

BACHELOR OF SCIENCE

Ist SEMESTER

DISCIPLINE SPECIFIC COURSE - 1 (CORE-1)

BT120C: BIO-TECHNOLOGY: FUNDAMENTALS OF BIOCHEMISTRY

CREDITS: THEORY – 4, PRACTICAL – 2 (4+2)

THEORY (4 CREDITS: 60 HOURS)

MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objective: This course is aimed to introduce students to basic concepts of life through the coordination of different biomolecules.

Unit – 1 (15 Hours)

Physicochemical properties of water; Concept of pH, pK, pI & buffers; Structure, classification, physical and chemical properties of amino acids; Levels of protein structure- primary, secondary, tertiary and quaternary; Structure and function of fibrous and globular proteins; Forces stabilizing protein structure.

Unit - 2 (15 Hours)

Nomenclature and classification of enzymes; Basic principles of enzyme catalysis; Concept of active site; Enzyme activity and its measurement, factors affecting enzyme activity; Michaelis–Menten kinetics; Lineweaver-Burk plot; Enzyme inhibition with special focus on the types and mechanism of reversible inhibitors.

Unit - 3 (15 Hours)

General structure, classification and function of carbohydrates; Stereoisomerism in monosaccharides with special reference to the concepts of configuration and conformation; Carbohydrate metabolism – glycolysis, TCA cycle, electron transport chain, oxidative phosphorylation.

Unit - 4 (15 Hours)

Nomenclature and properties of fatty acids; Structure and functions of major types of lipids - triglycerides, phospholipids, sphingolipids, sterols; Transport of fatty acids across the mitochondrial membrane, β oxidation of saturated and unsaturated fatty acids; Biosynthesis of fatty acids and triglycerides. Structure and classification of nitrogenous bases, composition and bonding in nucleotides and polynucleotides.

PRACTICALS (2 CREDITS: 60 HOURS) MAXIMUM MARKS: 30, MINIMUM MARKS: 12

1. Preparation of molar, molal, normal solutions and buffers.
2. Qualitative and quantitative estimation of carbohydrates in a given solution.
3. Qualitative and quantitative estimation of proteins in a given solution.
4. Enzyme activity assay: Acid/Alkaline Phosphatase.
5. Effect of temperature and pH on enzyme activity.

BOOKS RECOMMENDED

1. *Lehninger Principles of Biochemistry*: Nelson, D. L. and Cox, M. M. – Worth Publishers, New York.
2. *Biochemistry (Latest Edition)*: Stryer, L. - W. H. Freeman and Company, New York.
3. *Biochemistry (Latest Edition)*: Voet, D. and Voet, J. G. - John Wiley and Sons Inc. New York.
4. *Understanding Enzymes*: Palmer, T. – Ellis Horwood Limited, UK.
5. *Enzymology*: Devasena, T. – Oxford University Press.

Expected Learning Outcomes:

1. Understanding of structure, classification, function and physio-chemical properties of different bio-molecules.
2. Understanding of nature, classification and mode of action of enzymes along with study of kinetics and energetics of enzyme catalyzed reactions.
3. Hands on training on enzyme assay and estimation of different bio-molecules.