

Semester	2
Course	Major: C1MB230211T
Paper Title	Biochemistry of Biomolecules
No. of Credits	4
Theory/Practical/Composite	<b>Theory</b>
Minimum number of preparatory hours per week a student has to devote	4 hours/wk
Number of Modules	No modules
Syllabus	<ul style="list-style-type: none"> <li>• <b>CARBOHYDRATES</b> Importance in Life, Classification, D and L Sugars, “+” and “-“ Sugars, Families of Monosaccharides, Mutarotation, Cyclic forms of Sugars, Anomers, Anomeric Effect, Epimers, Epimerization, Ene-diol Rearrangement, Reduction and Oxidation of Simple Sugars, Glycosides, Disaccharides, Polysaccharides, Sugars containing Nitrogen, Oligosaccharides as components of Lipids and Proteins, Carbohydrate as a part of Antibiotics.</li>   <li>• <b>AMINO ACIDS AND PEPTIDES</b> Definition, classification, structure and stereochemistry of amino acids, Physicochemical properties of amino acids, Amphoteric molecule, Zwitter ion, pk values, Isoelectric point, electrophoresis, Formol titration of glycine, Reaction with Ninhydrin, Reaction of carboxyl and ammo groups, Separation of amino acids by Ion exchange, Gel filtration, Paper chromatography, Thin layer chromatography, Paper Electrophoresis. Peptides: peptide bond, biologically important peptides (glutathione, oxytocin-important functions), End group analysis, dihedral angel, Ramachandran Plot.</li>   <li>• <b>PROTEINS</b> General function of Protein, Types of proteins (simple and conjugated proteins Fibrous, Globular-definition example). Structural hierarchy of protein (Primary, Secondary, Tertiary, Quaternary) Forces that stabilizes structure of proteins, Protein denaturants, Transmembrane Protein, hydropathy plot. Relation between structure and function of globular and fibrous proteins (hemoglobin,myoglobin and keratin/collagen). Bohr effect, Cooperative binding of hemoglobin, Hill equation, Introduction to chaperons, Anfinsen cage model.</li>   <li>• <b>LIPIDS</b> Definition and major classes of storage and structural lipids. Storage lipids. Fatty acids structure and functions. Essential fatty acids. Triacyl glycerols structure, functions and properties. Saponification Structural lipids. Phosphoglycerides: Building blocks, General structure, functions and properties. Structure of phosphatidylethanolamine and phosphatidylcholine, Sphingolipids: building blocks,</li> </ul>

	<p>structure of sphingosine, ceramide. Special mention of sphingomyelins, cerebrosides and gangliosides. Lipid functions: cell signals, cofactors, prostaglandins, Introduction of lipid micelles, monolayers, bilayers.</p> <p style="text-align: center;"><b>• NUCLEIC ACIDS</b></p> <p>Nucleosides, Nucleotides, Ribose and Deoxyribose, Purines and Pyrimidines and their properties, Syn and Anti forms of Nucleosides, Ionization of the phosphates on Nucleotides, Sugar-Phosphate Backbone, Chemical Structure of a Polynucleotide Chain, Acidic property of Nucleic Acids, Resistance of Nucleic Acids to Nucleophilic Attack, Watson-Crick Model of DNA Double Helix, Non-Covalent Forces that Influence the Double Helical Structure, A and Z forms of Double Helices, tRNA as a model for Secondary and Tertiary Structure of RNA, Modified Bases in RNA, Physicochemical Properties of Nucleic Acids.</p>	
Learning Outcomes	To learn about the structures, functions, and properties of biological macromolecules.	
References/Reference Lists	<ol style="list-style-type: none"> <li>1. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone</li> <li>2. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman</li> <li>3. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company</li> <li>4. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company</li> <li>5. Willey MJ, Sherwood, LM &amp; Woolverton C J (2013) Prescott, Harley and Klein's Microbiology by. 9th Ed., McGrawHill</li> <li>6. Voet,D. and Voet J.G (2004) Biochemistry 3rd edition, John Wiley and Sons,</li> <li>7. Debajyoti Das. Biochemistry.</li> <li>8. Organic Chemistry by Solomons (2017)</li> </ol>	
Evaluation	Theory CIA:30 Semester Exam:70	Practical(if applicable) CA: NA Semester Exam: NA
Paper Structure for Theory Semester Exam	Full Marks: 70 Short questions: 10 (each 2 mark) from 12 (10x2=20) Long questions: 5 (each 10 marks) from 7 (5x10=50)	

