



M.Sc. – Semester I Microbiology and Biotechnology
PAPER: (MB/BT) **401: BIOCHEMISTRY**
[CSIR – UGC – NET - TOPIC: 1]

Total Credits – 3

Total Hours - 45

Objective:

- To understand the basic concepts of biomolecules and to learn the various metabolic cycles as well as to analyse the significant of biochemical reactions.

Unit – 1: Molecules and their interactions

Structure of atoms, molecules and chemical bonds.

Composition, structure and function of biomolecules (carbohydrates, lipids, proteins, nucleic acids and vitamins).

Stabilizing interactions (Van der Waals, electrostatic, hydrogen bonding, hydrophobic interaction, etc.).

Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).

Unit – 2: Conformation and stability of DNA and proteins

Conformation of proteins (Ramachandran plot, secondary structure, domains, motif and folds).

Stability of proteins and nucleic acids.

Conformation of nucleic acids (helix (A, B, Z), t-RNA, micro-RNA).

Unit – 3: Bioenergetics and catalytic activities of enzymes

Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction, group transfer, biological energy transducers.

Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.

Principles of catalysis, enzymes and enzyme kinetics, enzyme regulation, mechanism of enzyme catalysis, isozymes.

References:

1. Lehninger Principles of Biochemistry – David L. Nelson and Michael M. Cox, Publisher W. H. Freeman, 2017, Seventh Edition.
2. Principles of Biochemistry – Donald Voet, Judith G. Voet, Charlotte W. Pratt, Publisher Wiley, 2012, Fourth Edition.
3. Biochemistry: International Edition – Stryer, Berg and Tymoczko, Publisher W. H. Freeman, 2019, Ninth Edition.
4. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry – Trevor Palmer and Philip Bonner, Elsevier Science, 2007, Second Edition.