

ACHARYA NAGARJUNA UNIVERSITY :: NAGARJUNANAGAR-522 510

B.Sc. BIO-CHEMISTRY SYLLABUS, 2015
1st Semester Theory : Biomolecules

60 hrs
(2 hrs/week)

Unit-1 : Biophysical Concepts

12 hours

Basic Classification of biomolecules, Water as a biological solvent and its role in biological processes. Biological relevance of pH, measurement of pH, pKa of functional groups in biopolymers such as proteins and nucleic acids. Importance of buffers in biological systems, ion selective electrodes, and oxygen electrode. Donnan membrane equilibrium. Significance of osmotic pressure in biological systems,

Unit -II: Carbohydrates

12 hours

Carbohydrates: Classification. monosaccharides, D and L designation, open chain and cyclic structures, epimers and anomers, mutarotation, reactions of carbohydrates (due to functional groups - hydroxyl, aldehyde and ketone). Amino sugars, Glycosides. Structure and biological importance of disaccharides (sucrose, lactose, maltose, isomaltose, trehalose), trisaccharides (raffinose, melezitose), structural polysaccharides (cellulose, chitin, pectin) and storage polysaccharides (starch, insulin, glycogen). Glycosaminoglycans, Bacterial cell wall polysaccharides. Outlines of glycoproteins, glycolipids and blood group substances.

Unit - III : Lipids

12 hours

Lipids: Classification, saturated and unsaturated fatty acids, structure and properties of fats and oils (acid, saponification and iodine values, rancidity). General properties and structures of phospholipids, sphingolipids and cholesterol. Prostaglandins - structure and biological role of PGD₂, PGE₂ and PGF₂, Lipoproteins: Types and functions.

Biomembranes: Behavior of amphipathic lipids in water - formation of micelles, bilayers, vesicles, liposomes. Membrane composition and organization - Fluid mosaic model.

Unit-IV: Amino Acids and Peptides

12 hours

Amino Acids: Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. Titration curve of glycine and *pK* values. Essential and non-essential amino acids, non-protein amino acids, Peptide bond - nature and conformation, Naturally occurring peptides - glutathione, enkephalin.

Unit-V: Proteins

12 hours

Proteins: Classification based on solubility, shape and function. Determination of amino acid composition of proteins. General properties of proteins, denaturation and renaturation of proteins. Structural organization of proteins- primary, secondary, tertiary and quaternary structures (Eg. Hemoglobin and Myoglobin), forces stabilizing the structure of protein. Outlines of protein sequencing.

List of experiments:

45 hrs
(1½ hours/week)

1st Semester Practicals : Qualitative Analysis

1. Preparation of buffers (acidic, neutral and alkaline) and determination of pH.
2. Qualitative identification of carbohydrates - glucose, fructose, ribose/xylose, maltose, sucrose, lactose, starch/glycogen.
3. Qualitative identification of amino acids - histidine, tyrosine, tryptophan, cysteine, arginine.
4. Qualitative identification of lipids- solubility, saponification, acrolein test, Salkowski test, Lieberman-Burchard test.
5. Preparation of Osazones and their identification.
6. Absorption maxima of colored substances- *p*-Nitrophenol, Methyl orange.
7. Absorption spectra of protein-BSA, nucleic acids- Calf thymus DNA.

