

BP203T. BIOCHEMISTRY (Theory)

45 Hours

Course Content:

Unit-I

08 Hours

Biomolecules: Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

Bioenergetics: Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.

Energy rich compounds; classification; biological significances of ATP and cyclic AMP.

Unit-II

10 Hours

Carbohydrate metabolism:

Glycolysis- Pathway, energetics and significance.

Gluconeogenesis- Pathway and its significance.

Citric acid cycle- Pathway, energetics and significance.

HMP shunt and its significance- Glucose-6-Phosphate dehydrogenase (G6PD) deficiency.

Glycogen metabolism Pathways and glycogen storage diseases (GSD).

Hormonal regulation of blood glucose level and Diabetes mellitus.

Biological oxidation:

Electron transport chain (ETC) and its mechanism.

Oxidative phosphorylation & its mechanism and substrate level phosphorylation.

Inhibitors ETC and oxidative phosphorylation/Uncouplers.

Unit-III

10 Hours

Lipid metabolism: β -Oxidation of saturated fatty acid (Palmitic acid). Formation and utilization of ketone bodies; ketoacidosis. De novo synthesis of fatty acids (Palmitic acid).

Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D.

Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

Amino acid metabolism: General reactions of amino acid metabolism.

Transamination, deamination and decarboxylation, Urea cycle and its disorders.

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, Alkaptonuria, Tyrosinemia).

Synthesis and significance of biological substances: 5-HT, melatonin, dopamine, noradrenaline, adrenaline.

Catabolism of heme; hyperbilirubinemia and jaundice.

Unit-IV**10 Hours****Nucleic acid metabolism and genetic information transfer**

Biosynthesis of purine and pyrimidine nucleotides.

Catabolism of purine nucleotides and Hyperuricemia and Gout disease.

Organization of mammalian genome.

Structure of DNA and RNA and their functions DNA replication (semi conservative model)

Transcription or RNA synthesis.

Genetic code, Translation or Protein synthesis and inhibitors.

07 Hours**Enzymes**

Introduction, properties, nomenclature and IUBMB classification of enzymes.

Enzyme kinetics (Michaelis-Menten plot, Line-Weaver Burke plot) Enzyme inhibitors with examples.

Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation.

Coenzymes: Structure and biochemical functions.

Therapeutic and diagnostic applications of enzymes and isoenzymes.