

**SEMESTER: 1<sup>st</sup>**

**MAJOR / MINOR COURSE**

**CBC122M: CLINICAL BIOCHEMISTRY (BIOMOLECULES- METABOLISM AND RELATED DISORDERS)**

**Credits: Theory: 4**

**Practical: 2**

**Theory (4 Credits)**

**LEARNING OBJECTIVES AND OUTCOMES:** To acquaint the students with basic understanding of the structure and properties of macromolecules that interact to maintain and perpetuate the living systems and their clinical importance. Knowledge on the structure and function of different biomolecules would enable the students to consolidate their focus on understanding various metabolic pathways crucial for the sustenance of living systems

**UNIT I: Proteins - Metabolism and associated disorders**

Aminoacids – Basic structure, classification and metabolism of clinically important amino acids- phenylalanine, tyrosine and branched chain amino acids, Inherited errors of amino acid metabolism - Phenylketonuria, Alkaptonuria and Maple Syrup Syndrome; Proteins – overview, structure, classification and general chemical properties; Proteins in blood, urine and CSF and their clinical significance.

**UNIT II Carbohydrates - Metabolism and associated disorders**

General description of carbohydrates - Classification and chemical properties of carbohydrates, Glucose metabolism and its regulation – glycolysis, Krebs cycle, glycogen metabolism and gluconeogenesis) Disorders of carbohydrate metabolism – Glycogen storage disease, Galactosemia and Diabetes Mellitus.

**UNIT III Lipids – Metabolism and associated disorders**

Nomenclature, basic structure and classification of fatty acids, triglycerides, cholesterol and phospholipids; Lipoproteins - general structure and their types; Lipid metabolism:  $\beta$ -oxidation, Biosynthesis of Fatty acids, Cholesterol metabolism. Disorders – Lipid storage disease, dyslipidaemia, Hypercholesterolemia and Atherosclerosis

**UNIT IV Nucleic acids – Metabolism and associated disorders:**

structure and properties of purines and pyrimidine bases, nucleoside and nucleotides, Structure of DNA and RNA, Metabolism - Biosynthesis and degradation of purines and pyrimidines; Disorders of purine/Pyrimidine metabolism - Lesch Nyhan Syndrome, ADA deficiency, Gout and Von Gierke's disease.

**Laboratory Course (Practicals: 2 Credits)**

- 1) Biochemical calculations – Molarity, Molality, Normality, percent solution
- 2) Principle, working and maintenance of pH meter and Weighing balance
- 3) Preparation of standard Buffers and determination of pH of a solution.
- 4) Qualitative tests for Carbohydrates
- 5) Qualitative tests for Amino acids
- 6) Quantitative estimation of carbohydrates
- 7) Qualitative tests for lipids
- 8) Quantitative estimation of proteins

**Suggested Readings:**

1. Lehninger Principles of Biochemistry 4th Ed by David L. Nelson and Michael M. Cox, WH Freeman and Company.
2. Biochemistry and Molecular biology by William H. Elliott and Daphne C. Elliott. Oxford University Press.
3. Fundamentals of Biochemistry: Life at the Molecular Level 5th Ed. By Donald Voet, Judith G. Voet and Charlotte W. Pratt. Publisher: Wiley.
4. An Introduction to Practical Biochemistry by Plummer.