## Semester I Biochemistry

## **BIM111T:**

Semester: I	Course Title: Concepts in Biochemistry	Credit: 4
Course No.: 111T	Major (T)	Hours: 4/week

Unit	Detailed Syllabus	No. of Hours of Teaching
Ι	<ul> <li>Introduction:</li> <li>Definition, History, Foundation, Scope and Applications of Biochemistry, Biochemistry as the molecular logic of living organisms, Axioms of living matter, Origin of life, RNA world, Brief Introduction to Evolution and Mutation</li> <li>Major organic compounds of living organisms, including Enzymes, Hormones and Vitamins</li> <li>Cell: Define Cell, Cell organization, Postulates of Cell theory, and Classification of Living organisms, Differences between Prokaryotes and Eukaryotes, Plant Cell and Animal Cell</li> <li>Chemical bonds: Types, Covalent bonds, Non-covalent bonds (Hydrogen bond, Ionic bonds, Vander Waal forces, Ionic bonds), Co-ordinate bonds</li> <li>Functional groups and Linkage: Carboxyl group, Amino group, Hydroxyl group, Sulphydryl group etc., Peptide Linkage, Phosphodiester linkage, Glycosidic linkage, Ester linkage</li> </ul>	15
Π	Carbohydrates: Introduction, Classification Structure of Monosaccharide, Aldosugar, Ketosugar, Hexose, Glycosidic bonds. Amino acids: Introduction, Classification of Standard amino acids with structures Non-protein Amino acids: Beta Alanine, GABA, Citrulline; Rare Amino acids: 4 Hydroxy Proline, Selenocysteine, Desmosine- Isodesmosine; (Three examples of each with structures); Essential Amino acids, Conditionally Essential Amino acids (/Semi-essential Amino acids), and Non-essential amino acids Lipids: Definition, Classification and Functions of Lipids Classification and Structure of Fatty acids: Saturated, Unsaturated, Hydroxyl, Cyclic, Branched-chain, Essential fatty acids, MUFA, PUFA Proteins: Introduction, Functions of Proteins Nucleic Acids: Introduction, history and functions of Nucleic Acids (DNA& RNA), Nucleic acid structure: Nitrogen Bases, Nucleoside and Nucleotide. (Including structures) Differences between DNA and RNA	15

	Carbohydrates:	
	Oligosaccharides: Structure, Function and Occurrence	15
	Physical properties: Isomerism, Asymmetric carbon atom, Mutarotation.	
	Chemical properties: Hemiacetal, Hemiketal reaction, Fischer to Howarth	
	conversion,	
	Oxidation and Reduction of Sugars	
	Lipids:	
	Physical properties of Fatty acids(State, Solubility, Melting point, Boiling	
	point, Specific gravity, Polymorphism)	
III	Differences between Liquid fats and Solid fats	
	Isomerism in fatty acids(Positional, Geometrical (Cis-Trans)	
	Chemical properties of Fatty acids: Salt formation- Soap formation and	
	Action, Detergent formation, Esterification, Hydrogenation, Oxidation,	
	Halogenation.	
	Triglycerides: Types, Chemical composition, Functions.	
	Chemical properties of Triglycerides: Hydrolysis, Saponification,	
	Hydrogenation, Oxidation, Halogenation, Acetylation	
	Chemical constants of fats: Saponification number, Iodine number,	
	Reichert Meissl number, Acetyl number, Acid number	
	Rancidity of fats: Hydrolytic, Oxidative and Lipolytic, Prevention of	
	Rancidity	
	Waxes: Natural Waxes, Types, Properties, Importance	
	Amino acids:	
	Physical properties of amino acid: Stereoisomerism, Optical isomerism,	
	Acid-base properties or Ampholytic property of amino acid; Isoelectric	
IV	pH	
	Titration curve of Amino acids Alanine	
	Chemical reactions of amino acids:	
	Due to -COOH group: Decarboxylation, Amide formation.	
	Due to -NH <sub>2</sub> group: Sanger's reaction, Edman's reaction, Dansyl chloride	1.5
	reaction, Oxidative deamination by Ninhydrin.	15
	Colour reactions of amino acids:	
	Ninhydrin reaction, Hopkin-Coles reaction, Enrich reaction, Nitropruside	
	reaction, Sakaguchi reaction, Xanthoprotic reaction, Millon's reaction,	
	Sullivan's reaction, Pauly's reaction, Folin- Phenol reaction	
	reputes: Structure Formation & Characteristics of particle hand	
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	Brief Physiological role of peptides: Glutathione, Oxytocin, Insulin,	
	Glucagon	