**BT - III: Biochemistry**

**Marks :75** **Hours: - 45**

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**Objective:**

1. Structure, classification and the properties of Biomolecules
2. Functions of biomolecules in Human health
3. Laboratory skills for the study of biomolecules

**Outcomes:**

Students will understand the Structure, classification and the properties of Biomolecules. They will acquire the basic laboratory skills for the isolation and separation of biomolecules

**UNIT I: Chemical foundations of Biology-**

Structure of atoms, molecules and chemical bonds; Ionization of water, properties of water, The pH scale, concept of acids and bases, Henderson- Hasselbach equation, biological buffer systems. Thermodynamic principles in biology, Concept of free Energy and redox potential

**UNIT: II Carbohydrates:**

Classification occurrence, structure, function and properties of monosaccharide, oligosaccharide and polysaccharides.

**Lipids:** Classification, structure and functions of major lipids, Triglycerides,Phospholipids, Steroids and terpenes. Glycolipids and lipoproteins-structure and function. Role of lipids.

**UNIT: III Amino acids**:

Classification and chemical reactions and physical properties. Peptide bond, peptide classification, biologically important peptides.

**Proteins:** Properties and classification, primary, secondary, tertiary and quaternarystructure of proteins with example, structural comparison at secondary and tertiary levels. Ramachandran plot.

**Enzymes:** Historical perspectives, general characteristics, nomenclature andclassification. Methods of isolation, purification and characterization of enzymes. Concept of enzyme assay, enzyme activity, coenzymes and isoenzymes.

**UNIT: IV Nucleic acids:**

Primary, secondary and tertiary structure of nucleic acids, double stranded DNA and biological significance, forms of DNA, Physical properties of double stranded DNA, Types of RNAs and their biological significance. DNA Supercoiling.

**UNIT:V Hormones:**

Structure and function; **Vitamins**: Types, structure and functions; Prostaglandins; Silk fibroin, coiled coils, collagen triple helix and hemoglobin.



S. R. T. M., University, Nanded

**Text and Reference:**

1. Principles of Biochemistry - Lehninger , Nelson, Cox, CBS publishers
2. Fundamentals of Biochemistry - Voet and Voet- John Wiley and Sons, Inc.
3. Biochemistry - Zubay - WCB publishers
4. Harper's Biochemistry - R.K.Murray, D.K.Granner, P.A.Mayes –McGraw Hill
5. Biochemistry - L. Stryer-W.H. Freeman
6. Biochemistry –Rawn
7. Biochemistry- U Satyanarayana

**Practicals:**

1. Study of General and Safety Rules of Biotechnology Laboratory
2. Concept of Buffers, pH, Morality and Normality (Problem solving and preparation )
3. Reaction of amino acids, sugars, lipids
4. Estimations of Carbohydrates and Sugars
5. Estimation of amino acids, proteins
6. Titration of amino acids and determination of pKa
7. Estimations of DNA & RNA
8. Analysis of oils, iodine number, saponification value, acid number
9. Cholesterol estimation
10. UV visible fluorescence & IR spectroscopy absorption spectra

11. Enzyme assay