

Semester II Biochemistry

BIM121T:

Semester: II	Course Title: Introduction to Cell Biology, Molecular Biology & Complex Biomolecules	Credit: 4
Course No.: 121T	Major (T)	Hours: 4/week

COs with Cognitive Abilities

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

COs	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Learn the basic concepts of Biomolecules, Cell and Molecular biology to develop a strong foundation for the future courses.
CO2	UNDERSTANDING	Understand the complexity and harmony of the cell, cell organelles & its functions. Understand the structure, properties, organisation & role of complex Biomolecules, including Proteins, Complex Carbohydrates and Complex Lipids.
CO3	APPLYING	To apply basic knowledge of cell biology, molecular biology & biochemistry to understand the principles & mechanisms of the the molecular events in the cell
CO4	ANALYSING	Basic structural analysis of biomolecules

CO-PO Mapping

COs	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2	1	1		
CO 2	2	1	1		
CO 3	1	1	1		
CO 4	1	1	1		

CO-PSO Mapping:

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO6
CO 1	2	2	1	1		
CO 2	2	1	1	1	1	
CO 3	1	1	1	1	1	
CO 4	1	1	1			1

Unit	Detailed Syllabus	No. of Hours of Teaching
I	Fundamentals of Cell Biology: Cell Organelles: Structure, Composition, and Functions of Plant and Animal Cell organelles: Cytosol, Plasma membrane, Nucleus, Mitochondria, Endoplasmic reticulum (ER), Plastids-Chloroplasts, Ribosomes, Lysosomes Cell wall, Golgi bodies, Peroxisomes and Glyoxysomes. (Brief outline of the organelles) Cell Division & Cycle	15
II	Foundation of Molecular Biology: The structure and properties of DNA: Double helical structure of DNA: Watson & Crick Postulates The structure, types and the role of RNA: Ribosomal RNA (rRNA), Transfer RNA (tRNA), Messenger RNA (mRNA), other types of RNA (snRNA, scRNA, hnRNA, miRNA, siRNA) Central Dogma of life; (Brief outline, mainly definitions): Replication, Transcription & Translation. Nucleotide derivatives : (Structure & their two functions each): ATP, cAMP, SAM, GTP, UDP- glucose, CDP- Choline Chromosome structure: Definitions: Gene, Genome, Chromatin, Chromatid, Chromosomes, Autosomes, Karyotype, Centromere, Telomeres, Histones, Nucleosomes, Super coiling, Informosome.	15
III	Proteins : Structure, Properties & Functions: Classification based on solubility, shape and composition. Structure of proteins: Primary, Secondary, Tertiary and Quaternary structures. Quaternary Structure of Haemoglobin Protein Determination of sequences of amino acids in proteins by Sanger's method Physical Properties Of proteins: Isoelectric pH of proteins, Hydration, Behaviours in solution: Solubility, Salting in and Salting out of proteins, Precipitation of proteins by Acid reagents, Heavy metals, Denaturation by Heat, Extreme pH changes, and other agents and Renaturation of proteins. Chemical properties of proteins: Oxidation Reduction of Disulfide bond, Biological functions of Conjugated Proteins: Glycoproteins, Lipoproteins, Nucleoprotein	15
IV	Carbohydrates & Complex Lipids:	15

	Chemical properties of carbohydrate: Due to aldehyde and keto groups: Oxidation of sugars, Reduction of sugars, Lobry de Bruyn-von Ekenstein reaction, reducing action of sugars in alkaline medium, Action of mineral acids, Action of hydroxylamine, Action of hydrogen cyanide, Action of hydrazine Chemical properties of carbohydrate due to hydroxyl groups: Formation of esters, ethers and glycosides, Importance of glycosides. Transformation of sugars: Step up and step down synthesis, aldo and keto conversions, Sugars to Uronic acids, Sugars to vitamin Oligosaccharide and Poly sachharides their sources, structure and functions Complex carbohydrates: Poly Sachharides: Occurrence, Structure functions and importance of: Starch, Glycogen, Cellulose, Chitin, Inulin, Pectin, Agar-agar Glycosaminoglycans: Occurrence, Structure and functions of : Hyaluronic Acid, Heparin, Chondroitinsulphate A, Chondroitinsulphate B, and Chondroitinsulphate C Carbohydrates derivatives of biological importance: Amino sugar, Deoxysugar, Sugar Phosphate, Muramic acids, Mucopeptides Complex Lipids and Sterols: Phospholipids or Phosphorylated Lipids : Classification, Structure, Properties and Functions: Glycerophospholipids: Classification, Structure and functions of Lecithin, Cephalin and Sphingomyelins. Structure of Plasmalogens, Phosphatidyl Serine, Phosphatidylinositol Nonphosphorylated Lipids: Classification, Structure and Functions: Structure and functions of Cerebrosides, Sulpholipids; Functions of Gangliosides, Lipoproteins & Proteolipids Prostaglandins (Brief outline) Sterols: Structure, properties and functions of Cholesterol.	
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Suggested Reference Books:

1. Text Book of Biochemistry 4th Edition By West and Todd
2. Biochemistry (6th Edition) By; Breg J M Tymoczko T J Stryer L
3. Biochemistry D. Voet and Voet J 5th Edition
4. Concept in Biochemistry By Rodney Boyer 2nd Edition
5. Nelson DL and Cox MM; Lehninger's Principles of Biochemistry 6th edition
6. Fundamentals of Biochemistry By J.L.Jain, S.Jain and N.Jain 7th Edition
7. Biochemistry, U.Satyanarayan & U Chakrapani 6th Edition
8. Fundamentals of Biochemistry, Deb A.C.
9. Cell Biology , C B Powar, Third Edition.2008, Himalaya Publishing House
10. Cell & Molecular Biology, P K Gupta, Third Edition, Rastogi Publications