

BACHELOR WITH BIOTECHNOLOGY AS MAJOR

1st SEMESTER

BTG 122J: BIOMOLECULES: STRUCTURE AND FUNCTION

CREDITS: THEORY - 4, PRACTICAL – 2

MAXIMUM MARKS: 100, MINIMUM MARKS: 36

- Course Learning Objective: understand about the molecules of life like water, carbohydrates, amino acids and proteins etc., their structure, function and coordination.
- **Course outcome: A student will be able to;**
 - to measure pH, make buffers, and distinguish between the different levels of protein structure and types of proteins.
 - predict the effect of [S] and [I] on enzyme action and type of inhibition.
 - draw the different structures of sugars; calculate the energy released during the oxidation different sugar molecules.
 - distinguish between different types of lipids and relate with their biological role, show the steps of oxidation of fatty acids and oxidative phosphorylation, draw the structure of nucleotides and nucleic acids

Unit – 1 15 Hours

Physicochemical properties of water; Concept of pH, pK, pI & buffers; Structure and classification of amino acids; Levels of protein structure- primary, secondary, tertiary and quaternary; Types of proteins – 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 (competitive, non-competitive and uncompetitive)

Unit – 3 15 Hours

General structure, classification and function of carbohydrates; Stereoisomerism in monosaccharides with special reference to the concepts of configuration and conformation; Breakdown of carbohydrates– 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. Types of DNA (A, B and Z) and their structure, types of RNA (mRNA, tRNA and rRNA) and their structure.

PRACTICALS (2CREDITS: 30 hours) Maximum Marks: 50, Minimum Marks: 18

1. Preparation of molar, molal, normal solution 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.

BOOKSRECOMMENDED

1. Lehninger Principles of Biochemistry: Nelson, D. L. and Cox, M. M.-Worth Publishers, New York.
2. Biochemistry Stryer, L.-W.H.Freeman and Company, New York.
3. Biochemistry: 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.
6. Introductory Practical Biochemistry, S.K. Sawhney, R. Singh, Narosa Publishing House

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