

Ph.D course work
BIOCHEMISTRY SYLLABUS

UNIT 1

Carbohydrates

Classification: Monosaccharides, disaccharides, oligosaccharides, and polysaccharides.

Structure & Stereochemistry: D & L designation, ring structure (Haworth formula), epimers, anomers, and mutarotation. Functions, Structure and biological importance of cellulose, chitin, agar, glycogen, and starch.

Lipids

Classification & Fatty Acids: Saturated and unsaturated fatty acids, essential fatty acids.

Types: Triacylglycerols (fats and oils), phospholipids, sphingolipids, glycolipids, and sterols (cholesterol). Properties: Hydrolysis, saponification, halogenation, and rancidity of fats.

UNIT 2

Amino Acids and Peptides

Structure & Classification: Standard and non-standard amino acids, classification based on polarity and charge.

Properties: Acid-base properties, Zwitter ion, isoelectric pH (pI), and titration curves.

Peptides: Peptide bond structure and characterization (Glutathione).

Nucleic Acids

Components: Structure of purine and pyrimidine bases, nucleosides, and nucleotides.

DNA Structure: Watson-Crick model, forms of DNA (A, B, Z), and denaturation/annealing.

RNA Types: Structure and functions of mRNA, tRNA, and rRNA

UNIT 3

Techniques in Molecular Biology: Identification and characterization of DNA, RNA, Plasmids. Agarose Gel Electrophoresis. Ethidium bromide staining. Southern, Northern, Western blotting. RAPD, RFLP. Sequencing. RTPCR, Cloning, Library construction.

UNIT 4

Research Techniques: Enzyme assay, Enzyme activity and specific activity determination. Cell disintegration and extraction techniques, separation of proteins by fractionation (Ammonium sulphate, Organic solvents). Ion exchange chromatography. Molecular sieve chromatography. Affinity Chromatography, Paper chromatography, Thin layer chromatography, Ultra filtration, Ultra centrifugation, Gel electrophoresis, Iso electric focusing and Immuno-electrophoresis.