



SEMESTER-II

BTC DSC 151T BIOCHEMISTRY

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

Course Objective: The objective of the course in Biochemistry is to provide students with a comprehensive understanding of the fundamental principles and concepts in biochemistry. The course aims to introduce students to the structure, properties, and functions of biomolecules such as amino acids, proteins, carbohydrates, lipids, and nucleic acids. It also covers topics related to protein purification techniques, enzymology, and carbohydrate metabolism. The course intends to equip students with a solid foundation in biochemistry, enabling them to comprehend the intricate biochemical processes and their significance in cellular functions.

UNIT 1

(10 Lectures)

Amino acids and proteins: structure and properties of amino acids; physical and chemical properties of proteins; different level of structural organization of proteins; forces stabilizing protein structure and shape; fibrous and globular proteins. **Protein purification techniques:** protein extraction and fractionation techniques.

UNIT 2

(8 Lectures)

Carbohydrate: structure; properties and function of monosaccharides, disaccharides and polysaccharides. homo and hetero polysaccharides; mucopolysaccharides; glycoproteins and their biological functions.

UNIT 3

(10 Lectures)

Lipids: classification and properties of fatty acids; essential fatty acids; phospholipids, glycolipids and steroids. **Nucleic acids:** nucleosides and nucleotides; purines and pyrimidines; physical and chemical properties of nucleic acids; double helical model of DNA; types of DNA.

UNIT 4

(9 Lectures)

Enzymes: nomenclature and classification of enzymes; enzyme specificity; lock-and-key model and induced-fit model; active site; factors affecting enzyme activity; activation energy; enzyme inhibition- reversible and irreversible; cofactors; prosthetic groups.

UNIT 5

(8 Lectures)

Carbohydrate metabolism: glycolysis; fate of pyruvate under aerobic and anaerobic conditions; pentose phosphate pathway; gluconeogenesis; glycogenolysis TCA cycle; electron transport chain.

Course Outcomes: *The Biochemistry course aims to provide students with a comprehensive understanding of the molecular foundations of life. By the end of the course, students will be able to describe the structure and properties of biomolecules. They will develop an understanding of enzyme nomenclature and classification, along with factors influencing enzyme activity. Furthermore, students will have a comprehensive understanding of the major pathways of carbohydrate metabolism, including glycolysis and the TCA cycle. Through these outcomes, students will be well-equipped to comprehend the intricate molecular processes that underlie biological systems and apply their knowledge to various fields within biotechnology.*

SUGGESTED READING

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists.
3. Nelson, D.L., Cox, M.M. (2004) Lehninger: Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.
4. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
5. Salisbury, F.B. and Ross, C.W. (1991) Plant Physiology, Wadsworth Publishing Co. Ltd.