

## 1<sup>st</sup> SEMESTER

### {CORE FOR BIOCHEMISTRY}

#### GENERIC ELECTIVE FOR SOME HONOURS PROGRAMMES

##### BC120C: BIOCHEMISTRY: BIOMOLECULES

THEORY (4 CREDITS: 60 HOURS)

CREDITS: THEORY-4, PRACTICAL: 2  
MAXIMUM MARKS: 60, MINIMUM: 24

**Objectives & Expected Learning Outcomes:** *The objective of this course is to introduce the students to bio-molecules with an expected outcome to understand the different concepts in later courses of Biochemistry.*

##### UNIT I: CARBOHYDRATES (15 HOURS)

Definition, classification and structure of monosaccharides. Open and Ring structure; anomeric forms; mutarotation. Reaction of monosaccharides with special reference to glucose, Structure and functions of important oligosaccharides, Structure and functions of important polysaccharides, proteoglycans, Lipopolysaccharide, blood group polysaccharides. N-and O-type glycosylation in proteins, Role of lectins.

##### UNIT II: PROTEINS (15 HOURS)

**Amino acids:** Structure & their classifications, stereoisomerisms and RS System of designation, optical isomers. Biological role of Histidine, Tyrosine, Serine and Asparagine in protein structure, Zwitter ion, PI and its biological significance. Amino acid derived hormones and neurotransmitters.

**Proteins:** classification, composition and functions. Structure of peptide bond, chemical synthesis of polypeptides. Determination of the amino acid sequence of the polypeptide chain. Levels of structure in protein architecture, forces stabilizing the tertiary structure and quaternary structure of proteins. Denaturation and renaturation of proteins, Structure and function of Hemoglobin and myoglobin

##### UNIT III: LIPIDS (15 HOURS)

Introduction, classification, nomenclature, structure and properties of Fatty acids. Saturated and unsaturated fatty acids. Essential fatty acids, chemical properties and characterization of fats – hydrolysis, Saponification value, Reichert – Meissel number, Iodine number, rancidity of fats, Triacylglycerols and Cholesterol, Structure and functions of phospholipids and sphingolipids. Synthesis of prostaglandins and steroid hormones.

##### UNIT IV: NUCLEIC ACIDS AND VITAMINS (15 HOURS)

Evidence that DNA is the genetic material, compositions of RNA and DNA, generalized structural plan of nucleic acids, features of DNA double helix. Cot Curve. Structure and roles of different types of RNA, Central Dogma of Molecular Biology. Chromatin and its types.

**Vitamins:** Introduction to fat and water-soluble vitamins

##### PRACTICAL (2 CREDITS: 60 HOURS)

MAX. MARKS: 30, MIN. MARKS: 12 MARKS

- 1) Preparation of Standard buffers and determination of pH of a solution.
- 2) Qualitative tests for Carbohydrate
- 3) Qualitative tests for Proteins and Amino acids.
- 4) Qualitative tests for Lipids
- 5) Estimation of ascorbic acid
- 6) Titration curves of Amino acids

##### BOOKS RECOMMENDED

1. Principles of Biochemistry by Lehninger, Nelson & Cox
2. Biochemistry by Lubert Stryer
3. Biochemistry by Dr U Satyanarayan
4. Experimental Biochemistry by B A Ganai et al.