

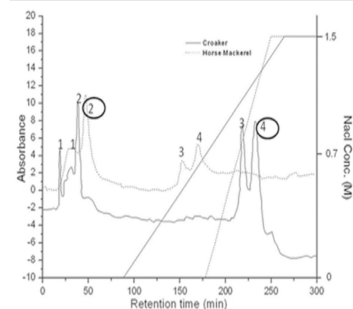
**19BT201 BIOCHEMISTRY**

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	5	50	-	8	1	2



Sampath et al., 2012

**COURSE DESCRIPTION AND OBJECTIVES:**

The main objective of the course is to acquire knowledge on various chemical processes associated with living cell machinery and familiarize students on the complex structures of biomolecules, their synthesis, interaction and metabolism.

**COURSE OUTCOMES:**

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the structures and functions of biological molecules and interactions between them.	1,2
2	Evaluate the bioenergetics of metabolic pathway.	1,2
3	Identify macro molecules using various characterization techniques.	1,4
4	Analyze the influence of enzymes in anabolic and catabolic steps of biological reactions.	1,4
5	Estimate the concentration of macromolecules in biological samples.	1,6, 9,10

**SKILLS:**

- ✓ Identify biomolecules by colorimetric and biochemical assays.
- ✓ Quantify macromolecules using UV-VIS Spectrophotometer.
- ✓ Proficiency in paper, thin layer and gel chromatographic techniques.
- ✓ Operation of HPLC.

**UNIT - I****L-9**

**CARBOHYDRATES AND ITS METABOLISM:** Structure and properties of mono-, di-, oligo- and polysaccharides; Complex carbohydrates; Confirmation of pyranose and furanose ring; Glycosidic bond; Structure and function - Glycogen, Starch, Cellulose, Glycoproteins and Glycosaminoglycans; Glycolysis; TCA cycle; Electron transport chain; Glucogenesis; Glycogenolysis; Gluconeogenesis; Entner-Doudoroff (ED) pathway; Pentose phosphate shunt.

**UNIT - II****L-9**

**AMINO ACIDS AND THEIR METABOLISM:** Amino acids - classifications, physico-chemical properties; Organizational structure of Protein structure; Nitrogen cycle; Nitrogen balance; Reductive amination and Transamination; Urea cycle; Synthesis of amino acids - Glutamate pathway, Serine pathway and Shikimate pathway.

**UNIT - III****L-9**

**LIPIDS AND THEIR METABOLISM:** Classification, structure and roles of fatty acids; Phospholipids & membrane lipids; Synthesis and breakdown of fatty acid; PUFA; Synthesis and metabolism of triglycerides; Cholesterol structure and function; Lipoproteins - classification and function.

**UNIT - IV****L-9**

**NUCLEIC ACIDS AND INTERMEDIARY METABOLISM:** Structure and properties of purines, Pyrimidines, Nucleosides and Nucleotides; Biosynthesis and degradation of purines and pyrimidines; Interconnection of pathways and metabolic regulation.

**UNIT - V****L-9**

**PLANT BIOCHEMISTRY:** Oxidation and Reduction; Bioenergetics; Photosynthesis-electron transport; Q-cycle; ATP synthesis; ATP Phosphorylation; Calvin cycle; Rubisco; Photorespiration; C4 metabolism; CAM metabolism; Regulation of primary metabolism; Nitrogen fixation; Nitrogen assimilation; Terpenes; Carotenoids and Alkaloids synthesis.

## LABORATORY EXPERIMENTS

**LIST OF LAB ACTIVITIES****TOTAL HOURS: 30**

1. Preparation of buffers, pH measurement and evaluation of its functionality.
2. Qualitative and quantitative tests for carbohydrates by 3, 5-dinitro salicylic acid (DNS) method.
3. Qualitative and quantitative tests for amino acids.
4. Protein estimation by Biuret / Lowry / Bradford methods.
5. Separation of different macromolecules by paper and thin layer chromatography.
6. Extraction of lipids through solvents.
7. Analysis of cholesterol by Zak method.
8. Estimation of RNA by orcinol methods.
9. Separation of proteins by electrophoresis.
10. Separation of biomolecules using gradient gradient and affinity based chromatography.

**TEXT BOOK:**

1. J.L. Jain, "Fundamentals of Biochemistry", 7<sup>th</sup> edition, S. Chand Publishers, 2009.

**REFERENCE BOOKS:**

1. Lehninger A.L, Nelson O.'L, M.M. Cox, "Principles of Biochemistry", 7<sup>th</sup> edition, CBS Publications, 2017.
2. L. Stryer, J.M. Berg, JL Tymockzo, "Biochemistry", 7<sup>th</sup> edition, WH Freeman & Co., 2013.