STUDY GUIDE

PROGRAM	**BDS**
COURSE TITLE	**Biochemistry**
ACADEMIC YEAR	**1st Year, 2024**
INTRODUCTION	The department of Biochemistry at KMDC is well organized having a spacious and well-equipped practical laboratory, which fulfills the student's requirements. Biochemistry is one of the essential basic science disciplines which dental students across Pakistan and outside study. This discipline helps students learn about the molecular basis of body functions. There is also an introduction to other body systems in order to provide a more holistic view of the body to the learners.
OUTCOMES	By the end of this course, students will be able to describe the various complex molecular structures, metabolisms & functions at a molecular level.
DEPARTMENT INVOLVED	Biochemistry
LECTURES OBJECTIVES	By the end of the course, the students will be able to: **BIOCHEMISTRY OF CELL** ● Discuss the importance of Biochemistry in Dentistry. ● Describe the important micro and macro molecules found in the cell. Discuss the major functions of organelles. ● Cell Membrane Explain the Biochemical structure and functions of cell membrane. ● Explain the biochemical structure and properties of water. ● Define the following: • Buffers • Acidosis • Alkalosis ● Explain The types and mechanisms of action of the following: • Buffers; • Acidosis; • Alkalosis. **CHEMISTRY OF CARBOHYDRATES** ● Define carbohydrates. ● Classify carbohydrates. ● Discuss sources and biodental importance of carbohydrates. ● Define Monosaccharides, Disaccharides and Oligosaccharides. ● Classify Monosaccharides, Disaccharides and Oligosaccharides. ● Describe isomerism in monosaccharides. ● Explain the biodental importance of Monosaccharides, Disaccharides and Oligosaccharides.

	● Define Polysaccharides. ● Classify polysaccharides. ● Explain functions of different types of polysaccharides. **LIPID CHEMISTRY** ● Define lipids. ● Classify lipids. ● Discuss the functions of lipids and biodental importance of lipids. ● Define fatty acids. ● Classify fatty acids. ● Explain the properties, functions and nutritional importance of fatty acids. ● Classify the functions and biodental properties of each type of lipid (PL, LP, GL, sphingolipid). ● Discuss the functions and biodental importance of each type of lipid. **PROTEIN CHEMISTRY** ● Describe the properties, functions and chemical reactions of amino acids. ● Explain the structure, function and biodental importance of proteins. ● Define simple proteins (plasma proteins). ● Classify simple proteins. ● Discuss biodental importance of simple proteins. **ENZYMES** ● Define enzymes. ● Classify enzymes. ● Explain the structure of enzymes. ● Discuss the mechanism of action of enzymes. ● Describe the MM equation. ● Discuss the factors that regulate enzyme activity. ● Discuss the clinical importance of enzymes in diagnosis. **NUCLEOPROTEINS** ● Define nucleoproteins. ● Discuss the chemical structure and significance of nucleoproteins. ● Describe the chemical structure, properties and functions of DNA and RNA. ● Discuss the central dogma of molecular biology. **HEMOGLOBIN CHEMISTRY** ● Discuss structure, functions and types of hemoglobin. ● Explain heme synthesis. Discuss disorders of heme synthesis. ● Discuss the types, biochemical defects and clinical manifestation of hemolytics. Anemia (Thalassemia, Sickle cell Anemia).

	● Discuss synthesis, types and fate of bilirubin. ● Classify Jaundice and LFTs. **VITAMINS** ● Discuss the structure, functions, RDA, sources and clinical abnormalities of Vitamin A, E, K, D, C, B12, Folic acid(B9), B1, B2, B3 and B6. **MINERALS** ● Discuss the functions, RDA, sources, transport, storage, biochemical role and clinical importance of Iron, Calcium, Phosphorous, Fluoride and other minerals. **CARBOHYDRATE METABOLISM** ● Describe the breakdown of complex dietary carbohydrates to simple sugars. ● Discuss the absorption of simple sugars from GIT into portal blood. ● Define glycolysis. ● Explain the reactions involved in the glycolytic pathway. Discuss the fate of pyruvate formed from glucose. ● Explain the reactions and the regulation of citric acid cycle. ● Define gluconeogenesis. ● Discuss the process of gluconeogenesis. ● Describe the formation breakdown and regulation of glycogen. ● Describe purpose importance and reactions of Hexose Monophosphate Pathway. ● State the range of normal blood glucose level. ● Discuss the clinical significance of variations in blood glucose level and metabolic derangements that occur in Diabetes Mellitus. **LIPID METABOLISM** ● Describe the breakdown of complex dietary lipids into simpler forms. ● Discuss the absorption of simpler forms of dietary lipids from GI. ● Discuss the chemistry, metabolism and associated clinical disorders of lipoproteins. ● Explain the oxidation of fatty acid. ● Explain the synthesis and utilization of Ketone Bodies. ● Discuss the structure and functions of Electron Transport Chain. ● Describe the synthesis of ATP. **PROTEIN METABOLISM** ● Describe the breakdown of dietary proteins into simpler forms. ● Discuss the absorption of simpler forms of dietary proteins from GIT. ● Explain the reactions of amino acids.

	● Describe the ammonia metabolism. ● Discuss the metabolism and inborn errors of specific amino acids. **NUTRITION** ● Discuss the biodental importance of nutrition. ● Explain the importance of a balanced diet. ● Discuss the clinical abnormalities related to an imbalanced diet. **ENDOCRINOLOGY** ● Define hormones. ● Classify hormones. ● Discuss the general characteristics of different types of hormones. ● Explain the chemistry, mechanism of action and metabolic role of hormones released by the following structures: - Hypothalamus; - Pituitary gland; - Thyroid gland; - Adrenal glands; - Pancreas.