M.Sc. BIOSCIENCES (CBCS Semester Scheme) SYLLABUS
I SEMESTER
HARD CORE COURSES
BSH401 BIOCHEMISTRY

Course Outcomes:

Upon successful completion of the course, students will be able to:

CO 1. Have in-depth knowledge of biochemistry and appreciate the knowledge of biochemistry in the day-to-day life

CO 2. Demonstrate an understanding of basic biochemical principles with reference to structure and functions of proteins, carbohydrates and lipids, and their metabolic pathways.

CO 3. Understand the mechanisms of transport and excretion of cholesterol andsterols

CO 4. Know the clinical relevance of studying biomolecules and metabolic disorders.

Unit I (13 hours)

Carbohydrates: Classification, chemistry and properties of monosaccharides - Pentoses, hexoses, deoxyglucoseamino sugars, muramic acid, neuraminic acid, disaccharides - Linkage in sucrose, lactose and maltose, polysaccharides– Homo-and hetero-poly saccharides -starch, cellulose, glycogen, hyaluronic acid, chondroitin sulphate chitin, xylans, bacterial cell wall and blood group polysaccharides, glycoproteins. Metabolism of carbohydrates: Pathways and regulation. Glycogenesis and Glycogenolysis. Anaerobic glycolysis, Citric acid cycle, Hexose monophosphate shunt. Gluconeogenesis. Coordinated control of metabolism.

Unit II (13 hours)

Amino acids and Proteins: Classification, chemistry and properties of amino acids and proteins. Primary, secondary (alpha helix, beta pleated sheets), tertiary (fibrous - Collagen, globular - Myoglobin) and domain structure of proteins. Reverse turn and Ramachandran plot. Helix - coil, transition. Quarternary structure – Hemoglobin. Energy terms in biopolymers. Conformational calculations, hydrogen bonding, hydrophobic, electrostatic and Vander Waalsinteractions. Lipoprotein metabolism and associated disorders.

Unit III (13 hours)

Lipids. Classification, chemistry and properties of lipids. Biological role of phospholipids, Sphingolipids, Glycolipids and Plasmalogens. Structure of cholesterol, Structure and function of essential fatty acids, Eicosanoids, Prostaglandins, Thromboxanes, Leukotrienes. Metabolism of lipids. Biosynthesis of fatty acids, oxidation of fat and fatty acids - beta, alpha and Omega oxidation. Ketogenesis and ketolysis. Biosynthesis ofphospholipids. Triacylglycerol biosynthesis and role of adipose tissues. Biosynthesis, transport and excretion of cholesterol and sterols.

Unit IV (13 hours)

Protein and amino acid metabolism. Nitrogen balance, transamination and deamination. Catabolism of phenylalanine, tyrosine, tryptophan, sulphur containing amino acids, creatine and creatinine. Urea cycle and disorders.