

**Semester - I**  
**C1: Biochemistry & Metabolism (MBTCR1011T)**

**Theory: CIA: 20 Marks; End-Sem: 80 Marks**

**Module A: (40 Marks)**

**(3 Classes per week including tutorial)**

**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.

**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.

**UNIT III:** Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebroside, gangliosides, Prostaglandins, Cholesterol.

**Module B: (40 Marks)**

**(3 Classes per week including tutorial)**

**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.

**UNIT V: Enzymes:** Nomenclature and classification of enzymes, holoenzyme, apoenzyme, cofactors, coenzyme, prosthetic groups, 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<sup>+</sup>, NADP<sup>+</sup>, FMN/FAD, coenzymes A, Thiamine pyrophosphate, Pyridoxal phosphate, lipoic-acid, Biotin vitamin B12, Tetrahydrofolate and metallic ions.

**UNIT VI:**

**Carbohydrates 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.

**β-oxidation of fatty acids.**

**Teachers involved:** Dr. Jhimli Dasgupta (Module A); Dr. Uma Siddhanta (Module B)

**Texts & Reading/Reference Lists:**

1. Biochemistry - Voet & Voet.
2. Lehninger Principles of Biochemistry - Cox & Nelson.
3. Biochemistry Berg – Tymoczko & Stryer.