

Course Code	Course Title	L	T	P	C
1151BT104	Biochemistry	3	1	0	4

- Course Category** : *Program Core*
- a. Preamble** : *Biochemistry introduces the concepts of chemistry in the field of Biomolecules.*
- b. Prerequisite Courses:** *Engineering Chemistry*
- c. Related Courses** : *Engineering Chemistry*
- d. Course Outcomes** : *Upon the successful completion of the course, students will be able to:*

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Develop a basic understanding on the importance of Biochemistry	K2
CO2	Study the major metabolic pathways and their importance	K2
CO3	Understand role of proteins and nucleic acids, their genesis and regulation	K3
CO4	Understand the role of lipids in metabolism	K3
CO5	Exposure to the practical applications of Biochemistry	K3

COs		PROGRAMME OUTCOMES											
		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Develop a basic understanding on the importance of Biochemistry	H	M	L	L	L	H	M	L	L	L	L	H
CO2	Study the major metabolic pathways and their importance	L	H	H	L	L	L	L	M	L	L	M	
CO3	Understand role of proteins and nucleic acids, their genesis and regulation	L	H	H	M	L	L	L	M	L	M	L	
CO4	Understand the role of lipids in metabolism	L	H	H	M	L	L	L	M	L	M	L	
CO5	Exposure to the practical applications of Biochemistry	L	L	L	L	H	L	L	H	L	L	L	H

*e. Course Content:*

**UNIT I: BIOMOLECULES: AN INTRODUCTION**

Introduction and scope of Biochemistry, basic principles of organic chemistry, structure, function and properties of mono, di and polysaccharides - homopolysaccharides (starch and glycogen); heteropolysaccharides, Carbohydrates, Lipids: classification, structure, properties and functions of triacylglycerols, phospholipids and cholesterol, Amino acids: classification and general properties, Proteins: Primary, Secondary, Tertiary, Quaternary, role of biological buffers.

**UNIT II: BIOMOLECULES IN METABOLISM AND BIOENERGETICS**

Classification of Carbohydrates, Lipids and proteins; Metabolic pathways - TCA cycle, Glycolysis, Gluconeogenesis, Pentose Phosphate pathway, Glycogenesis, Glycogenolysis, Embden-Meyerhof pathway, Bioenergetics, Thermodynamics of energy rich compounds, free energy, reduction potentials, calculation of ATP production during glycolysis and TCA cycle, Respiratory chain and oxidative phosphorylation.

**UNIT III: PROTEIN AND NITROGEN METABOLISM**

Structure and properties of amino acids, Functions of Proteins, Enzymes, Introduction to biocatalysts, Nitrogen metabolism and urea cycle. Structure and functions of purines, pyrimidines, nucleosides, nucleotides, polynucleotides, ribonucleic acids and deoxy ribonucleic acids, nucleoprotein complexes, chemistry of nucleic acids.

**UNIT IV: LIPID METABOLISM**

Lipid Metabolism, Biosynthesis and degradation of Lipids, fatty acid synthesis and oxidative degradation, Triglycerol and phospholipids biosynthesis and degradation, cholesterol biosynthesis.

**UNIT V: APPLICATIONS OF BIOCHEMISTRY IN BIOTECHNOLOGY**

Introduction to Molecular docking, Drug design principles, Biochemistry of environmental pollutants, role of Biochemistry in food and pharmaceutical industry.

**TEXT BOOKS**

1. Nelson, D.L. and M.M. Cox, "Lehninger's Principles of Biochemistry", 4th Edition, W.H. Freeman & Co., 2005.
2. Satyanarayana, U. and U. Chakerapani, "Biochemistry" 3rd Rev. Edition, Books & Allied (P) Ltd., 2006.
3. Rastogi, S.C. "Biochemistry" 2nd Edition, Tata McGraw-Hill, 2003.

## **REFERENCES**

1. Voet, D. and Voet, J.G., "Biochemistry", 3rd Edition, John Wiley & Sons Inc., 2004.
2. Murray, R.K., et al "Harper's Illustrated Biochemistry", 27th Edition, McGraw-Hill, 2006.