

Course	Discipline Specific Core
Semester	I
Paper Number	MBTCR1011T
Paper Title	BIOCHEMISTRY & METABOLISM
No. of Credits	6
Theory/Composite	Theory
No. of periods assigned	5 Theory + 1Tutorial
Course description/objective	<ol style="list-style-type: none"> 1. Students are introduced to the biological macromolecules – protein, lipids, carbohydrates and nucleic acids - the key players in a living system. 2. Focus is on structure-function relationship of the bio-molecules. 3. Lessons on bioenergetics will lead to the realisation that biological systems indeed abide by the physico-chemical laws. 4. Students are introduced to enzymes, the wonder molecules, and the magnificent roles they play in the isothermal and isobaric biological systems. 5. Students are provided with an overview of carbohydrate and lipid metabolism. 6. The complex regulation of metabolic processes is elucidated by in-depth carbohydrate metabolism.
Syllabus	<p>Module A: (40 Marks)</p> <p>UNIT I: Amino acids & Proteins: Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Level of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins.</p> <p>UNIT II: Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Bacterial cell wall polysaccharides, Glycoprotein's and their biological functions.</p> <p>UNIT III: Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol.</p> <p>No. of Classes: 3 Classes per week including tutorial</p> <p>Module B: (40 Marks)</p> <p>UNIT IV: Nucleic acids: Structure and functions - Physical & chemical properties of nucleic acids - Purines & pyrimidines, nucleosides & nucleotides, biologically important nucleotides, double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and renaturation of DNA. RNA - folding of RNA into higher order structures; types of RNAs - mRNA, tRNA, rRNA in ribosome; modified nucleotides in tRNA and their importance.</p> <p>UNIT V: Enzymes: Nomenclature and classification of enzymes, holoenzyme, apoenzyme, cofactors, coenzyme, prosthetic groups,</p>

	<p>metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity - types & theories, biocatalysts from extreme thermophilic and hyperthermophilic archaea and bacteria. Role of: NAD⁺, NADP⁺, FMN/FAD, coenzymes A, Thiamine pyrophosphate, Pyridoxal phosphate, lipoic-acid, Biotin vitamin B12, Tetrahydrofolate and metallic ions.</p> <p>UNIT VI: Carbohydrate Metabolism: Reactions, energetics and regulation. Glycolysis - Fate of pyruvate under aerobic and anaerobic conditions; Pentose phosphate pathway and its significance; Gluconeogenesis, glycogenolysis and glycogen Synthesis; TCA cycle, electron transport chain, oxidative phosphorylation.</p> <p>β-oxidation of fatty acids.</p> <p>No. of Classes: 3 Classes per week including tutorial</p>
Readings	<ol style="list-style-type: none"> 1. Biochemistry - Voet & Voet. 2. Lehninger Principles of Biochemistry - Cox & Nelson. 3. Biochemistry Berg – Tymoczko & Stryer.
Evaluation	<p>Continuous Internal Assessment: 20 marks</p> <p>End- Semester Theory Examination: 80 marks</p>
Paper Structure for End Sem Theory	<p>Module A (40 marks)</p> <p>Q.1. Compulsory – 10 marks</p> <p>Any two from four (Q.2.-Q.5.) – each 15 marks</p> <p>No sub-part will be less than 1 mark and more than 5 marks.</p> <p>Module B (40 marks)</p> <p>Q.6. Compulsory – 10 marks</p> <p>Any two from four (Q.7.-Q.10.) – each 15 marks</p> <p>No sub-part will be less than 1 mark and more than 5 marks.</p>