

**DEPARTMENT OF BIOTECHNOLOGY
GOVT. DEGREE COLLEGE BARAMULLA**

SEMESTER 1st (NEP)

MAJOR/MINOR COURSE

SUBJECT: BIOTECHNOLOGY

TITLE: (BIOMOLECULES STRUCTURE AND FUNCTION)

Code: BBT22C101

CREDIT: (4+2) THEORY: 04; PRACTICAL: 02 CONTACT HOURS: 64 (T) + 64 (L)

Course Objective:

- *To introduce students to the basic concepts of biomolecules*

Expected Learning Outcomes:

- *Student should be able 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.*
- *Draw the different structures of sugars, calculate the energy released during the oxidation of different sugar molecules.*
- *Distinguish between different types of lipids and relate with their biological role, draw the structure of nucleotides and nucleic acids.*

UNIT-1: AMINO ACIDS AND PROTEINS (16 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; Overview of forces stabilizing protein structure.

UNIT-2: ENZYMES (16 HOURS)

Nomenclature and classification of enzymes; Basic principles of enzyme catalysis; Concept of active site; Enzyme activity and its measurement, factors affecting enzyme activity: pH, temperature, substrate and inhibitor concentration. Michaelis-Menten kinetics; Lineweaver-Burk plot; Enzyme inhibition (competitive, non-competitive and uncompetitive).

UNIT-3: CARBOHYDRATES (16 HOURS)

Introduction and Classification of Carbohydrates, Configuration; Structure and Function of Mono and Disaccharides (Glucose, Mannose, Fructose, Galactose, Lactose, Sucrose).

Polysaccharides: homo and heteropolysaccharides (starch, cellulose, glycosaminoglycans).

Breakdown of carbohydrates- glycolysis, TCA cycle, electron transport chain, oxidative phosphorylation.

UNIT-4: LIPIDS AND NUCLEIC ACIDS (16 HOURS)

Nomenclature and properties of fatty acids, Structure and functions of major types of lipids: triglycerides, phospholipids, sphingolipids, sterols. β -oxidation of saturated and unsaturated fatty acids. Introduction to nucleosides and nucleotides: nitrogenous bases, pentose sugars, composition and bonding in nucleotides and polynucleotides. Basic idea of DNA and RNA structure.

PRACTICAL (02 CREDITS)

1. Good Lab Practices.
2. Introduction to various equipments used in Biotechnology Laboratory.
3. Preparation of percent, molar, molal, normal solutions.
4. Preparation of standard Buffers and determination of pH of a solution.
5. Qualitative tests for carbohydrates.
6. Qualitative tests for proteins.
7. Quantitative estimation of proteins in a given solution.

BOOKS RECOMMENDED

1. *Lehninger Principles of Biochemistry*: Nelson, D. L. and Cox, WH Freeman Publishers, New York.
2. *Instant Notes Biochemistry*: David Hames, Nigel Hooper. Taylor & Francis
3. *Biochemistry (Latest Edition)*: Stryer, L., -W. H. Freeman and Company, New York.
4. *Biochemistry (Latest Edition)*: Voet, D and Voet, J. G. -John Wiley and Sons Inc. New York.
5. *Understanding Enzymes*: Palmer, T. -Ellis Horwood Limited.
6. *Enzymology*: Devasena, T. -Oxford University Press.
7. *Biochemistry* by U Satyanarayana.
8. *Introductory Practical Biochemistry*, S. K. Sawhney, R. Singh, Narosa Publishing House.