

**4th SEMESTER
(CORE-4)**

BC420C: BIOCHEMISTRY: INTERMEDIARY METABOLISM

**CREDITS: THEORY-4, PRACTICAL: 2
MAXIMUM MARKS: 60, MINIMUM: 24**

THEORY (4 CREDITS: 60 HOURS)

Objectives/Expected Learning Outcomes: Metabolism is central to biochemistry and thus this course aims to introduce the students to Biochemistry with an expectation to learn how biochemistry is central to disease diagnosis, prognosis, therapeutic intervention, biochemical industry and/or medicinal industry.

Unit-I (15 HOURS)

Bioenergetics, Energy transformation by biological systems, Concept and significance of free energy, Implications of First, 2nd and 3rd law of thermodynamics in biological system, Phosphoryl transfer potential, Coupled reactions, ATP as energy currency.

Unit II: Carbohydrate Metabolism (15 HOURS)

Reactions and energetics of glycolysis. Gluconeogenesis, Glycogenesis and Glycogenolysis. Reactions and physiological significance of Pentose Phosphate Pathway. Regulation of glycolysis, Entry of pyruvate into mitochondria, TCA cycle and its regulation, Sequence of electron carriers, Sites of ATP production, Inhibitors of electron transport chain, Mitochondrial oxidative phosphorylation, Disorders of carbohydrate metabolism.

Unit III: Lipid Metabolism (15 HOURS)

Introduction. Hydrolysis of Triacyl-glycerols, transport of fatty acids in to mitochondria, β -oxidation of saturated and unsaturated fatty acids, ATP yield from fatty acid oxidation. Biosynthesis of saturated and unsaturated fatty acids. Cholesterol metabolism. Metabolic disorders of lipids. Atherosclerosis and Coronary heart diseases.

Unit IV: Amino Acid & Nucleic Acid Metabolism (15 HOURS)

Transamination, oxidative deamination and decarboxylation reactions of amino acids, Urea cycle. Biosynthesis and degradation of purines and pyrimidines. Metabolic disorders of amino acid and Nucleic acid metabolism (Phenyl-ketaturia, Albinism, Alkaptonuria, Gout, Lesch-Nyhan syndrome, Oroticaciduria).

PRACTICAL (2 CREDITS: 60 HOURS)

MAX.MARKS 30, MIN.12 MARKS

1. Estimation of protein by Lowry method.
2. Estimation of glucose by Nelson-Somogyi method.
3. Estimation of bilirubin (conjugated and unconjugated) in serum.
4. Estimation of cholesterol.
5. Separation and identification of amino acids/sugars by paper chromatography.

BOOKS RECOMMENDED

1. Text book of Biochemistry by Lubert Stryer
2. Text book of Biochemistry by Voet and Voet
3. Text book of Biochemistry Lehninger by Nelson & Cox
4. Understanding Carbohydrate Metabolism by Rabia Hamid
5. Laboratory manual of Biochemistry and Biotechnology by Syed Eazaz Hussain Rizvi