

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
CUDDALORE-1**



**PG & RESEARCH DEPARTMENT OF  
BIOCHEMISTRY  
UG SYLLABUS 2016-2017**

## B.Sc. BIOCHEMISTRY

Semester	Subject Code	Part	Subject Title	Hrs	Cr	Exam. Hrs
<b>I</b>	LT101T	I	Language	4	3	3
	LE101T	II	English	4	3	3
	BC101S	III	Main Paper – I(Biomolecules-1)	4	3	3
	BC102S	III	Main Paper – II(Cell Biology)	4	3	3
	BCP201S	III	Main Practical – I *	3	2	-
	ACH101T	IV	Allied 1 (Chemistry)	5	3	3
	ACHP101	IV	Allied 1 (Chemistry Practical)	3	2	3
	VE101T	V	Communication skills/Value education	3	2	3
			<b>Total</b>	<b>30</b>	<b>21</b>	
<b>II</b>	LT202T	I	Language-II	4	3	3
	LE202T	II	English-II	4	3	3
	BC203S	III	Main Paper – III (Biomolecules-II)	4	3	3
	BC204S	III	Main Paper – IV (Nutritional Biochemistry)	4	3	3
	BCP201S	III	Main Practical – I *	3	2	6
	ACH202T	IV	Allied 2 (Industrial Chemistry)	5	3	3
	ACHP202	IV	Allied 2 (chemistry Practical)	3	2	3
	EPD201T	V	Communication skills/Value education	3	2	3
			<b>Total</b>	<b>30</b>	<b>21</b>	
<b>III</b>	LT303T	I	Language III	4	3	3
	LE303T	II	English III	4	3	3
	BC303S	III	Main Paper – V(Enzymes)	4	4	3

	BC304S	III	Main Paper - VI (Analytical Biochemistry-I)	4	4	3
	BCP402S	III	Main Practical - II *	3	2	-
	AMBC302	IV	Allied 3 Principles of Microbiology	5	3	3
	AMBCP301	IV	Allied 3 Microbiology Practical	3	2	3
	AOFA301	IV	Herbal technology/ First aid	3	4	3
			<b>Total</b>	<b>30</b>	<b>25</b>	
<b>IV</b>	LT404T	I	Language-IV	4	3	3
	LE404T	II	English-IV	4	3	3
	BC405S	III	Main Paper - III (Intermediary Metabolism)	4	4	3
	BC406S	III	Main Paper - IV (Analytical Biochemistry -II)	4	4	3
	BCP402S	III	Main Practical - II *	3	2	6
	AZBC401T	IV	Allied 4 Zoology	5	3	3
	AZBP401	IV	Allied 4 Zoology Practical	3	2	3
	EVS401S	IV	EVS/CLP	3	2	3
				<b>Total</b>	<b>30</b>	<b>23</b>

<b>V</b>	BC507	III	Main Paper – IX(Molecular Biology)		6	5	3
	BC508	III	Main Paper – X(Immunology)		6	5	3
	EBC509	III	Elective Paper – I	Medical Biochemistry	6	5	3
	EBC509A			Food Technology			
	EBC510A	III	Elective Paper – II	Plant Biochemistry	4	5	3
	EBC510B			Pharmaceutical Biochemistry and Bioinformatics			
	BCP603	III	Main Practical – III *1		4	2	-
	BCP604	III	Main Practical – IV *1		4	2	-
			<b>Total</b>	<b>30</b>	<b>24</b>		
<b>VI</b>	BC611	III	Main Paper – XII(Physiology)		6	5	3
	BC612	III	Main Paper – XIII(Biotechnology)		6	5	3
	EBC613	III	Elective Paper – III	Endocrinology	6	5	3
	EBC613A			Biostatistics & Clinical research			
	EBC614A	III	Elective Paper – IV	Hospital Management	4	5	3
	EBC614B			Medical Lab Technology			
	BCP603	III	Main Practical – III *1		4	2	6
	BCP604	III	Main Practical – IV *1		4	2	6
			<b>Total</b>	<b>30</b>	<b>24</b>		

\*End of the Academic Year

---

<b>B.Sc (Biochem)</b>	<b>BIOMOLECULES-I (60 hrs)</b>	<b>BC101S</b>
<b>SEMESTER-I</b>		<b>HRS/WK-4</b>
<b>CORE-1</b>		<b>CREDIT-3</b>

## **OBJECTIVES**

To understand the structure and functions of complex biomolecules.

### **UNIT I [10 hrs]**

Scope of Biochemistry - Importance of biomolecules, Chemical Bonding- nature and types- ionic bond (or) polar bond, covalent (or) non-polar bonds, coordinate bond and non-covalent bonds (Hydrogen, hydrophobic, vanderwalls interactions). Isomerism- structural isomerism, and stereoisomerism.

### **UNIT II [15 hrs]**

Introduction and definition of carbohydrates, classification – monosaccharides, oligosaccharides, polysaccharides; occurrence, structure and functions of monosaccharides (glucose and fructose).General properties with reference to glucose, anomers, epimers and mutarotation .Ring and straight chain structure of glucose (haworth projection formula). Kiliani synthesis ,inversion of sucrose.

### **UNIT III [10 hrs]**

Structure, occurrence, properties and biological importance of disaccharides (sucrose, lactose, maltose).Structure, occurrence, properties and biological importance of polysaccharides – Storage polysaccharides (starch, glycogen, inulin), Structural polysaccharides (cellulose, chitin, pectin), Heteropolysaccharides (hyaluronic acid, heparin).

### **UNIT IV [10 hrs]**

Nucleic acids – Bases ,Nucleosides and Nucleotides, Phosphodiester linkage, DNA and RNA, Structure –double helical structure of DNA, Properties of DNA – Denaturation, Renaturation, T<sub>m</sub> and Hyperchromicity, Types of DNA, Structure of RNA- tRNA, mRNA and rRNA.

### **UNIT V [15 hrs]**

Porphyrin nucleus and its classification, heme synthesis. bile pigments- chemical nature and physiological significance. Biological importance of Heterocyclic compounds- Thiazole, Indole, Pyridine, Pteridine, Pyrrole, Imidazole.

---

**TEXTBOOKS:**

1. Renuka Harikrishnan ,1995, “ Biomolecules and Enzymes” (second edition), Madurai, Indraja Pathipagam
2. J.L.Jain, Sanjay Jain and Nitin Jain, 1997, “Fundamentals of Biochemistry”(6<sup>th</sup> Edition) ,New Delhi, S.Chand& Company Ltd

**REFERENCES:**

1. Power & Chatwal “Biochemistry”, 4<sup>th</sup> edition , Himalaya Publishing House
2. Cambell &Farrell, 2007, “Biochemistry” 5<sup>th</sup> edition, Delhi, Baba Borkhanath printers
3. T.N.Pattabiraman, 1993“Principles of Biochemistry” 5<sup>th</sup> edition, Bangalore,. Gajanana Book Publishers and Distributors
4. Dr.A.C.Deb, 1983,“Fundamentals of Biochemistry” (8<sup>th</sup> edition), Kolkata,New Central Book Agency
5. Lehninger, Nelson And Cox ,1982, “ Principles of Biochemistry”, (4th ed)UK, Macmillan Worth Publishers.

---

<b>I B.Sc (Biochem)</b>	<b>CELL BIOLOGY (60 hrs)</b>	<b>BC102S</b>
<b>SEMESTER-I</b>		<b>HRS/WK-4</b>
<b>CORE-2</b>		<b>CREDIT-3</b>

## **OBJECTIVE**

To study the structural and functional organization of cell and its organelles

### **UNIT I [15 hrs]**

Introduction – Classification of cell -Prokaryotic and eukaryotic cell. Cell membrane – structure and functions of Fluid Mosaic Model. Membrane proteins: Carbohydrate, lipids, proteins and their function in FMM. Membrane transport – Types of transport, passive and active transport, sodium potassium pump, Ca<sup>2+</sup>and ATP<sub>ase</sub> pumps, symport and antiport, endocytosis and exocytosis, liposomes.

### **UNIT II [10 hrs]**

Endoplasmic reticulum – occurrence, morphology and function. Enzymes of the ER membrane. Lysosomes – structure and chemical composition. Ribosomes – structure and functions.

### **UNIT III [10 hrs]**

Mitochondria: morphology and function., Golgi complex : structure & function. Microbodies – structure, morphology and function, peroxisomes and glyoxysomes

### **UNIT IV [15 hrs]**

Nucleus – structure composition and biochemical function, chromosome structure – structure and organisation of chromatin, polytene and lambrush chromosome with example. Cell cycles – Phases of cell cycle, mitotic and meiotic cell cycle

### **UNIT-V [10 hrs]**

Cytoskeleton - components and biological functions. Microtubules, Microfilaments and IF proteins - Distribution, chemical composition and function.

---

**TEXTBOOKS:**

1. Verma . P.S and Agarwal .P.K,1999, "Cell biology, Genetics, Molecular biology, Evolution and Ecology", ( 24th edition) New Delhi, S.Chand & Company Ltd
2. De Robertis EDP and De Robertis EMF, 1987, "Cell and Molecular Biology", (8<sup>th</sup> edition ),New Delhi, B.I.Waverly Pvt Ltd

**REFERENCES:**

1. Sheela A. Stanly ,2008,"Cell biology for biotechnologist", (I Edition), Narosa Publishing House Pvt-Ltd
2. Prakash S.Lohar, 2007, "Cell and Molecular biology" (I edition),Chennai, MJP publishers
3. Darnell J, Lodish H, Baltimore D,1986, "Molecular cell biology", England, WH Freeman.
4. Cell biology –Gerald karp (7<sup>th</sup> edition) –international student version, wiley publications



---

<b>I B.Sc (Biochem)</b>	<b>BIOMOLECULES-II (60 hrs)</b>	<b>BC203S</b>
<b>SEMESTER-II</b>		<b>HRS/WK-4</b>
<b>CORE-3</b>		<b>CREDIT-3</b>

**OBJECTIVE :**

To understand the structure and functions of complex biomolecules.

**UNIT I [15 hrs]**

Introduction , definition, classification of lipids, Physical properties ,classification of fatty acids –saturated, unsaturated and essential fatty acids, properties of fatty acids{Iodine number, Acid number, RM number, Saponification number and Rancidity}. Structure and function of commonly occurring phospholipids (esp.Lecithin, cephalin, phosphatidyl inositol and serine)Sphingomyelin, plasmalogen, sterols{cholesterol}. Glycolipids- cerebrosides and gangliosides. Steroids and carotinoids.

**UNIT II [10 hrs]**

Definition and classification of Amino acids based on structure, metabolism & Polarity .Essential & Non essential amino acids, Non protein amino acids. General properties of amino acids. Titration curve of amino acids.

**UNIT III [10 hrs]**

Protein- Definition, Peptide bond, Classification based on size and shape, solubility, composition & functions. General reactions of proteins (Reactions of both NH<sub>2</sub> group & COOH group)

**UNIT IV [15 hrs]**

Structure of proteins-primary, secondary, tertiary & quaternary. Ramachandran plot and forces stabilizing the structure of proteins, Determination of amino acid sequence, N -terminal determination- Edman's and dansylchloride method. C-terminal- hydrazinolysis and enzymatic method, solid phase polypeptide synthesis.

**UNIT V [10 hrs]**

Structure and functions of biologically important peptides-Glutathione, vasopressin & Insulin. Biologically important proteins-structure and functions of Globular proteins (Haemoglobin, Myoglobin),Fibrous protein (Keratins, collagen) and Lipoproteins.

---

**TEXTBOOKS:**

1. Renuka Harikrishnan ,1995, “ Biomolecules and Enzymes” (second edition), madurai, Indraja Pathipagam
2. J.L.Jain, Sanjay Jain and Nitin Jain,1997, “Fundamentals of Biochemistry”(6<sup>th</sup> Edition) ,New Delhi, S.Chand & Company Ltd

**REFERENCES:**

1. Power & Chatwal “Biochemistry” 4th edition , Himalaya Publishing House
2. Cambell &Farrell, 2007, “Biochemistry” 5th edition, Delhi ,Baba Borkhanath printers
3. Dr.A.C.Deb ,1983,“Fundamentals of Biochemistry” (8th edition), Kolkata,New Central Book Agency
4. Lehninger,Nelson And Cox ,1982, “ Principles Of Biochemistry”, (4TH Ed)UK, Macmillan Worth Publishers.
5. Donald Voet and Judith Voet,“Biochemistry”,2nd edition,John Wiley & Sons,Inc,NY

---

<b>I B.Sc (Biochem)</b>	<b>NUTRITIONAL BIOCHEMISTRY</b> <b>(60 hrs)</b>	<b>BC204S</b>
<b>SEMESTER-II</b>		<b>HRS/WK-4</b>
<b>CORE-4</b>		<b>CREDIT-3</b>

### **OBJECTIVE**

To study the nutritional aspects of various food stuffs and the disorders associated with it

### **UNIT I**

**[15 hrs]**

Introduction and definition of food and nutrition, Basic food groups – Energy yielding, body building and protective foods. Basic concepts of energy expenditure, Unit of energy, measurement of food stuffs by bomb calorimeter , calorific value of proteins, carbohydrates and lipids, RQ of foods, Basic metabolic rate (BMR),its measurements and influencing factors, SDA of foods.

### **UNIT II**

**[10 hrs]**

Biological value of proteins , evaluation of proteins by nitrogen balance method – DC, BV, NPU and NAP, sparing action of carbohydrates, single cell proteins (SCPs) (e.g.,spirulina only). PCM: Kwashiorkor and Marasmus- preventive and curative measures.

### **UNIT III**

**[10 hrs]**

Vitamins –classification- sources, RDA, deficiency and functions of fat soluble vitamins (A,D,E,K) and water soluble vitamins (B – complex – B<sub>1</sub>, B<sub>2</sub>, B<sub>5</sub>, B<sub>6</sub>, B<sub>9</sub>, B<sub>12</sub> and vitamin – C.)

### **UNIT IV**

**[10 hrs]**

Minerals – physiological role and nutritional significance of principal and essential trace elements (sodium, potassium, calcium, magnesium, phosphorous, copper, zinc, iron, iodine, fluorine, selenium, Molybdenum).

### **UNIT V**

**[15 hrs]**

Composition of balanced diet and RDA. Nutritional requirements for infants, children, adolescents and adult (male and female), pregnant and lactating women and old age.

---

**TEXTBOOKS:**

1. Dr. M. Swaminathan,1987, "Food and Nutrition Vol I&II", Second edition,Bangalore, Bappco Publishers.
2. M.N Chatterjea and Rana Shinde," Text book of Medical biochemistry",4<sup>th</sup> edition, Jaypee Publishers, New Delhi

**REFERENCES:**

1. Patricia Trueman, 2007, "Nutritional Biochemistry" (I edition), Chennai, MJ publishers
2. Darnell J, Lodish H, Baltimore D, 1986, "Molecular Cell Biology", England, WH Freeman publishers.
3. William's Basic Nutrition and Diet Therapy Williams (14<sup>th</sup> edition), Staci Nix.
4. U. Sathyanarayana and U.Chakrapani ,"Biochemistry", Books And Allied Publishers.
5. Dr.A.C.Deb ,1983,"Fundamentals of Biochemistry" (8th edition), Kolkata,New Central Book Agency



<b>II B.Sc (Biochem)</b>	<b>ENZYMES</b> <b>(60hrs)</b>	<b>BC303S</b>
<b>SEMESTER-III</b>		<b>HRS/WK-4</b>
<b>CORE-3</b>		<b>CREDIT-4</b>

**OBJECTIVE:**

To understand the basics of enzyme and its action.

**UNIT I ENZYMES-CLASSIFICATION & MECHANISM OF ACTION [15 hrs]**

Introduction of Enzymes-Classification-nomenclature-chemical nature and general characterization, factors affecting enzyme activity , Active site determination- trapping ES complex, use of substrate analogue. Mechanism of enzyme action – Lock and key, induced fit theory. Coenzymes and Cofactor, units of enzyme activity, Monomeric and oligomeric enzymes.

**UNIT II ENZYME INHIBITION [10 hrs]**

Michaelis-Menten equation - determination of  $K_m$  and  $V_{max}$  and its significance. Line weaver Burk plot & Eadie-Hofstee plot. Enzyme inhibition – Competitive, Non-competitive and Uncompetitive inhibition (no derivation), reversible & irreversible inhibition, mixed - partial inhibition (definition) – suicidal inhibition

**UNIT III ALLOSTERIC INHIBITION [15 hrs]**

Allosterism, nature of allosteric enzymes, sigmoidal curve, mode of action (sequential & symmetry model), Allosteric inhibition and its regulation Eg. Aspartate transcarbamylase and PFK. Mechanism of enzyme action without cofactors eg. Chymotrypsin

**UNIT IV CHEMICAL NATURE OF ENZYMES [10 hrs]**

Chemical nature of enzyme catalysis: Acid base catalysis, covalent catalysis, metal ion catalysis, proximity, orientation effects. catalysis reaction, Co-enzymes –  $NAD^+$ ,  $NADP^+$ , FMN & FAD, COA, TPP.

**UNIT V ISOLATION & APPLICATIONS OF ENZYMES [10 hrs]**

Purification of enzymes, immobilization of enzymes- methods: adsorption, entrapping, ionic bonding, cross -linking and encapsulation. Applications of enzymes - Therapeutic, analytical and industrial use.

**TEXT BOOKS:**

1. Trevor Palmer, (2004). Enzymes. 5th edition, Affiliated East –West press (P) Ltd. New Delhi
2. Renuka Harikrishnan ,1995, “ Biomolecules and Enzymes” (second edition), Madurai, Indrajaya Pathipagam
3. Dixon, Malcolm; Webb, Edwin Clifford, Enzymes: Third Edition, Published by Longman, USA, 1979.

---

**REFERENCES:**

1. Bery J.M., Tymoezko J.L. and Stryer L. (2008) Biochemistry, 5<sup>th</sup> Edition, W.H. Freeman and Company, New York.
2. Lehninger Principles of Biochemistry 6th Edition by David L. Nelson, 6<sup>th</sup> edition, 2012
3. Victor W. Rodwell, Harpers Illustrated Biochemistry 30<sup>th</sup> Edition Paper back– Import, 1 Jan 2015.
4. Nicholas C.Price. Fundamentals of enzymology –14<sup>th</sup> edition 1989 by Oxford University press.
5. Dixon, M. and Webb, J.F., 1979, Enzymes, Longman Publishing, London.
6. Price and Stevens, 1999, Fundamentals of Enzymology, Oxford University Press, UK.
7. Jain,J.L & Jain,(2005) Fundamentals of Biochemistry. Sixth Edition, S.Chand & Company, New Delhi.

<b>II B.Sc (Biochem)</b>	<b>ANALYTICAL BIOCHEMISTRY- I</b> (60 hrs)	<b>BC304S</b>
<b>SEMESTER-III</b>		<b>HRS/WK-4</b>
<b>CORE-4</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To impart knowledge about the principle and applications of various biochemical techniques

### **UNIT I PHYSICAL PROPERTIES OF BIOMOLECULES [10 hrs]**

Units of measurements. Colloids - properties of colloids, osmosis and viscosity and its significance in biology, surface tension, factors affecting surface tension.

### **UNIT-II ELECTRO CHEMICAL TECHNIQUES [10 hrs]**

Electro chemical techniques : Principles of electro chemical techniques pH, pOH, buffer, buffer capacity , Henderson-Hasselbalch equation, buffers in body fluids, Red blood cells and tissues, Measurement of pH using indicator – Glass electrode, Oxygen electrode – Principle and application of Clark electrode.

### **UNIT III ELECTROMAGNETIC RADIATION [15 hrs]**

Electromagnetic radiation: Basic Principles of electromagnetic radiation. Energy, wavelength, wave number and frequency, absorption and emission spectra, Beer-Lambert Law, light absorption and its transmittance. UV and Visible Spectrophotometry – Principles, instrumentation and applications with examples, Infrared – principles and application of spectrophotometry.

### **UNIT IV SPECTROSCOPY [15 hrs]**

Fluorescence and Phosphorescence. Spectrofluorimetry techniques-Principle, instrumentation and applications in Vitamin assays (Riboflavin and Thiamine), Flame photometry – Principle, instrumentation and applications in trace elements (Na<sup>+</sup>, K<sup>+</sup> analysis), Principle, instrumentation of Atomic absorption spectrophotometer with one example.

### **UNIT V CENTRIFUGATION [10 hrs]**

Centrifugation technique: Basic principles - types of centrifugation, rotors, Sedimentation rate, Svedberg unit. Preparative centrifugation: Differential, Density gradient. Analytical ultracentrifugation techniques-Determination of molecular weight of proteins.

## **TEXTBOOKS:**

1. Keith Wilson, and John Walker,(2010). Principles and Techniques of Practical Biochemistry. 7th edition, Cambridge University Press. UK.
2. Avinash Upadhyaye, and Nirmalendhe Nath, (2002). Biophysical Chemistry Principles and Techniques. 3rd edition, Himalaya Publishers, New Delhi.
3. Analytical biochemistry by Asokan, 3rd edition , 2006.

## **REFERENCES:**

1. Introduction to Practical Biochemistry – Shawney, Randhir Singh, Narasa Pub, N. Delhi.



- 
2. Subramanian, M.A. (2005). Biophysics : Principles and Techniques. MJP Publishers, Chennai.
  3. Biochemical methods by Pingoud, A., Urbanke, Claus, Hoggett, Jim, Jeltsch, Albert ,Wiley
  4. Biochemistry Laboratory: Modern Theory and Techniques (2nd Edition) 2nd Edition by Rodney F. Boyer. 2011

<b>II B.Sc (Biochem)</b>	<b>INTERMEDIARY METABOLISM</b> (60 hrs)	<b>BC405S</b>
<b>SEMESTER-IV</b>		<b>HRS/WK-4</b>
<b>CORE-5</b>		<b>CREDIT-4</b>

### **OBJECTIVE**

To understand the pathways of various biomolecules and their energetics

#### **UNIT I CARBOHYDRATE METABOLISM [15 hrs]**

Glycolysis – aerobic and anaerobic, energetics, Pyruvate dehydrogenase complex, oxidation of pyruvate, citric acid cycle (energetics included). Glycogenesis and glycogenolysis (key enzymes and regulation of these metabolic pathways are included). Pentose phosphate pathway and Gluconeogenesis.

#### **UNIT II BIOSYNTHESIS OF FATTY ACIDS [15 hrs]**

Biosynthesis of fatty acids -saturated and unsaturated, Fatty acid synthase complex, Biosynthesis of cholesterol (regulation included), Biosynthesis of triglycerides and phospholipids (lecithin and cephalin only). Degradation of fatty acids: oxidation of fatty acids – alpha, beta, and omega oxidation.

#### **UNIT III FATE OF DIETARY PROTEINS [10 hrs]**

Introduction – fate of dietary proteins – Glucogenic and Ketogenic amino acids, catabolism of amino acids – Transamination , oxidative and non-oxidative deamination, Decarboxylation – urea cycle .

#### **UNIT IV BIOSYNTHESIS OF NUCLEOTIDES [10 hrs]**

Biosynthesis of purine and pyrimidine – de novo and salvage pathway – degradation of purine and pyrimidine – biosynthesis of nucleotide coenzymes – NAD and FAD. Conversion of ribonucleotides to deoxyribonucleotides.

#### **UNIT V ELECTRON TRANSPORT CHAIN [10 hrs]**

The Electron transport chain - components and reactions of ETC- Oxidative phosphorylation – chemiosmotic theory, P/O ratio, uncouplers of oxidative phosphorylation.

### **TEXT BOOKS:**

1. M.N Chatterjea and Rana Shinde,” Text book of Medical biochemistry”,8th edition,2012, Jaypee Publishers, New Delhi
2. Jain, J.L & Jain, (2005) Fundamentals of Biochemistry. Sixth Edition,S.Chand& Company, New Delhi.
3. U.Sathayanarayana, (2006). Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India.

---

**REFERENCES:**

1. Lehninger Principles of Biochemistry 6th Edition by David L. Nelson, 6<sup>th</sup> edition, 2012
2. Victor W. Rodwell, Harpers Illustrated Biochemistry 30<sup>th</sup> Edition, 2015.
3. Voet, D. & Voet, J. G. Biochemistry. 4<sup>th</sup> edn, 2010
4. Victor W. Rodwell, Harpers Illustrated Biochemistry 30<sup>th</sup> Edition,2015.

<b>II B.Sc (Biochem)</b>	<b>ANALYTICAL BIOCHEMISTRY- II</b> (60 hrs)	<b>BC406S</b>
<b>SEMESTER-IV</b>		<b>HRS/WK-4</b>
<b>CORE-6</b>		<b>CREDIT-4</b>

### **OBJECTIVE**

To impart knowledge about the principle and applications of various biochemical techniques

#### **UNIT I CHROMATOGRAPHY I [10 hrs]**

Paper chromatography, Thin layer chromatography, Column chromatography Gas liquid chromatography

#### **UNIT II CHROMATOGRAPHY II [10 hrs]**

Procedure and applications of Molecular sieve chromatography, Ion exchange chromatography, Affinity chromatography, HPLC, Reverse phase chromatography (elementary knowledge)

#### **UNIT III ELECTROPHORESIS [15 hrs]**

Electrophoresis-Factors affecting electrophoretic mobility, Tiselius moving boundary electrophoresis, Paper, Cellulose acetate, Gel electrophoresis: Polyacrylamide, SDS-PAGE. Blotting techniques- Southern Blot, Northern blot, Western blot.

#### **UNIT IV RADIO ISOTOPE TECHNIQUES I [10 hrs]**

Radio isotope Techniques: Atomic structure, isotopes, radiation, type of radioactive decay, half-life, and units of radioactivity. Detection and measurement of radioactivity – Methods based upon ionization -GM counter and Scintillation counter.

#### **UNIT V RADIO ISOTOPE TECHNIQUES II [15 hrs]**

Radio isotope Techniques: Auto radiography and isotope dilution techniques. Applications of radio isotopes in biology, clinical scanning and radio dating, Radio immuno assay. Biological hazards of radiation and its safety aspects.

### **TEXTBOOKS:**

1. Keith Wilson, and John Walker, (2010). Principles and Techniques of Practical Biochemistry. 7th edition, Cambridge University Press. UK.
2. Avinash Upadhyaye, and Nirmalendhe Nath, (2002). Biophysical Chemistry Principles and Techniques. 3rd edition, Himalaya Publishers, New Delhi.
3. Analytical Biochemistry by Asokan, 3rd edition , 2006.

### **REFERENCES:**

1. Introduction to Practical Biochemistry – Shawney, Randhir Singh, Narasa Pub, N. Delhi.
2. Subramanian, M.A. (2005). Biophysics : Principles and Techniques. MJP Publishers, Chennai.
3. Biochemistry Laboratory: Modern Theory and Techniques (2nd Edition) 2nd Edition by Rodney F. Boyer. 2011

<b>YEAR-III</b>	<b>MOLECULAR BIOLOGY (90 hrs)</b>	<b>BC507</b>
<b>SEMESTER-V</b>		<b>HRS/WK-6</b>
<b>CORE-VII</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To understand the basics of molecular biology.

### **UNIT I INTRODUCTION [15 hrs]**

DNA-genetic material-Griffith, Avery et al and Hershey and Chase experiment, C value paradox, Cot value, organization of chromosomes and nucleosomes, Euchromatin, heterochromatin, centromeres and telomeres (brief description), central dogma of molecular biology.

### **UNIT II REPLICATION [20 hrs]**

Replication-conservative and semiconservative- experimental proof for semiconservative replication-factors involved in prokaryotic and eukaryotic replication-DNA polymerases in prokaryotes and eukaryotes-inhibitors of replication-repetitive DNA-Highly repetitive, moderately repetitive and unique DNA sequences. satellite DNA, transposons(brief explanation)

### **UNIT III TRANSCRIPTION [20 hrs]**

Transcription-promoters, RNA polymerase in prokaryotes and eukaryotes-initiation, elongation and termination of transcription process in prokaryotes-inhibitors of transcription-post transcriptional modification of mRNA, tRNA and rRNA

### **UNIT 1V TRANSLATION [20 hrs]**

Genetic code-features and deciphering of genetic code, wobble hypothesis,translation- activation of amino acids, initiation, elongation and termination process in prokaryotes. Inhibitors of protein synthesis -post translational modification Operon concept-lac and trp operon.

### **UNIT V REPAIR [15 hrs]**

DNA repair-photoreactivation, Excision repair, recombination and SOS repair.Restriction endonucleases, SNP

## **TEXTBOOKS:**

1. David Friefelder,,"Molecular Cell Biology"( 2<sup>nd</sup> edition),Narosa Publishing House.
2. Lehninger,Nelson And Cox ,1982, " Principles Of Biochemistry", (4<sup>th</sup> ed)UK, Macmillan Worth Publishers.

---

**REFERENCES:**

1. Lehninger, Nelson And Cox ,1982, “ Principles Of Biochemistry”, (4<sup>th</sup> ed)UK, Macmillan Worth Publishers.
2. De Robertis EDP and De Robertis EMF,1987, “Cell and Molecular Biology”,(8<sup>th</sup> edition ), New Delhi, B.I.Waverly Pvt Ltd
3. Darnell J, Lodish H, Baltimore D,1986, “Molecular cell biology”, England, WH Freeman
4. L Stryer, ‘Biochemistry’, W.H.Freeman and Company, New York.
5. Benjamin Lewin , Genes VIII.
6. Donald Voet and Judith Voet, ‘Biochemistry’, JohnWiley and Sons, New York.

<b>YEAR-III</b>	<b>IMMUNOLOGY</b> <b>(90 hrs)</b>	<b>BC508</b>
<b>SEMESTER-V</b>		<b>HRS/WK-6</b>
<b>CORE-VIII</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To understand the structure and functions of immune system.

### **UNIT I CELLS OF IMMUNE SYSTEM [20 hrs]**

Introduction, characteristics of immune system, classification of immunity-innate and acquired immunity. Structure and function of primary and secondary lymphoid organs Structure and function of immune cells (macrophage, T cell, B cell, NK, KC, dendritic cell and APC), T and B cell mediated immune response. Phagocytosis, pinocytosis.

### **UNIT II ANTIGEN & ANTIBODY [20 hrs]**

Antigen-properties, epitope, paratope, specificity, cross reactivity, antigenicity, immunogenicity, haptens, adjuvants. Antibody-structure, specificity and distribution of antibodies. Different class and subclasses of immunoglobulins, clonal selection theory.

### **UNIT III COMPLEMENT & MHC [20 hrs]**

Complement components- complement cascade-classical, alternate and lectin pathway. Major Histocompatibility Complex (MHC)- Structure and function of MHC-I, II, III molecules. Transplantation - Graft - types - mechanism of graft rejection.

### **UNIT IV HYPERSENSITIVITY [15 hrs]**

Allergy and hypersensitivity-type I, II, III and IV, their clinical manifestations, autoimmune diseases-myasthenia gravis, rheumatoid arthritis, thyrotoxicosis and SLE.

### **UNIT V ANTIGEN -ANTIBODY INTERACTIONS [15 hrs]**

Antigen-antibody interaction-precipitation reaction, precipitation reaction in gel (double and radial immune diffusion). Agglutination reaction- widal, agglutination inhibition reaction, pregnancy test. Principle and application of immunoelectrophoresis, RIA and ELISA.

---

**TEXTBOOKS:**

- 1) Abbas, Lightman and Pober. W.B. Saunders, "Cellular and Molecular Immunology", 2<sup>nd</sup> edition, 1994.
- 2) Ananthanarayanan. K and Jayaraman Paniker, "Textbook of Microbiology", 1996.

**REFERENCES:**

- 1) I. Roitt. Essential Immunology. 10th ed. Blackwell Science, 2005
- 2) Richard A. Goldsby, Thomas J. Kindt and Barbara A. Osborne. Kuby Immunology. 4th ed. W. H. Freeman & Company, 2000.
- 3) Tizard. R, "Immunology-An introduction", Jan 1995.



<b>YEAR-III</b>	<b>MEDICAL BIOCHEMISTRY (90 hrs)</b>	<b>EBC509</b>
<b>SEMESTER-V</b>		<b>HRS/WK-6</b>
<b>ELECTIVE - I</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To understand biochemical basis of various diseases and disorders

### **UNIT I BASIC CONCEPTS OF CLINICAL BIOCHEMISTRY [15 hrs]**

Biological samples-Specimen collection-anticoagulant-preservatives for blood and urine-transport of specimens. normal and abnormal values of different parameters.

### **UNIT II DISEASES RELATED TO CARBOHYDRATE METABOLISM [15 hrs]**

Diabetes mellitus- definition-WHO criteria-classification of diabetes mellitus-signs,symptoms and complications-GTT- galactosemia,galactosuria,fructosuria.

### **UNIT III DISEASE RELATED TO AMINO ACID AND LIPID METABOLISM [20 hrs]**

Inborn errors of metabolism- phenylketonuria, alkaptonuria, albinism, cystinuria, fanconi syndrome. Exogenous and endogenous transport of lipids-chylomicron transport, VLDL transport-reverse cholesterol transport-atherosclerosis- fatty liver- risk and anti-risk factors.

### **UNIT IV ORGAN FUNCTION TEST [20 hrs]**

Liver function test-heme catabolism- jaundice- classification- biochemical findings-liver function test based on bile pigments- Vanderbergh test, Detoxification-hippuric acid excretion and BSP dye test, metabolism-galactose tolerance test, Prothrombin Time- Gastric function test-gastric contents, resting stage gastric analysis-stimulation test (histamine, pentagastrin) - FTM-AZURE-A test. Hypo and hyperacidity. Renal function test-renal concentration test-PSP dye test-urea, creatinine and inulin clearance test.

### **UNIT V DIAGNOSTIC ENZYMOLOGY [20 hrs]**

Plasma enzymes-functional and non-functional enzymes-isoenzymes-enzyme patterns in acute pancreatitis, liver diseases and myocardial infarction .

## **TEXTBOOKS:**

1. Textbook of Biochemistry for medical students-DM.Vasudevan, 5<sup>th</sup> edition,Jaypee publishers, 2008
2. Textbook of Medical. Biochemistry, Chatterjee, M.N. and Rana Shinde, 5<sup>th</sup> ed. Jaypee Medical Publishers, 2002.

---

**REFERENCES:**

1. Robert K. Murray, Daryl K. Grammer "Harper's Biochemistry", (25<sup>th</sup> Edition) Mc Graw Hill, Lange Medical Books.
2. Sathya Narayana U, 1999, "Biochemistry", (2<sup>nd</sup> Edition), Kolkata, Allied Publishers..
3. Mallikarjuna Rao N, 2002, " Medical Biochemistry", 2<sup>nd</sup> Edition, New Delhi, New Age International publishers
4. Thomas .M.Devlin , 1997, "Textbook of Biochemistry with clinical correlations", 4<sup>TH</sup> Edition, U,S, Wiley-Liss
5. Bhagavan.N.V(2004), "Medical Biochemistry", (4<sup>th</sup> ed) Noida, Academic press
6. Harrison, T.R. Fauci, Braunwalad, and Isselbaeher, "Principles of Internal Medicine, 1998, McGraw Hills

<b>YEAR-III</b>	<b>FOOD TECHNOLOGY</b>  (75 hrs)	<b>EBC509A</b>
<b>SEMESTER-V</b>		<b>HRS/WK-5</b>
<b>ELECTIVE - I</b>		<b>CREDIT-5</b>

**OBJECTIVE:**

To study the nature of food, spoilage, preservation and its applications.

**UNIT –I FOOD CONSTITUENTS AND ADULTERATION [20 hrs]**

**Constituents of food:** Introduction, water, carbohydrate, fat, oil, vitamins and minerals. Pulses, grams, vegetables and fruits-varieties, composition, nutritive value and cooking. Milk-kinds of milk, composition, nutritive value, pasteurization and homogenization. Food Adulteration: types of adulterants, common adulterants in foods, toxicants in foods, impact of food adulteration in humans.

**UNIT –II FOOD SPOILAGE [15 hrs]**

**Food spoilage:** Characteristic features, dynamics and significance of spoilage of different groups of foods - Cereal and cereal products, vegetables and fruits, meat poultry and sea foods, milk and milk products, packed and canned foods. Factors affecting growth & survival of microorganism in food, physical & chemical methods to control microorganism.

**UNIT –III FOOD PROCESSING AND PRESERVATION [20 hrs]**

**Food processing:** Principle and methods of food processing and preservation-freezing, heating, dehydration, canning, additives, fermentation, irradiation and osmotic pressure. Application of enzymes and microorganisms in food processing and preservation. Food Additives - Definition, types and functions, permissible limits and safety aspects.

**UNIT –IV INDUSTRIAL PRODUCTIONS OF FOODS [10 hrs]**

Yogurt preparation, Cheese varieties and its classification, cheese making, fermented vegetables, production of oil from soya beans. Fruit and vegetable juices, jams, production of beer, wine and vinegar

**UNIT -V LEGAL ISSUES AND GOVERNMENT NORMS [10hrs]**

Food regulations – History of Indian Food Regulations: BIS, ISI, FPO, PFA and FDA. Food Safety and Standards Act 2006. Food laws and quality control – HACCP, Codex alimentarius, PFA, FPO, MFPO, BIS, AGMARK and FSSAI. Legal aspects related to storage and disposal.

---

**TEXT BOOKS:**

- Gabriel Virella (1997), Microbiology and infectious disease, 3rd Ed, Ingraham international, New Delhi.
- John L Ingraham and Catherine A.Ingraham. Microbiology an introduction, 2rd Ed, Cengage learning, New Delhi
- Sivasankar,B.(2005),Food processing and preservation,3rd Ed, Prentice Hall India (P) Ltd.
- VijayaKhader (2009), Text book of food science and technology,5thEd, Indian council of Agricultural research.
- Avantina Sharma, Text book of food science and technology, 3rd Ed, CBS Publishers.

**REFERENCES:**

- Belitz, H.D. Grosch W et al., (2005). Food Chemistry. 4th edition, Springer Verlag.
- Adams, M.R. and M.G. Moss (2009): Food Microbiology, 1st edition, New AgeInternational (P) Ltd.
- Fellows, P.J. (2005). Food processing technology: Principle and Practice. 2nd Ed. CRC Publishers.
- BibekRay, Fundamental food microbiology, 3rd edition, PRC Press, Washington D.C.
- James, M.J. (2000) Modern Food Microbiology, 2<sup>nd</sup> Edition. CBS Publisher.

<b>YEAR-III</b>	<b>PLANT BIOCHEMISTRY ( 60 hrs)</b>	<b>EBC510A</b>
<b>SEMESTER-V</b>		<b>HRS/WK-4</b>
<b>ELECTIVE-II</b>		<b>CREDIT-3</b>

**OBJECTIVE:**

To understand the basics of plant biochemistry.

**UNIT I PLANT CELL & ABSORPTION OF MINERAL SALTS [10 hrs]**

Discovery and definition of plant cell . Mechanism of absorption .Ion exchange passive absorption. Active absorption .The carrier concept. Donnan's equilibrium.

**UNIT II NATURAL GROWTH HORMONES IN PLANTS [10 hrs]**

Structure ,biosynthesis ,mode of action &physiological effects of auxins, giberellins, cytokinins and IAA.

**UNIT III PHOTOSYNTHESIS PIGMENTS [15 hrs]**

Structure &synthesis of chlorophyll, phycobilins and carotenoids. Photosynthesis photosystem –I &II.Light absorption,Hill reaction, Red drop & Emerson's enhancement effect.Cyclic and non-cyclic photophosphorylation,calvin cycle.Factors and regulation of photosynthesis.

**UNIT IV SECONDARY METABOLITES [15 hrs]**

Secondary metabolites in plants –classification & function of alkaloids, terpenoids, tannins, lignin and pectin.

**UNIT V NITROGEN FIXATION [10 hrs]**

Nitrogen fixation-symbiotic&non symbiotic, nitrogenase enzyme-nodule development carbon dioxide fixation, glyoxalate cycle.

**TEXTBOOKS :**

- 1.Jain.V.K., 'Fundamentals of Plant Physiology', Revised 1<sup>st</sup> edition 2005,S.Chand & Company Ltd
- 2.Pandey.S.N.,and Sinha.B.K.,Plant Physiology,1999,Vikas Publishing House.

**REFERENCES:**

- 1.Solisbury and Ross,Plant Physiology,3<sup>rd</sup> edition,CBS Publishers and Distributors.
- 2.Hans-Walter Held,Plant Biochemistry, 3<sup>rd</sup> edition,Elsevier India Pvt.Ltd.
- 3.Bonner and Varner, Plant Biochemistry, 3<sup>rd</sup> edition,Academic Press.

<b>YEAR-III</b>	<b>PHARMACEUTICAL BIOCHEMISTRY AND BIOINFORMATICS ( 60 hrs)</b>	<b>EBC510B</b>
<b>SEMESTER-V</b>		<b>HRS/WK- 4</b>
<b>ELECTIVE-II</b>		<b>CREDIT-3</b>

**OBJECTIVE:**

To gain the knowledge about the essential information on the drugs

**UNIT I DRUGS [10 hrs]**

Definition, source and Nature of common drugs-Antimalarials drugs - Chloroquine, quinine, Hydroxychloroquine, Amodiquine. Antifungal drugs- Chlorophenesin, Griesofulvin and Candicidin. Antiviral agents- Idoxuridine, Acyclovir, Methisozone, Amantadine hydrochloride-(structure not required)

**UNIT II METABOLISM OF DRUGS [15 hrs]**

Factors affecting metabolism, site of metabolism, routes of elimination (kidney, biliary excretion) Phase-I-oxidation, microsomal oxidation, microsomal reduction, non-microsomal metabolism, hydrolysis Phase-II Conjugation-glucuronide conjugation, acylation, methylation, mercapturic acid formation and sulphate conjugation

**UNIT III ANTIOXIDANTS [10 hrs]**

Antioxidant defense system-oxygen dependent and independent (nos) antioxidant defence enzymes SOD, Catalase, Glutathione peroxidase, Glutathione reductase and lipid peroxidation

**UNIT IV INTRODUCTION TO BIOINFORMATICS [15 hrs]**

Bioinformatics-definition, application, challenges and opportunities. internet, www, programming Languages-HTML, JAVA, Perl and Python. operating systems- Windows, UNIX & LINUX. Database-types, classification, sequence formats, DBMS, RDBMS, SQL, (brief description), Nucleic Acid Database-NCBI, EMBL & DDBJ. Protein Sequence Database-PIR, SWISS-PROT, Structure database-PDB, CDS, ORF, EST, motifs, domain and annotation

**UNIT V SEQUENCE ALIGNMENT [10 hrs]**

Sequence alignment-algorithm, global and local alignment, sequence alignment methods, pairwise alignment-dot matrix, dynamic programming, FASTA & BLAST. multiple sequence alignment-HMM & CLUSTAL (brief description) Homology, orthology, paralogs & xenologs, softwares used for phylogenetic analysis

**TEXTBOOKS:**

---

S.Ignacimuthu,"Basic Bioinformatics",2005,Narosa publications

**REFERENCES:**

1. David R.Westhead,J.Howard Parish & Richard"Instant notes on bioinformatics" 2003,viva book Pvt ltd
2. K.Mani & N.Vijayaraj "Bioinformatics- a practical approach" ,2004,Aparna publications,Coimbatore
3. Lubert Styrer,Biochemistry ,4<sup>th</sup> editon, W.H.Freeman and Company, New York.
4. G.R.Chatwal, Pharmaceutical chemistry, Himalayaa Publishing House.
5. L.M Atherden,Textbook of Pharmaceutical chemistry ,8<sup>th</sup> edition
6. Joseph R.Dipalma,,G.John diGregorio, Basic Pharmacology in Medicine,3th edition

<b>YEAR-III</b>	<b>HUMAN PHYSIOLOGY</b> (90 hrs)	<b>BC611</b>
<b>SEMESTER-VI</b>		<b>HRS/WK-6</b>
<b>CORE-X</b>		<b>CREDIT-4</b>

**OBJECTIVE:**

To understand the structure and functions of the organ systems in the body

**UNIT I BLOOD AND CIRCULATORY SYSTEM [15 hrs]**

Composition of blood –functions , types of blood cells, morphology and function, Blood groups - ABO group and Rh group. Composition of lymph, circulatory system-Heart-- basic anatomy,cardiac cycle, cardiac out put ,pace maker(general circulation).

**UNIT II DIGESTION [20 hrs]**

Definition, digestive system (alimentary canal) - chemical process of digestion. Role of bile salt in Digestion, Mechanism of HCl secretion in stomach, Digestion and absorption of carbohydrates, proteins, and lipids.

**UNIT III RESPIRATORY SYSTEM AND EXCRETORY SYSTEM [20 hrs]**

Respiration, types of Respiration , respiratory medium, Respiratory system of man, Transport of O<sub>2</sub> and CO<sub>2</sub>. Role of Hb in transport of O<sub>2</sub> and CO<sub>2</sub> . Oxygen Dissociation curve, Bohr effect, Chloride shift. Kidney of man, structure of nephron- Formation of urine – Ultra filtration, Reabsorption and Secretion.

**UNIT IV NERVOUS SYSTEM [20 hrs]**

Neuron, types of neuron , conduction of nerve impulse, synaptic transmission ,neuro muscular junction, reflex action. Human brain-anatomy, meninges, cerebrum, brain stem, cerebellum, spinal cord and function.

**UNIT V MUSCLE [15 hrs]**

Introduction, types of muscle, structure and their functions. Ultra structure of skeletal muscle –light band, dark band, thick filament, thin filament-, myofilament, contraction and relaxation of skeletal muscle.

**TEXTBOOKS:**

- 1.A Text book of Animal Physiology , KA Goel, KV Sastri, Rastogi publications,Meerut.
2. Textbook of Medical Physiology by A.C. Guyton and J. E. Hall, W.B.Saunders Publication, 9th Edition, 1996



---

**REFERENCES:**

- 1.Human Physiology, 2<sup>nd</sup> edition –BJ Meyer, Hs Meij, AC Meyer, AITBS Publishers and distributon.
- 2.Cell Physiology by Giese, 5<sup>th</sup> edition, W .B Saunders company, Tokyo, Japan.
- 3.Animal Physiology and biochemistry –RA Agarval, Anil. K,Srivastav, Kaushal Kumar,  
S .Chand &CO.,
- 4.Review of Medical Physioly, Ganong W. E.. 21<sup>st</sup> ed. Mc Graw Hill, 2003.

<b>YEAR-III</b>	<b>BIOTECHNOLOGY</b> (90 hrs)	<b>BC612</b>
<b>SEMESTER-VI</b>		<b>HRS/WK-6</b>
<b>CORE-XI</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To provide an insight into the basic concepts of biotechnology.

### **UNIT I VECTORS [15 hrs]**

Biotechnology-definition, history and scope. Restriction and modification enzymes, vectors, plasmids-pBR322,Ti plasmid, bacteriophages-lambda, phage M<sub>13</sub>,cosmids,YAC,shuttle vectors.

### **UNIT II ANIMAL CELL CULTURE [20 hrs]**

Animal cell culture- requirements,sterilization &applications.culture media-natural and artificial,properties& use of serum and serum-free media,cell adhesion molecules.Primary cell culture-mechanical disaggregation,enzymatic disaggregation and primary explants technique (brief description).Cell lines-finite and continuous.subculture-mono layer and suspension cultures.Transformation of cell-characteristics,types of culture process-batch,fed batch, ,semi-continuous ,continuous perfusion and continuous flow culture (brief description).

### **UNIT III TRANSGENESIS [20 hrs]**

Production of vaccines in animal cells-traditional and recombinant vaccines-subunit vaccines-Hepatitis B, Vector recombinant vaccines, DNA and RNA vaccines. Production and Applications of monoclonal antibodies. Transgenic Animals-techniques and applications -transgenic mice and sheep.

### **UNIT IV PLANT TISSUE CULTURE [20 hrs]**

Totipotency, tissue culture-media, composition, nutrients, growth regulators, regeneration of plants-organogenesis and somatic embryogenesis, callus and cell suspension culture, micropropagation, production of haploid plants, protoplast isolation, fusion and regeneration, production of secondary metabolites, transgenic plants.

### **UNIT V FERMENTATION [15 hrs]**

Fermentation -fermenter-common features and operation for a conventional bioreactor, classification of fermentation processes-type 1, type 2 and type 3-fermentation process-factors affecting fermentation process-media for fermentation – synthetic and crude media.

---

**TEXTBOOKS:**

- 1.Sathya Narayana U,1999, "Biotechnology", (2<sup>nd</sup> Edition), Kolkata,Allied Publishers..
- 2.P.K.Gupta,"Biotechnology and Genomics",2004,Rastogi Publications.

**REFERENCES:**

- 1.Bernard, Glick Jack.R,Pasternak.J,Molecular Biotechnology-Principle and Application of Recombinant DNA, 3<sup>rd</sup> edition,2003,Library of Congress Cataloging in Publication Data.
- 2.Dubey.R.C.,A Textbook of Biotechnology,S.Chand & Company Ltds.,
- 3.Prakash.S.Lohar,Biotechnology,MJP Publishers,Chennai.

<b>YEAR-III</b>	<b>ENDOCRINOLOGY</b> (90 hrs)	<b>EBC613</b>
<b>SEMESTER-VI</b>		<b>HRS/WK-6</b>
<b>ELECTIVE-III</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To provide an insight into the structure and functions of hormones.

### **UNIT I HORMONES [15 hrs]**

Hormones-definition, classification-both receptor and chemical classification-transport-functions-feedback regulation.

### **UNIT II SECONDARY MESSENGERS [15 hrs]**

Different mechanisms of signal transduction,secondary messengers-cAMP mediation, calcium and DAG mediation, cGMP mediation,ionic conduction.

### **UNIT III PITUITARY HORMONES [20 hrs]**

Hormones of anterior pituitary-FSH,LH,TSH and its functions.Posterior pituitary-oxytocin and vasopressin with its functions. Hormones of hypothalamus.

### **UNIT IV THYROID HORMONES [20 hrs]**

Thyroid hormones-structure-functions-hypothyroidism-cretinism, myxedema, simple goiter, grave's disease. Parathyroid hormones-regulation of calcium homeostasis by PTH and calcitonin. Hormones of pancreas- insulin & glucagon.

### **UNIT V STEROID HORMONES [20 hrs]**

Hormones of adrenal cortex-cortisol-biosynthesis (structure not required) and its functions, cushing's syndrome, addison's disease-aldosterone-biosynthesis and its functions- renin-angiotensin mechanism, conn's syndrome. Medullary hormones-biosynthesis of epinephrine, norepinephrine. dopamine and its metabolic functions,pheochromocytoma. Sex steroids-male sex hormones-biosynthesis and its metabolic functions-female sex hormones- biosynthesis and its metabolic functions.

## **TEXTBOOKS:**

- 1.Textbook of Medical. Biochemistry, Chatterjee, M.N. and Rana Shinde, 5<sup>th</sup> ed. Jaypee Medical Publishers,2002.
- 2.Textbook of Biochemistry for medical students-DM.Vasudevan, 5<sup>th</sup> edition, Jaypee Publishers, 2008
- 3.Robert K. Murray, Daryl K. Grammer "Harper's Biochemistry", (25<sup>th</sup> Edition) Mc Graw Hill, Lange Medical Books.

---

**REFERENCES:**

1. Sathya Narayana U,1999, "Biochemistry", (2<sup>nd</sup> Edition),Kolkata,Allied Publishers..
2. Mallikarjuna Rao N,2002, " Medical Biochemistry",2<sup>nd</sup> Edition, New Delhi,New Age International Publishers
3. Thomas .M.Devlin ,1997,"Textbook of Biochemistry with clinical correlations",4<sup>th</sup> Edition,U,S, Wiley-Liss
4. Ramakrishnan S, Prasanna K.G. and Rajan R,1980, " Textbook of Medical Biochemistry",3<sup>rd</sup> Edition,Chennai, Orient Longman
5. Bhagavan.N.V(2004),"Medical Biochemistry",(4<sup>th</sup> ed) Noida, Academic Press

<b>YEAR-III</b>	<b>BIostatISTICS AND CLINICAL RESEARCH</b> (75 hrs)	<b>EBC613A</b>
<b>SEMESTER-VI</b>		<b>HRS/WK-5</b>
<b>ELECTIVE-III</b>		<b>CREDIT-5</b>

**OBJECTIVES:**

- To provide sufficient background to interpret statistical results in research papers.
- To ensure the students with requisite knowledge to pursue a career in the clinical research industry.

**UNIT I DATA COLLECTION AND PRESENTATION [15hrs]**

Introduction: Collection of data, primary data, secondary data, methods of data collection. Processing of data- classification and tabulation of statistical data, Frequency Distribution: Simple and Cumulative, Diagrammatic presentation of data - Histogram, Bar chart, Frequency polygon and Pie chart, graphical presentation of data- line graph.

**UNIT II MEASURES OF CENTRAL TENDENCY [15 hrs]**

Measurement of Central Value: Mean, Median, Mode, Geometric Mean (G.M) and Harmonic Mean (H.M), Measures of Dispersion: Range, Quartile deviation, Mean deviation, Standard deviation.

**UNIT III STATISTICAL ANALYSIS [15hrs]**

Test for correlation and regression coefficients, Chi-square test for goodness of an independence of attributes. F-test for equality of variances, ANOVA – one way classification.

**UNIT IV CLINICAL RESEARCH [15hrs]**

Introduction to clinical research, origin and history of clinical research, Biochemical investigations in clinical research, difference between clinical research and clinical practice, types of clinical research, phases of clinical research, career in clinical research.

**UNIT V DRUG DEVELOPMENT [15 hrs]**

Drug discovery and development process, Preclinical testing, Clinical trials, ethical issues, new drug application and approval. Pharmacokinetics, Pharmacodynamics and Pharmacogenomics.

**TEXT BOOKS**

- Green. R. H. 1979. ‘Sampling Design and Statistical Methods for Environmental Biologists’ .John Wiley & Sons.
- Gupta.S.C& Kapoor. 1978.V.K. “Fundamental of Applied Statistics” (2<sup>nd</sup>ed), MJP Publishers.
- Satoskar RS, bhandarkar SD, AinapureSS,E.Padmini, 2003.Biochemical calculations and Biostatistics. Books and Allied (P) Ltd.Pharmacology&Pharmacotherapeutics. 18<sup>th</sup> ed. Mumbai: popular prakashan: 376.

---

**REFERENCES**

- Thomas Glover, Kevin Mitchell.2001.' Introduction to Biostatistics', 1<sup>st</sup> ed. McGraw Hill Science
- Dr N .Gurumani,2015. "An Introduction toBiostatistics",MJP Publishers
- Wilson & Walker, 2000. Principles and Techniques in Practical Biochemistry' 5<sup>th</sup> ed.. Cambridge Univ. Press.
- Clinical Research Practice and prospects-T.K.Pal,Sangita Agarwal,1<sup>st</sup> edition.
- Essential of Medical Pharmacology, Sixth edition-KD.Thripathi MD, Jaypee brothers medical publishers (P) Ltd. St Louis (USA).

<b>YEAR-III</b>	<b>HOSPITAL MANAGEMENT</b> ( 60 hrs)	<b>EBC614A</b>
<b>SEMESTER-VI</b>		<b>HRS/WK-4</b>
<b>ELECTIVE-IV</b>		<b>CREDIT-3</b>

**OBJECTIVE:**

To provide an insight into the principles of management in hospitals.

**UNIT I INTRODUCTION TO PUBLIC HEALTH [10 hrs]**

Concepts of health, disease and diagnosis, principles of public health, role of hospitals, role of administrator ,hospital planning , medical terminology, medical records science, medical communication

**UNIT II HUMAN RESOURCE MANAGEMENT [10 hrs]**

Manpower planning ,recruitment procedures, managing technical,clinical and other personnel-specialists and interdisciplinary services,human resources connected with advanced diagnostics and therapeutics-time management.

**UNIT III INVENTORY MANAGEMENT [10 hrs]**

Inventory control and purchase management,support and utility services-pharmacy hospital equipment,function,purchase,service and maintenance-hospital policies, financial management

**UNIT IV LAW AND HOSPITALS [15 hrs]**

Laws in relation to hospital,medical care,diseases,birth and death, insurance, reimbursements, subsidies and third party payments-compensations, litigations, redressal of complaints.

**UNIT V QUALITY ASSURANCE AND INFORMATION MANAGEMENT [15 hrs]**

Quality of hospital services, assurance of professional competence, hospital waste management, management of crisis situations, emergencies and disasters. Hospital information services, networking with multiple organizations, information sharing, telemedicine-academic services, training & conferences .

**TEXTBOOKS :**

1. Gupta, Hospital & Health care Administration, 2000, Jaypee Brothers Medical Publishers, New Delhi
2. Jha, S.M., Hospital Management, 2003, Himalaya publishing house,New Delhi.



---

## REFERENCES

1. Mohd.Faisal Khan, Hospital Waste Management, 2004, Kanishka publishers, New Delhi.
2. Shakti Gupta & Sunil Gupta, Hospital Stores Management – An Integrated Approach, 2000, Jaypee Brothers Medical Publishers, New Delhi.
3. Collin Grant, "Hospital Management'
- 4.S.L.Goel and R.Kumar,'Hospital Administration and Management'
- Howard.S.Rowland and Beatrice.S.Rowland,"Hospital Administration'
- 5.Allers Louise, 'Management and Organisation'
- 6.Sahini.A,'Hospital and Health Administration"
- 7.Klinobol.K,"Public Health Development and Administration'
- 8.Lefournean Charles,"The Hospital Administrator"



---

## REFERENCES

1. Henry, John Bernard, Todd Sanford and Davidson, 2002. Clinical diagnosis and management by laboratory methods. W.B. Saunders & Co.
2. Fischbach Francis A, 2003. Manual of laboratory and diagnostic tests. Philadelphia, J.B. Lippincott & Co, N.Y.
3. Gradwohls, 2000. Clinical laboratory methods and diagnosis Alex.C. Sonnenwirth & Leonard Jarret. M.D.B.I. Publications, New Delhi,
4. Sood, R, 2005, Medical Laboratory methods and interpretation, Jaypee Brothers Medical Publications, New Delhi.

---

## ALLIED PAPERS

<b>I B.Sc MICROBIOLOGY</b>	<b>BASIC BIOCHEMISTRY (75 hrs)</b>	<b>ABC101</b>
<b>SEMESTER-I</b>		<b>HRS/WK-5</b>
<b>ALLIED-1</b>		<b>CREDIT-3</b>

### OBJECTIVE

To understand the structure and functions of biomolecules

### UNIT I CHEMISTRY OF CARBOHYDRATES [20 hrs]

Occurrence, Definition, structure : linear and ring forms (Haworth formula), classification of carbohydrates; Monosaccharides (Glucose , Fructose), Disaccharides (Lactose and Sucrose), Physical properties – Muta rotation, stereo isomerism and optical isomerism chemical properties-oxidation, reduction and osazone formation. Polysaccharides: starch and cellulose- structure and functions.

### UNIT II AMINOACIDS [15 hrs]

Aminoacids- structure and classification based on structure. Standard and non standard amino acids, essential and non essential amino acid. Physical properties: Acid base properties; isoelectric points and zwitter ions. General reactions of amino acids – Edman's reaction, Sanger's reaction, reaction with Dansyl chloride, Van Slyke reaction and Ninhydrin reaction.

### UNIT III CHEMISTRY OF PROTEINS [10 hrs]

Definition, classification of proteins based on size, solubility, chemical composition functions , structure of proteins- peptide bond, primary, secondary, tertiary and quaternary structure of proteins, forces that determine folding and conformation and structural organization, Physical properties: salting in and salting out and denaturation.

### UNIT IV CHEMISTRY OF NUCLEIC ACIDS [15 hrs]

Definition, Nucleic acid- base, Nucleotides and Nucleosides, phosphodiester linkage; Nucleic acid types –DNA and RNA; structure- double helical structure of DNA; Denaturation , T<sub>m</sub> and hyperchromicity structure of RNA; tRNA, mRNA and rRNA.

---

**UNIT V CHEMISTRY OF LIPIDS****[15 hrs]**

Introduction, definition and classification of lipids- simple, compound(phospholipids) and derived lipids (cholesterol).Classification and nomenclature of fatty acids – saturated fatty acids; Butyric and stearic acid, unsaturated fatty acids ; oleic, linoleic and linolenic acid. Physical property-emulsification. Chemical properties- saponification number, Rancidity, acid number, Iodine number and Reichert – Meissl number.

**TEXTBOOKS :**

1. Dr.A.C.DeB,1983, “Fundamentals of biochemistry” 8<sup>th</sup> edition, Kolkata, New Central Book Agency
2. J.L.Jain, Sanjay Jain and Nitin Jain,1997, “Fundamentals of Biochemistry”6<sup>th</sup> Edition,New Delhi, S.Chand& company Ltd

**REFERENCES:**

1. Lehninger , David L.Nelson, Michael M.Cox, 1982, “Principles Of Biochemistry” , (4<sup>th</sup> ed )UK,Macmillan Worth Publishers.
2. Robert K. Murray, Daryl K. Grammer “Harper’s Biochemistry”,(25<sup>th</sup> Edition) Mc Graw Hill, Lange Medical Books.
3. Sathya Narayana. U,1999, “Biochemistry”, (2<sup>nd</sup> Edition),Kolkata,Allied Publishers..
4. Mallikarjuna Rao N,2002, “ Medical Biochemistry”,2<sup>nd</sup> Edition, New Delhi, New Age International Publishers
5. T.N.Pattabiraman ,1993“Principles of Biochemistry” ,( 5<sup>th</sup> edition) , Bangalore,Gajanana book Publishers and Distributors

<b>I B.Sc MICROBIOLOGY</b>	<b>ADVANCED BIOCHEMISTRY (75 hrs)</b>	<b>ABC202S</b>
<b>SEMESTER-II</b>		<b>HRS/WK-5</b>
<b>ALLIED-2</b>		<b>CREDIT-4</b>

## **OBJECTIVE**

To understand biochemical basis of various diseases and disorders

### **UNIT I METABOLISM [20 hrs]**

\*Glycolysis – Aerobic & Anaerobic – key enzymes and energetic \*TCA –key enzymes and energetics – \*HMP shunt, \*Glycogenesis, \*Glycogenolysis, and \*Gluconeogenesis. \*Urea cycle – (\* structure not required).

### **UNIT II ENZYMES [15 hrs]**

Definition – Classification of Enzymes – Mechanism. of Enzyme action – Lock & key & induced fit model. Specificity – Factors affecting enzyme activity – pH, temperature & substrate concentration. MM Equation. Allosteric enzymes Enzyme Inhibition – Irreversible – Reversible- competitive, uncompetitive, non competitive (Kinetics not required).

### **UNIT III METABOLIC DISORDERS [15 hrs]**

Jaundice- Classification – Biochemical findings-DM – Classification – Complications – Diagnosis – Treatment – Gout – Dehydration – definition, causes, symptoms & prevention.

### **UNIT IV DISORDERS OF AMINO ACID METABOLISM [10 hrs]**

Inborn errors of metabolism –Albinism-Phenylketonuria –Alkaptonuria, Maple's syrup and Hartnup's disease .

### **UNIT V CLINICAL BIOCHEMISTRY [15 hrs]**

Enzymes –isoenzymes-functional and non functional enzymes-diagnostic enzymes associated with liver disorder and myocardial infarction.  
Blood glucose, urea, uric acid, TG, ,serum alkaline phosphatase ,calcium, total protein, electrolytes-significance and normal levels(Brief Discussion)

---

**TEXT BOOKS:**

1. Deb, A.C (2004). Fundamentals of Biochemistry. 8th Edition, New Central Book Agency,
2. Jain, J.L & Jain, (2005) Fundamentals of Biochemistry. Sixth Edition,S.Chand& Company, New Delhi.

**REFERENCES:**

1. Nelson, D. L. & Cox, M. M. Lehninger Principles of Biochemistry. Freeman, 5th edn, 2008.
2. Robert Murray, Bender, (2012) Harper's Illustrated Biochemistry.McGraw Hill
3. U.Sathayanarayana,(2006). Biochemistry. 3rd Edition by Books and Allied (P) Ltd., India
4. Thomas .M.Devlin ,1997,"Textbook of Biochemistry with clinical correlations",4th Edition,US, Wiley-Liss
5. Ramakrishanan S, Prasannan K.G. and Rajan R,1980, " Textbook of Medical Biochemistry",3<sup>rd</sup> Edition,Chennai, Orient Longman
6. Bhagavan.N.V (2004),"Medical Biochemistry",(4<sup>th</sup> ed) Noida, Academic press

---

<b>II B.Sc PHYSICS</b>	<b>BIOPHYSICS (75 hrs)</b>	<b>ABC401</b>
<b>SEMESTER-IV</b>		<b>HRS/WK-5</b>
<b>ALLIED-3</b>		<b>CREDIT-4</b>

### **OBJECTIVE**

To understand the structure and functions of biomolecules

#### **UNIT I NUCLEIC ACIDS [15 hrs]**

Fundamental units of nucleic acids – purine pyrimidine, nucleosides and nucleotides. DNA-double helical structure, Watson Crick model and base pairing. Nucleic acid-denaturation and annealing of DNA, DNA- carrier of genetic information by an experimental proof- RNA- Types - central dogma (DNA –RNA-Protein)

#### **UNIT II PROTEINS [15 hrs]**

Classification of amino acids based on structure, Classification of proteins, Zwitter ion, pH dependent ionization of amino acids, Structure of proteins (primary, secondary, tertiary and quaternary). Different types of bonds that stabilize the protein. Denaturation and renaturation of proteins. Biological functions of fibrous proteins (Eg-collagen) ,globular protein (Hemoglobin) and lipoproteins

#### **UNIT III MEMBRANE BIOPHYSICS [15 hrs]**

Nerve cell-structure, bioelectrical and biochemical conduction of nerve impulses, Membrane potential, Resting potential, action potential-bioelectrical phenomenon of ECG and EEG-Molecular basis of muscle contraction

#### **UNIT IV RADIATION BIOPHYSICS [15 hrs]**

Radioactive isotopes, types of radioactive decay, units of radioactivity, Biological effects of radiation –Applications of radioisotopes in biology (tracing metabolic pathways, isotope dilution techniques radio dating and RIA) – Detection and measurement of radioactivity-GM counter and scintillation counter, Autoradiography.

#### **UNIT V BIOINSTRUMENTATION [15 hrs]**

Principle and biological application of UV-VIS Spectrophotometry, Spectrofluorimetry, X-ray Diffraction and Flame photometer

### **TEXTBOOKS:**

1. P.Narayanan , "Essentials of Biophysics", 2<sup>nd</sup> ed , New Age Publishers, New Delhi



---

2. Dr. A.C. Deb, 1983, "Fundamentals of biochemistry" 8<sup>th</sup> edition, Kolkata, New Central Book Agency

**REFERENCES:**

1. M.A. Subramanian, "Biophysics- Principles And Techniques", MJP publishers, Chennai
2. M.V. Volbenshtein, "Biophysics", MIR publishers, Moscow, 1983
3. William Huges, "Aspects of biophysics", John Wiley and sons, N.Y, 1979
4. L.E. Ackermann, "Biophysical Science", L.B.E. Ellis And Williams, 1979
5. J.L. Jain, Sanjay Jain and Nitin Jain, 1997, "Fundamentals of Biochemistry", 6<sup>th</sup> Edition, New Delhi, S.Chand & company Ltd

---

## **PRACTICAL SYLLABUS**

### **ABCP201- ALLIED PRACTICAL SYLLABUS (One year)** (For Microbiology)

#### **1. VOLUMETRIC ANALYSIS**

1. Estimation of Glycine by formal titration method
2. Estimation of Ascorbic acid using dichlorophenol indophenol dye as link solution.
3. Estimation of Glucose by Benedict's Method.
4. Estimation of Iron.

#### **2. QUALITATIVE ANALYSIS**

1. Qualitative analysis of carbohydrates  
Glucose, fructose, Arabinose, maltose, Lactose, sucrose and starch
2. Qualitative analysis of Amino acids  
Tyrosine, Tryptophan, Arginine, Histidine and Cysteine

#### **3. NUCLEIC ACID EXTRACTION (Demonstration)**

1. Isolation of DNA
2. Isolation of RNA

#### **4. BIOCHEMICAL ANALYSIS (Demonstration)**

Amino acids by paper chromatography

---

## **PRACTICAL SYLLABUS**

### **ALLIED PRACTICAL SYLLABUS (One year)** (For Microbiology)

#### **QUALITATIVE ANALYSIS**

1. Qualitative analysis of Carbohydrates ( Glucose, Fructose ,Sucrose, Lactose , Maltose, Starch).
2. Qualitative analysis of Aminoacids ( Arginine, Tryptophan, Tyrosine, Histidine).
3. Qualitative analysis of urine

#### **FOOD ANALYSIS**

4. Preparation of starch from potatoes
5. Preparation of casein from milk
6. Preparation of albumin from milk
7. Determination of moisture content of food material
8. Determination of ash content of food material
9. Estimation of protein by Lowry's method (demonstration )

#### **VOLUMETRIC ANALYSIS**

10. Estimation of Ascorbic acid using dichlorophenol indophenol dye as link solution
11. Estimation of Glycine by Sorenson's formal titration
12. Estimation of Glucose by Benedict's method.

#### **HEMATOLOGY**

13. Estimation of hemoglobin by Sahli's method
14. Estimation of ESR
15. Separation of plasma and serum from whole blood.
16. Determination of Bleeding time
17. Determination of clotting time.
18. Investigation of sugar in urine sample.

---

**MAIN PRACTICAL SYLLABUS-1  
(I & II SEMESTER)**

**VOLUMETRIC ANALYSIS**

1. Estimation of Glycine by formal titration method
2. Estimation of ascorbic acid using dichlorophenolindophenol dye as link solution
3. Determination of Saponification value of an edible oil
4. Determination of acid number of an edible oil
5. Determination of iodine value of an edible oil
6. Estimation of chloride by Mohr's method and Volhard's method
7. Estimation of reducing sugar from biological fluids by benedict's method
8. Titration curve of amino acids

**BIOCHEMICAL PREPARATION**

9. Preparation of albumin from egg
10. Preparation of albumin from milk
11. To find out the moisture and water content in food stuffs.

**QUALITATIVE ANALYSIS**

12. **Qualitative analysis of carbohydrates** - Glucose, fructose, arabinose, maltose, lactose, galactose, dextrin, mannose, sucrose and starch
13. **Qualitative analysis of aminoacids** - Tyrosine, tryptophan, arginine, Histidine, Proline and cysteine

**SPOTTERS.**

14. Cell division identification ( mitosis & meiosis)
15. BMI calculation

---

**BCP402 - MAIN PRACTICAL II  
(III & IV SEMESTER)**

**1. PREPARATION OF BUFFERS**

Saline  
Bicarbonate buffer  
Phosphate buffer  
Tris buffer

**2. FOOD AND BIOCHEMICAL ANALYSIS**

Carbohydrate content  
Protein content  
Fibre content  
Water content  
Ash content

**3. COLORIMETRIC ANALYSIS**

Estimation of proteins by Biuret method  
Estimation of phosphorous –Fiske and Subarrow method  
Estimation of DNA  
Estimation of RNA

**4. BIOCHEMICAL ANALYSIS (Demonstration)**

Aminoacids by paper chromatography  
Lipids by thin layer chromatography  
SDS-PAGE electrophoresis

**5. BIOCHEMICAL PREPARATION**

Preparation of starch from potatoes  
Preparation of casein and lactalbumin from milk  
Preparation of albumin from egg

**6. VOLUMETRIC ANALYSIS**

Estimation of iron, copper, oxalate, potassium dichromate  
And calcium

**PRACTICAL MARKS: 60**

Volumetric analysis	- 24
Biochemical preparation/	- 20
Colorimetric analysis	
Spotters	- 6
Record	- 10

---

## MAIN PRACTICAL SYLLABUS-III

### 1.COLORIMETRIC ESTIMATION

- a.Estimation of creatinine by Jaffe's method
- b.Estimation of urea by Diacetyl Monoxime method.
- c.Estimation of DNA.
- d.Estimation of RNA.

### 2.ELECTROPHORETIC TECHNIQUES

Separation of protein by SDS-PAGE and Agarose.

### 3.EXPERIMENTS ON ENZYMES BY COLORIMETRY

Effects of pH,temperature and substrate concentration for amylase and urease.

### 4.HAEMATOLOGY

RBC count,PCV,ESR,total and differential WBC count

---

## MAIN PRACTICAL SYLLABUS-IV

### 1. COLORIMETRIC ESTIMATION

- a. Estimation of glucose by
  - i. Folin Wu and
  - ii. Ortho toluidine methods
- b. Estimation of albumin and A/G ratio in serum.
- c. Estimation of cholesterol by Zak's method
- d. Estimation of protein by lowry method
- e. Estimation of protein concentration by  $A_{280\text{ nm}}$
- f. Estimation of purity of DNA

### 2. ENZYME ASSAY

- a. Assay of activity of alkaline phosphatase in serum.
- b. Assay of activity of acid phosphatase in serum.
- c. Estimation of SGOT and SGPT

### 3. URINE ANALYSIS

- a. Collection of urine sample.
- b. Qualitative analysis of urine for normal and pathological conditions.

### 4. PREPARATION OF SOLUTIONS

Normal, molar, percentage solution

### REFERENCE BOOKS:

1. Practical Clinical Biochemistry-Harold Varley, CBS, New Delhi.
2. Medical Laboratory Technology- Kanai L. Mukherjee, Tata McGraw Hill Publication and Co. Ltd., Vol I, II and III.
3. Clinical Chemistry-Ranjana Chawla.
4. Laboratory manual in Biochemistry-Jayaraman.
5. Biochemical methods-S. Sadasivam and Manickam.
6. Introduction to Practical Biochemistry-David T. Plummer

---

**ABCP401 - ALLIED BIOPHYSICS  
PRACTICAL SYLLABUS  
(IV semester)**

**Volumetric Analysis**

1. Estimation of Glycine by formal titration method
2. Estimation of Ascorbic acid using dichlorophenol indophenol dye as link solution.
3. Estimation of Glucose by Benedict's Method.
4. Estimation of protein by Biuret method (Colorimetric Estimation)

**Qualitative analysis**

- a) Qualitative analysis of carbohydrates Glucose, fructose, Lactose, sucrose and starch
- b) Qualitative analysis of Amino acids -Tyrosine, Tryptophan, Arginine and Histidine

**Nucleic acid extraction (Demonstration)**

1. Isolation of DNA
2. Isolation of RNA

**PRACTICAL MARKS: 60**

Volumetric analysis /	- 25
Colorimetric analysis	
Qualitative analysis	- 25
Record	- 10



---

## MODEL QUESTION PAPER

**TIME: 3 hrs**

**TOTAL MARKS :75**

### PART-A

#### I Choose the best answer: (10 x 1= 10 marks)

- The general formula for disaccharides  
a)  $C_nH_{2n}O_n$    b)  $C_n(H_2O)_{n+1}$    c)  $C_n(H_2O)_{n-1}$    d)  $C_n(H_2O)_{2n+1}$
- The diameter of the double helix structure of DNA is  
a) 10 A   b) 15 A   c) 20 A   d) 22 A
- The base which is present in DNA and not in RNA  
a) thymine b) uracil c) guanine d) cytosine
- Which is a non-reducing sugar?  
a) lactose b) sucrose c) maltose d) glucose
- ...
- ...
- ...
- ...
- ...
10. The pyrrole ring is present in  
a) Vitamin B1 b) folic acid c) hemoglobin d) serotonin

#### II Say true or false for the following questions : (5 X1 =5 marks)

- All proteins are enzymes
- Cellulose cannot be digested by human beings
- Deoxyribose sugar is present in RNA
- Glucose and fructose form the same type of Osazone
- Iodine number is used to find unsaturation of fats

#### III Answer all the questions: (10 x1=10)

- Define Zwitter ion?
- Why sucrose is called nonreducing sugar?
- Draw the structure of cholesterol?
- What is hyperchromicity of DNA?
- Bring out the significance of indole groups in biological systems
- What are heterocyclic compounds?
- Draw the structure of Adenine?
- What are essential fatty acids?
- Denaturation of protein?
- What is an epimer?

---

### **PART-B**

**Answer any FOUR of the following :(4 x5 = 20)**

26. Give the biological importance of carbohydrates?
27. How proteins are classified? explain
28. Explain the structure and function of bile salts?
29. Explain the structure of t-RNA?
- 30.5 Explain renaturation and denaturation of DNA?
31. Write a note on bile pigments

### **PART-C**

**Answer any THREE of the following elaborately: (3 x10=30 marks)**

32. Explain the structure of proteins?
33. Describe the structure and function of phospholipids?
34. Describe the double helical structure of DNA?
35. Describe Polysaccharides in Detail
36. Explain the biological importance of heterocyclic compounds in detail

---

## THEORY EXAMINATION

### **Continuous Internal Assessment (CIA) (25 marks)**

Two internal examinations	15 marks
Assignment / Seminar	10 marks

**Total** **25 marks**

### **External Examination (75 marks)**

#### Question Pattern

**Time: 3 Hours**

**Max. Marks: 75**

#### **SECTION - A (25 x 1 = 25 )**

Answer **ALL** the Questions

I. Choose the correct answer (10 x 1 = 10)

II. True Or False (05 x 1 = 5)

III. Answer in One Or Two Sentences (10 x 1 = 10)

#### **SECTION -B (4 x 5 = 20)**

Answer any **Four** out of **Six**

#### **SECTION -C (3x 10 = 30)**

Answer Any **Three** Out of **Five**

