

**SPACES DEGREE COLLEGE**  
**B.Sc. Biochemistry Semester wise Syllabus**  
**SEMESTER-1**

**Unit - I: Biophysical Concepts** **12 hours**

Water as biological solvent, Buffers, measurement of pH, electrodes, Biological relevance of pH, pK<sub>a</sub> value, analysis of drinking water and pond water, Total dissolved salts (TDS), BOD, COD, soil analysis (texture, organic matter, elements), Electrical conductivity.

**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, inulin, 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. Prostaglandins- structure, types and biological role. Lipoproteins- types and functions, Biomembranes- formation of micelles, bilayers, vesicles, liposomes. Membrane composition and organization - Fluid mosaic model.

**Unit-IV: Amino Acids and Proteins** **12 hours**

Amino Acids: Classification, structure, stereochemistry, chemical reactions of amino acids due to carbonyl and amino groups. Titration curve of glycine and p<sub>x</sub> values. Essential and nonessential amino acids, non-protein amino acids. Peptide bond - nature and conformation. Naturally occurring peptides - glutathione, enkephalin.

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).

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### Unit-V: Nucleic acids and porphyrins 12 hours

Types of RNA and DNA. Structure of purines and pyrimidines, nucleosides, nucleotides. Stability and formation of phosphodiester linkages. Effect of acids, alkali and nucleases on DNA and RNA. Structure of Nucleic acids- Watson-Crick DNA double helix structure, denaturation and renaturation kinetics of nucleic acids-,  $T_m$ -values and their significance, cot curves and their significance.

Structure of porphyrins: Identification of Porphyrins, Protoporphyrin, porphobilinogen properties, Structure of metalloporphyrins—Heme, cytochromes and chlorophylls.

### I 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.

### Recommended books:

1. Soil Testing Manual by Dr. G. S. Wagh.
2. Soil Testing and Plant Analysis: Part I Soil Testing, Volume 2, SSSA Special publications by Glenn W. Hardy.
3. Soil Analysis: An interpretation manual by K. I. Peverill, L. A. Sparrow, D. J. Reuter
4. The biochemistry of Nucleic acids; Adams et al., Chapman and Hall, 1986.
5. Proteins: A guide to study by physical & chemical methods, Haschemeyer and Haschemeyer,
6. Proteins: Structure, function and evolution. Dickerson & Geis, 2nd Edn, Benjamin/Cummings.
7. Biochemistry - Zubay C, Addison – Wesley, 1986.
8. Biochemistry, A problem Approach, 2nd Edn. Wood, W.B. Addison Wesley 1981.
9. Biochemistry, Lehninger A.H.
10. Textbook of Biochemistry West, E.S., Todd, Mason & Vanbruggen, Macmillan & Co.
11. Principles of Biochemistry White-A, Handler, and Smith E.L. Mc Graw Hill.
12. Organic chemistry, I.L. Finar, ELBS. (1985).
13. Organic Chemistry by Morrison and Boyd (2000) Prentice Hall.
14. Fundamentals of Biochemistry by Donald Voet (1999).