

# 18BP018 BIO-CHEMISTRY

Hours Per Week :

L	T	P	CP	CL
3	1	4	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	1	60						

## SCOPE:

Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

## COURSE OUTCOMES:

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

COs	Course Outcomes	POs	PSOs
1	Understand the principles of chemistry in biology	1,4	1
2	Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.	1,4	1
3	Understand the metabolism of nutrient molecules in physiological and pathological conditions.	1,4	1
4	Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.	1,4	1
5	Apply the knowledge to estimate various biochemical parameters in physiological systems	1,2	1

**UNIT – I****08HOURS**

**BIO MOLECULES:** 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****10HOURS**

**CARBOHYDRATE METABOLISM:** Glycolysis – Pathway, energetic and significance Citric acid cycle- Pathway, energetic and significance. HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency. Glycogen metabolism Pathways and glycogen storage diseases (GSD) Glucose exogenesis- Pathway and its significance. 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/ UN couplers.

**UNIT-III****10HOURS**

**LIPID METABOLISM:**  $\beta$ -Oxidation of saturated fatty acid (Palmitic acid). Formation and utilization of ketone bodies; keto acidosis 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 & decarboxylation, urea cycle and its disorders. Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia). Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline. Catabolism of heme; hyperbilirubinemia and jaundice.

**UNIT-IV****10HOURS**

**NUCLEIC ACID METABOLISM AND GENETIC INFORMATION TRANSFER :** Biosynthesis of purines and pyrimidine nucleotides; Catabolism of purines nucleotides and hyper uricemia 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.

**UNIT-V****07HOURS**

**ENZYMES:** Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Lineweaver Burk plot); Enzyme inhibitors with examples; Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation; Therapeutic and diagnostic applications of enzymes and iso enzymes Coenzymes –Structure and biochemical functions.

