

BIOMOLECULES

Sem	Sub. Code	Category	Lecture		Theory		Practical		Credits
			Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	Hrs/ week	Hrs/ sem.	
I	21CPBC1C	Core	4	60	4	60	-	-	4

COURSE OBJECTIVE:

Objectives of this course is to enable the students to learn the basic functions, structures and biological importance of biomolecules like carbohydrates, lipids, proteins and nucleic acids. It also conveys the basic fundamental aspects of transport mechanism in cells.

COURSE OUTCOMES:

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

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Helps to understand about the carbohydrates and its types.	K2
CO2	Gives a clear understanding about the amino acids and structures of various proteins.	K3
CO3	A clear knowledge about lipids and its role.	K2
CO4	Provides an impression about structure of Nucleic acids.	K4
CO5	Gives an awareness about membrane structure and transport mechanism.	K3

(*CO – Course Outcomes

Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze).

MAPPING WITH PROGRAMME OUTCOMES:

COS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	M	S	M	S	M
CO2	M	S	S	M	S	M
CO3	M	S	S	S	M	S
CO4	M	M	S	S	M	S
CO5	S	S	S	M	S	S

(S- Strong; M-Medium; L- Low)

UNIT I

Structure and Biological importance of carbohydrates

10 Hours

Classification of carbohydrates – monosaccharides, disaccharides; N-linked, O-linked and GPI linked oligosaccharides, glycoproteins structure, function and recognition, poly saccharide; homo and hetero polysaccharides, Bacterial cell wall polysaccharides. Structure, location and biological role of proteoglycans (Glycosaminoglycans) and peptidoglycans.

UNIT II

Proteins and Amino acids

15 Hours

Classification of amino acids, classification of proteins- size, solubility and structure- primary structure, secondary structure: α - helix, β - sheets and turns, keratin: coil, collagen triple helix, Tertiary structure, Quaternary structure: structure and functions of Hb, actin, myosin, elastin. Solid-state synthesis of proteins, Protein sequencing (Sanger's method and Edman reaction)

UNIT III

Structure and Function of Lipids

15 Hours

Classification, structure, function of lipids. Fatty acids-saturated and unsaturated fatty acids. Lipids in cell membranes. Sterols- (Cholesterol, Bile acids and Bile Salts) structure, properties and functions. Eicosanoids – structure and biological role of prostaglandins, Leukotrienes, prostacyclins and thromboxanes. Lipoprotein classification and functions.

UNIT IV

Nucleic acids

10 Hours

Structure of nitrogenous bases, nucleosides & nucleotides. DNA double helix- Watson and crick model of DNA, other forms; A, B, Z DNA. Properties of DNA- physical (buoyant density, viscosity) and chemical properties (renaturation and denaturation), RNA classes- mRNA, tRNA and rRNA, hnRNA, snRNA, miRNA-structure and function. Chemical and enzymatic methods of sequential analysis. Chemical synthesis of oligonucleotides.

UNIT V

Membrane models and Transport system

10 Hours

Structure, composition and assembly of biological membranes, membranes models. Membrane assembly- importins and exportins. Transport process- Passive transport- Facilitated transport, Active transport – Na^+K^+ - ATPases like P-Type ATPase. F-Type ATPase, V- Type ATPase. Co-transporters – Uniporter, Symporter, Antiporter. Ionophores. Endocytosis and exocytosis. Docking proteins and their functions.

DISTRIBUTION OF MARKS: Theory - 100% and Problems – Nil

TEACHING METHODOLOGY:

- Black Board
- Power Point Presentations
- Assignments
- Models
- Demonstrations

TEXT BOOKS:

S.No	Author Name	Title of the Book	Publisher	Year
1.	Thomas M Devlin	Text book of Biochemistry	A John Wiley, Inc publication, New York, 4th edition	1997
2.	Eric E.Conn, P.K. Stumpf, G.Brueins and Ray H.Doi, John	Outlines of Biochemistry,	Wiley and sons, Singapore, 5th edition	2005
3.	Garrett & Grisham	Principles of Biochemistry	Saunders College publishing	1994
4.	U. Sathayanarayana	Biochemistry	Books and allied (P) ltd., India, 3rd edition	2006

REFERENCE BOOKS:

S.No	Author Name	Title of the Book	Publisher	Year
1.	Lubert Stryer	Biochemistry	W.H. Freeman and Co San Francisco, 5 th edition.	2002
2.	Donald Voet, Judith G. Voet and Charlotte W	Fundamentals of Biochemistry	Pratt, John Wiley and Sons, 3 rd edition.	2008
3.	David L. Nelson and Michael Cox.	Lehninger Principle of Biochemistry,	W.H. Freeman, 4 th edition	2004
4.	Zubay G L	Biochemistry	W M C Brown publishers, 4 th edition.	1988

WEB SOURCES:

- http://www.biology.arizona.edu/cell_bio/cell_bio.html
- https://ecok.libguides.com/biology/web_sources
- <https://www.nicholls.edu/biol-ds/biol155/Lectures/Cell%20Biology.pdf>
- <http://www.bio-nica.info/Biblioteca/Bolsover2004CellBiology.pdf>

SYLLABUS DESIGNER:

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