentationn Fermentor design, Industrial use of microbes, Strain improvement. Inocula preparation, Down stream processing-Recovery and purification of intracellular and extra cellular products. Methods to maximize the yield.

UNIT-III

Microbial products: production of microbial enzymes-Amylase, cellulose, Pectinase and protease, Industrial production of alcohol, alcoholic beverages – Wine and Beer. Production of organic acids – Citric Acid, Acetic acid, Gluconic acid and lactic acid.

UNIT -IV

Microbes and Environment-Microbes in mineral recovery - Bioleaching and Biosorption, microbial recovery of petroleum. Microbial degradation of xenobiotics. Sewage biodegradation . Production of Biomass, Production of Single cell protein and Mushrooms.

UNIT -V

Production of bacterial and fungal polysaccharide, polyhydroxyalkanoates and microbial lipids, bioinsecticides, Industrial Production of Penicillin and streptomycin. Production of Vitamins-B12 and riboflavin.

RECOMMENDED BOOKS

- Microbiology, Pelczar. Jr. M. J. Chan, McGraw – Hill Inc. NY.
- Textbook of microbiology, Ananthanarayanan. R. and Jayaram Panicker. C.K. Orient Longman, 1994.
- Industrial microbiology, A.H. Patel.
- Microbiology, Prescott.L.M.JP. Harley and D.A. Klein, 2nd edition, 1993, W.C. Brown Publishing Co.
- Principles of Fermentation technology, Stanburry. P.Whitalcer and S.J. Hall, 1995.
- Medical microbiology, David Green Wood, Richard C.B.Slack. John Foreest Pevtherer, 14th edition, ELBS with Churchill Living Stone, 1992.

- Biotechnology –U.Sathyanarayana.

CORE XIV

CORE PRACTICAL – III

A. Urine Analysis

1. Qualitative analysis of normal and abnormal constituents in Urine; Microscopic analysis
2. Estimation of creatinine in urine.
3. Estimation of urea in urine by DAM method.
4. Estimation of uric acid in urine by caraway's method.
5. Estimation of chloride in urine by Vanslyke ' method.
6. Analysis of urinary calculi.

B. Blood Analysis

1. Estimation of blood glucose by Asatoor and King method.
2. Estimation of blood urea by DAM method.
3. Estimation of creatine and creatinine in serum.
4. Estimation of Total proteins in serum by biuret method.
5. Estimation of bilirubin in serum (conjugated and unconjugated).
6. Estimation of cholesterol in serum by Zak's method.

C. ENZYMOLOGY – Determination of the activity of SGOT and SGPT.

D. HAEMATOLOGY

1. Estimation of Haemoglobin
2. Enumeration of RBC/WBC
3. Differential count
4. Determination of blood grouping
5. Bleeding time, clotting time
6. ESR, Haematocrit and PCV

CORE XV

CORE PRACTICAL – IV

1. Preparation of media – liquid, solid, slant.
2. Culture techniques – streak plate, pour plate, spread plate.
3. Enumeration of microbes from soil, air, water.
4. Identification of microbes – biochemical tests (Imvic test)
5. Immunodiffusion – single and double diffusion
6. Immunoelectrophoresis
7. Sterilisation
8. Plant tissue culture
9. Media preparation
10. Callus induction
11. Micropropagation
12. Extraction and purification of sub – cellular organelles.
13. Restriction enzymes
14. Isolation of plasmid DNA and separation by electrophoresis
15. Isolation and separation of Genomic DNA.

NON MAJOR ELECTIVE COURSE

BIOCHEMISTRY IN DIAGNOSIS*

UNIT - I

Approaches to clinical biochemistry: Concepts of accuracy, precision, sensitivity and reproducibility, quality control, Collection and processing of samples, anticoagulants, preservatives for blood and urine, transport of biological samples.

UNIT - II

Components of the blood (Plasma and Cellular elements) and their functions Haemoglobin, PCV, ESR, RBC count, WBC count, Platelet count, MCH, MCV & MCHC, Absolute Eosinophil count, Differential count.

UNIT - III

Collection and physical examination: Collection of urine, Types of preservative, physical examination; Volume, colour, odour, appearance, specific gravity and pH. Chemical examination: Reducing sugar-Benedict test, protein: -Heat coagulation and acetic acid test, and sulfosalicylic acid test, Ketone bodies-Rothera's test, Bile pigment (Fouchet method), bile salt (Hay's test), Urobilinogen-Ehrlich aldehyde test and Bence Jones protein test, Test for mucin. Microscopic Examination

UNIT - IV

Stool examination: Collection of fecal specimen, preservation, physical examination; volume, colour, odour and appearance. Chemical examination; reducing sugar, occult blood test, detection of steatorrhea., Microscopic examination

UNIT - V

Assay of Biochemical components of Blood: Estimation of Glucose in blood, GTT, Glycosylated haemoglobin, cardiovascular disease estimation of cholesterol, Urea, Protein Uric acid and Creatinine.

RECOMMENDED BOOKS

- Sabitri sanyal-(1991):Text book of pathology, first edition.
- June H.cella- (1994): manual of laboratory test, AITBS publishers.
- Kanai L.Mukherjee, Medical Laboratory Technology Vol. I.Tata McGrawHill 1996, New Delhi.
- Gradwohl, Clinical Laboratory-methods and diagnosis, Vol-I.
- SabitriSanyal, Clinical pathology, B.I.Churchill Livingstone(P)Ltd, New Delhi.2000.
- Judith Ann Lewis, Illustrated guide to diagnostic tests-students version, Springhouse Corporation, Pennsylvania, 1994.
- Text book of medical Biochemistry, M.N. Chatterjee and Rane Sinda
- Text book of Biochemistry with clinical correlation, Thomas M. Devlin, 3rd edition, A. John Wiley-Liss Inc. Publication.
- Practical Clinical Biochemistry, Harold Varley, 4th edition, CBS Publication and Distributors, New Delhi.
- Principles of Internal Medicine, Harrison T.R. Fauci, Braunwald, Isselbacher 14th edition, MC-graw hill, Newyork. Volume I and II

- Tietz Fundamentals of Clinical Chemistry- (5th edition) C.A. Burtis, E.R. Ashwood (eds) Saunders WB Co.

NON MAJOR ELECTIVE COURSE

CLINICAL NUTRITION*

UNIT I

Diet and nutrition :Assessment of nutritional status, Factors affecting digestion and absorption of food Effects of irradiation, cooking, refining, sprouting and fermentation on nutritional quality of food, Food toxins, adverse effects of alcohol, tobacco, tea.

UNIT II

Dietary requirements, recommended dietary allowances for infants, children and adolescent, pregnant and lactating women and geriatric nutrition. Role of dietary fat, fiber, antioxidants. Proteins: Protein content of diets of people in different parts of India.

UNIT III

Interrelationship between dietary lipids and cholesterol metabolism, Malnutrition and infection, Malnutrition and mental development, Nutritional basis of behavior, neutral tranquilizers

UNIT IV

Nutrition and body defenses: Effect of drugs on food and nutrients, Amino acid therapy, drug - nutrient Interaction nutritional therapy, food preparation and management. Role of diet and nutrition in the prevention and treatment of disease Conditional Nutritional Disorders, Disorders of Gastrointestinal tract, Liver, Biliary tract and Pancreas and Heart, Diabetes. Food toxins and Allergy.

UNIT V

Acidic and alkaline foods, Dietary fiber chemical composition and importance Physiological effects and Metabolic adaptation during exercise, Nutritional management of inborn errors of metabolism.

RECOMMENDED BOOKS

- Human nutrition and dietetics, S. Davidson and J.R. Passmore.
- Human nutrition and dietetics, IS Garraw, WPT James, 10th edition.
- Mechanism and theory in food chemistry, DWS Wong, CBS New Delhi, 1996.
- Food and nutrition, Narayanan.
- Modern nutrition in health and diseases, Whol and Good hart.

***III SEMESTER**

ANY ONE OF THE ABOVE PAPER CAN BE SELECTED

NON MAJOR ELECTIVE COURSE

CELL BIOCHEMISTRY AND HUMAN PHYSIOLOGY**

UNIT I

Cell classification, cell variability, size, shape and complexity, function, Prokaryotes, cell - structure and components Eukaryotic cell : Structure, sub cellular components: nucleus, chromosomes, plasma membrane, cell wall, endoplasmic reticulum, lysosomes, peroxisomes, golgi apparatus, mitochondria, chloroplast, cytoskeleton, pili, flagellum.

UNIT II

Cell division, mitosis and meiosis, cell cycle, Plant cells: Cell wall and its function, xylem, phloem and epidermal cells. The interaction and communication between the cells, cell- cell reorganization in plants, role of golgi vesicles in plasma membrane, cell growth and division.

UNIT - III

Digestive System: Secretions of digestive tract, digestion, absorption, assimilation of carbohydrates, proteins, fats, nucleic acids, vitamins and minerals.

UNIT - IV

Respiratory System: Transport and exchange of gases between lungs and tissues, Blood composition, function and mechanism of blood coagulation.

UNIT - V

Excretory and Circulatory system: Structure and function of Kidneys. Structure and function of heart and lymphatic system.

RECOMMENDED BOOKS

- Textbook of Biochemistry with clinical correlations by Thomas M. Devlin, 2nd Edition.
- Wiley and Sons (1986). Physiological chemistry by Harper.
- Textbook of Medical Physiology by Guyton. A.C., H. Sanders Philadelphia. 1988.
- Physiological basis of Medical practice, West J.B., Best and Taylor.
- Introduction to Physiology by Davidson H and Segal M.B. Academic Press.
- Microbiology, M.S. Pelczar, R.D. Reid, E.C.S. Chan, Mc Graw Hill, New York (1986).
- General Microbiology (Vth Edition), R.Y. Stanier, Prentice Hall (1986) Biochemical Engineering, S Aiba, A.E. Humphrey, Nancy F. Mills, University of Tokyo Press. (1978).
- Introductory Microbiology, F.C. Ross, Charles Merrill Publication

(1983).

NON MAJOR ELECTIVE COURSE

BIOCHEMISTRY AND HEALTH**

UNIT – I

Carbohydrate – Source of carbohydrates, Importance of carbohydrates in living organisms, Normal level of sugar in humans, Diabetes mellitus and its complications in human. Control and prevention of diabetes mellitus.

UNIT – II

Proteins –Sources of proteins and amino acids. Importance of proteins in living organisms. Normal level of proteins in human. Protein deficiency disease-Kwashiorkor and Marasmus, Protein quality.

UNIT – III

Fatty acids - Source of fats and importance of fats and lipids in living organism and. Role of LDL, VLDL, HDL and chylomicrons in human body. Normal levels of cholesterol hypercholesterolemia and role of cholesterol in Blood pressure. Atherosclerosis and Heart attack. Prevention and control of heart related diseases.

UNIT – IV

Vitamins –Source of water soluble and fat soluble vitamins. Deficiency disorders of Vitamins and importance of vitamins in humans.

UNIT – V

Minerals - Source and deficiency disorders of calcium, magnesium, sodium, potassium, phosphorus, Iron, Iodine in humans.

REFERENCE BOOKS

- Text book of Medical Physiology –Guyton.A.C.
- Human Physiology by Chatterjee.
- Food facts and principles, Shakuntala Manay.
- Deb.A.C., Fundamentals of Biochemistry, Books and allied (p) Ltd, 2002.
- Essentials of Biochemistry Sathyanarayanan.U. Books and allied (p) Ltd, 2002.
- Biochemistry by Ambika Shanmugam.

**** IV SEMESTER**

ANY ONE OF THE ABOVE PAPER CAN BE SELECTED

SEMESTER I

ALLIED BIOCHEMISTRY - I

UNIT - I

Carbohydrates: Introduction, classification, monosaccharide-structure, stereoisomers and structural isomers, mutarotation, and chemical reactions. Oligosaccharides-Dissaccharides-structure and importance of sucrose, Lactose, maltose, .Polysaccharides-structure and importance of homopolysaccharides and heteropolysaccharides.

UNIT - II

Amino acids: Classification, Essential & Non essential amino acids, structure and properties. Protein: Definition, classification and functions – structural levels of organization.

UNIT - III

Enzymes – Definition, classification with example, active site, lock & key model, induced fit hypothesis. Enzyme units – kinetics- factors affecting enzyme activity.

UNIT - IV

Lipids: Classification, physical & Chemical properties, saturated and unsaturated fatty acids, Structure of cell membrane & transport.

UNIT - V

Vitamins: Classification, occurrence, deficiency symptoms, biochemical functions of fat soluble and water soluble Vitamins.

RECOMMENDED BOOKS

- Lehninger's Principles of Biochemistry (2000) by Nelson, David I. and Cox, M.M. Macmillan/ worth, NY.
- Fundamentals Of Biochemistry (1999) by Donald Voet, Judith G.Voet and Charlotte W Pratt, John Wiley & Sons, NY.
- Biochemistry 3rd (1994) by Lubert Stryer, W H Freeman and co, San Francisco.
- Biochemistry 4th edition (1988) by Zubay G L, W M C Brown Publishers.
- Principles of Biochemistry (1994) Garrette & Grisham, Saunders college publishing.
- Outlines of Biochemistry (1987) by Eric E.Conn, P.K. Stumpf, G.Brueins and Ray H.Do, John Wiley & Sons, NY.
- Text book of biochemistry (1997) 4th edition Thomas M devlin, A John Wiley, Inc publication, New York.

SEMESTER II

ALLIED BIOCHEMISTRY II

UNIT I

Buffers -Definition and determination of pH, Henderson Hasselbach Equation. Dialysis, Surface tension and Viscosity. Principle and Applications of Colorimetry and Chromatography.

UNIT II

Carbohydrate metabolism -Glycolysis, Glucogenesis, Glycogenolysis, Citric acid cycle & HMP shunt. Lipid metabolism- Beta & omega oxidation, Biosynthesis of Saturated fatty acids.

UNIT III

Protein metabolism -Transamination, oxidative and non-oxidative deamination, decarboxylation- urea cycle. Interrelationship of carbohydrates, proteins and fat metabolism.

UNIT IV

Bioenergetics- Redox potential, Respiratory chain, Oxidative phosphorylation (Theories and Mechanism), High energy compounds.

UNIT V

Hormones – Definition, Classification of Hormones, Biological function and disorders of Pancreatic Hormones (Insulin and Glucagon), Thyroid hormone (thyroxin).

RECOMMENDED BOOKS

- Principles and techniques of practical Biochemistry, Keith Wilson and John Walker, 1995.Cambridge University Press.
- Biophysical chemistry Principles and Techniques- Avinash Upadhyaye and Nirmalendhe Nath, Himalaya Publishers.
- A Biologist Guide to Principles and Techniques of Biochemistry, Keith Wilson and Kenneth Goulding, Edward Arnold publishers.
- Principles of Biochemistry, Emil I.Smith
- Endocrinology – Williams.
- Fundamentals Of Biochemistry (1999) by Donald Voet, Judith G.Voet and Charlotte W Pratt, John Wiley & Sons, NY.
- Outlines of Biochemistry (1987) by Eric E.Conn, P.K. Stumpf, G.Brueins and Ray H.Do, JohnWiley & Sons, NY.
- Biochemistry 3rd (1994) by lubert stryer, W H freeman and co, Sanfrancisco.
- Text book of biochemistry (1997) 4th edition Thomas M devlin, A John Wiley, In.
- Principles of Biochemistry (1994) Garrette & Grisham, Saunders college.
- Essentials of Biochemistry Sathyanarayanan.U. Books and allied (p) Ltd, 2002 Publishing.

ALLIED BIOCHEMISTRY PRACTICAL – I

Qualitative Analysis

- a. Analysis of carbohydrates
- b. Analysis of Amino acids
- c. Test for proteins
- d. Test for lipids – cholesterol

Biochemical preparation

- a. Starch from Potato
- b. Casein from milk
- c. Lecithin from egg yolk

Quantitative Analysis

- a. Reducing Sugar – Benedict's method
- b. Amino acid – formal titration
- c. Ascorbic acid – using 2, 6 Dichloro phenol Indophenol method.

Techniques

- a. Separation of sugar & amino acid by paper chromatography
- b. Separation of lipid by thin layer chromatography

RECOMMENDED BOOKS FOR B. Sc. BIOCHEMISTRY PRACTICALS

- Practical Clinical Biochemistry, Volume I and II – Harold Varley, et al., CBS Publishers, Fifth Edition, 1980.
- Biochemical Methods. Sadasivam.S and Manickam, A. II Edition. New Age International Private Ltd. Publishers.
- Laboratory techniques in Biochemistry and Molecular Biology, Work and Work.
- A Biologist's Guide to principles and Techniques of Practical Biochemistry, K.Wilson and K.H.Goulding, ELBS Edition, 1986.
- Modern Experimental Biochemistry Boyer, R, III Edition, Benjamin Cummings Publisher.
- A Text Book of Practical Biochemistry, by David Plummer.
- Enzyme Structure and Mechanism, Aln Fersht (1997).
- Introductory Practical Biochemistry –S.K.Sawhney, Randhir Singh
- Practical Immunology 4th ed by Frank C.Hay Olywn
- Practical Manual of Biochemistry – S.P Singh
- Laboratory Manual in Biochemistry by S.Jayaraman
- Laboratory Manual in Biochemistry – T.N.Pattabiraman
- Handbook of Emergency Lab Test –L.I.G.Worthley
- Practical Immunology –Frank L.Hay, Olwyn.M.R.Westwood
