5. ECG recording/ interpretation of normal ECG
6. Measurement of arterial blood pressure
7. Examination of apex beat
8. Auscultation of normal heart sounds
9. Recording of body temperature

SYLLABUS / COURSE DETAILS FOR:

BIOCHEMISTRY

Introduction:

Biochemistry is the molecular interpretation of cellular/subcellular organization of life. The main goal of Biochemistry Curriculum is to help a Dental Surgeon understand molecular basis of human body and thereby identify the disease/treatment.

Learning Methods:

- Lecture / Group discussions
- Clinical Scenarios
- Self study / Practical Laboratory Sessions

Learning Resources:
Clinical Biochemistry Volume 1 & 2 for Medical Professional by Professor Kamran Aziz
Clinical Biochemistry by Marshal & Tietz.
Clinical Biochemistry Case Presentation Seminar [CPC].
Biochemistry Laboratory with Spectrophotometer/Flame photometer/basic lab
Harper's Illustrated Biochemistry 28th Ed.
Textbook of Biochemistry by Stryer.

Course Description / Objectives: Student should be able to	Suggested Lecture Hours
Fluid & Electrolyte Balance & Clinical Scenarios. Fluids: Mechanism of Formation, Quantification [Molarity, Molality, Normality]. ECF & ICF: Formation, Normal Levels. Fluid Forming Areas & Fluid Balance [GIT, Kidney, Respiratory Tract]. Oedema / Dehydration in Clinical Scenarios. Practical Analysis of Normal/Abnormal Urine. Acquire the knowledge of Fluid Formation & its ratio. Formulate and determine the mechanism of Fluid formation by human body. Identify the division of Fluid in different human body Compartments [ICF/ECF]. Evaluate and analyse the basic problems of Oedema & Dehydration in clinical scenarios.	4
Acid Base Balance & Clinical Scenarios. Acid/Base/Alkali/Salt defined.	5

Buffers: Extracellular/Intracellular [Types/Mechanism of Action]. Henderson Hassel Balch's Equation in Clinical Scenarios. Management of Acid Base Balance in Human Body [Role of ECF/Lungs/Kidney]. Acidosis/ Alkalosis [Pulmonary/Metabolic] with Clinical Scenarios. Practical Performance: Mechanism of Buffer Action. Acquire and identify the knowledge of Basic terms in acid base system. Formulate and determine the mechanism of Acid base management by human body. Evaluate and analyse the basic problems of acidosis & alkalosis. Justify the basis of theses clinical correlations & provide strategy for clinical assistance.	
Genomics Digestion & Absorption & Metabolism. Nucleotides/Nucleosides/Nitrogenous Bases. RNA Characteristics, Types & Biosynthesis. DNA Characteristics, Types & Biosynthesis. Digestion & Absorption in GI Tract. Purine Metabolism & Hyperuricaemia with Clinical Scenarios. Pyrimidine Metabolism. Genetic Disorders. Recognise & identify the structure & functions of nucleotides in human body [dental tissue]. Categorize & appraise the structural characteristics of RNA/DNA their types & functions. Indicate the process of digestion/absorption of genomics in human body. Apprehend the process of Purine/Pyrimidine metabolic sequences & identify clinical/genetic complications. Analysis of human sera for Uric Acid estimation [Normal/Abnormal Cases].	4
Bioenergetics. Metabolic Fuels & Energy Generation Principles [Biological Oxidation-Reduction]. Respiratory Chain; Components & Functions. Validate & interpret the mechanism of energy production in human body. Illustrate the process of energy production by respiratory chain components.	2

Proteomics Digestion & Absorption & Metabolism. Amino Acids [Essential/Non-essential]. Primary Hierarchy/ Secondary Hierarchy/Tertiary Hierarchy/Quaternary Hierarchy. Collagen Biosynthesis & Clinical/Dental Scenarios. Immunoglobulin's types, structure-function relationship. Plasma Proteins & Clinical/Dental Scenarios. Selective Amino Acid Metabolism [Taurine/Histamine/Creatine Phosphate /Epinephrine Metabolism. Protein Synthesis [transcription, translation & posttranslational modification [Lac Operon Theory]. Krebs Henseleit's Urea Cycle. Genetic Disorders. Structure/Function relationship of Amino Acids in human body. Primary/Secondary/Tertiary/Quaternary Hierarchies in structural determination of peptides/polypeptides/proteins. Collagen, immunoglobulins, plasma proteins biosynthesis & clinical scenarios. Selective Amino Acid Metabolism [Taurine/Histamine/Creatine Phosphate /Epinephrine Metabolism. Protein Synthesis: transcription, translation & posttranslational modification [Lac Operon Theory] Describe & evaluate Urea Cycle: Amino acid degradation in clinical scenarios. Genetic Disorders in protein metabolic sequences	3
Enzymology. Basic Characteristics of Enzymes [Structural characteristics/Nomenclature]. Enzyme Kinetics [Basic kinetic principle / factors effecting enzyme activity]. Enzyme Classification [IUBMB rules & clinical examples]. Clinical Significance of Enzyme Diagnosis. Identify & analyse the Basic Characteristics of Enzymes [Structural characteristics / Nomenclature]. Employ & evaluate the Enzyme Kinetics. [Basic kinetic principle / factors effecting enzyme activity] Apply IUBMB Enzyme Classification strategy & illustrate with clinical examples. Apply Clinical Significance of Enzyme Diagnosis with selected clinical scenarios.	3

Glycomics & Metabolism. Relevant mono/di/polysaccharides. Glycomic Isomerism. Chondroiten Sulphate/Hyaluronic Acid/Chitin/Heparin. Digestion & Absorption of Glycomes. Regulation of Blood Glucose Level. Glycolysis/Lactate Cori Cycle. Hexose Monophosphate Shunt Pathway. Glycogenesis/Glycogenolysis/Gluconeogenesis. Citric Acid Cycle/Metabolic Cross Talk. Detection of Glycomes. Identify & evaluate the Biochemically related glycomes / their structure / isomeric forms in human body. Appraise & identify role of Chondroiten Sulphate / Hyaluronic Acid / Chitin / Heparin in clinical scenarios. Digestion & Absorption of Glycomes. Regulation of Blood Glucose Level. Glycolysis/Lactate Cori Cycle. Hexose Monophosphate Shunt Pathway Glycolysis/Lactate Cori Cycle. Hexose Monophosphate Shunt Pathway Glycogenesis/Glycogenolysis/Gluconeogenesis Citric Acid Cycle/Metabolic Cross Talk	3
Lipomics & Metabolism. Relevant Simple/Conjugated/Derived Lipomes. Digestion & Absorption of Lipomes. Biosynthesis of Fatty Acids & Fats. α, β, & γ Oxidation of Fatty Acids. Ketosis & Clinical Relevance. Biosynthesis of Phospholipids. Biosynthesis of Cholesterol & Derivatives & Clinical Scenarios. Metabolism of Lipoproteins & Clinical Scenarios. Outline & appraise Relevant Simple/Conjugated/Derived Lipomes & their significance in human body. Appraise & identify the mechanism of Digestion & Absorption of Lipomes. Analyse, compare & comprehend Biosynthesis of Fatty Acids & Fats along with α, β, & γ Oxidation of Fatty Acids. Appraise & identify Ketosis with Clinical Relevance. Distinguish & describe Biosynthesis of Phospholipids/Biosynthesis of Cholesterol & Derivatives & Clinical Scenarios. Critique and evaluate Metabolism of Lipoproteins &	4

Clinical Scenarios.	
Metabolism of Haeme. Biosynthesis of Haeme. Degradation of Haeme. Bilirubin Turnover & Jaundice Classification & Practical Performance of Bilirubin Estimation in Human Sera. Extrapolate & analyse the Biosynthesis of Haeme. Deduce & interpret the Degradation of Haeme. Bilirubin Turnover & Jaundice Classification & Practical Performance of Bilirubin Estimation in Human Sera.	3
Endocrines. Hormones of Anterior Pituitary: Growth Hormone/FSH/LH/ACTH [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Hormones of Posterior Pituitary: Prolactin/ADH [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Thyroid Hormones [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Insulin/Glucagon/Pancreatic Polypeptide [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Hormones of Adrenal Glands: Aldosterone/Cortisol & Cortisone/Adrenaline & Nor Adrenaline [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Hormones of Male & Female Gonads: Testosterone/Oestrone/Oestradiol/Progesterone [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Acquire/distinguish/analyse & appraise the Hormones of Anterior Pituitary: Growth Hormone/FSH/LH/ACTH [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, and abnormalities]. Acquire/distinguish/analyse & appraise the Hormones of Posterior Pituitary: Prolactin/ADH [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions,	4

and abnormalities]. Acquire/distinguish/analyse & appraise the Thyroid Hormones [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Acquire/distinguish/analyse & appraise the Insulin/Glucagon/Pancreatic Polypeptide [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Acquire/distinguish/analyse & appraise theHormones of Adrenal Glands: Aldosterone/Cortisol & Cortisone/Adrenaline & Nor Adrenaline [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, abnormalities]. Acquire/distinguish/analyse & appraise the Hormones of Male & Female Gonads: Testosterone/Oestrone/Oestradiol/Progesterone [Mechanism of synthesis, discharge, transport, binding to receptors, mechanism of action, functions, and abnormalities].	
Vitamins. Fat Soluble Vitamins: A/D/E/K. Biochemical Role & Abnormalities. Water Soluble Vitamins: B Complex/C. Biochemical Role & Abnormalities. Acquire/ analyze/interpret the structural /functional characteristics of Fat Soluble Vitamins: A//E/K. Biochemical Role & Abnormalities. Acquire/ analyze/interpret the structural /functional characteristics of Fat Soluble Vitamin: D. Biochemical Role & Abnormalities in dental tissue. Acquire/ analyze/interpret the structural / functional characteristics of Water Soluble Vitamin: C. Biochemical Role & Abnormalities in dental tissue. Acquire/ analyze/interpret the structural / functional characteristics of Water Soluble Vitamins: B Complex. Biochemical Role & Abnormalities.	3
Minerals. Macro Minerals: Sodium/Potassium/Calcium/Phosphate/Chloride. Micro Minerals: Copper/Iron/Magnesium/Lithium/Cobalt/Molybdenum/ Selenium/Zinc etc. Macro Minerals: Identification, critical evaluation and analysis in role of Sodium/Potassium/Calcium/Phosphate/Chloride in fluid formation & associated functions in human body.	2

Micro Minerals: Identification, critical evaluation and analysis in role of Copper / Iron/Magnesium / Lithium / Cobalt / Molybdenum/ Selenium/Zinc in metabolic reactions in human body.	
Nutrition. Basic Principles of Human Nutrition. Obesity & Anorexia. Clinical Modules / Scenarios. Categorize/analyze & consider the Basic Principles of Human Nutrition.[BMR / RQ / Nutrition Components] Distinguish/analyse/judge nutritional deficiencies leading to obesity & anorexia. Discuss & elaborate Clinical Modules / Scenarios related to nutrition.	2
Biochemical Technology. Chromatography. Electrophoresis. Spectrophotometry. PCR Technology. Define basic principal & development of PCR Technology with modern diagnostic application. Define basic principal & development of Spectrophotometry along with modern research procedures in Auto analyzers. Define basic principal & development of Electrophoresis along with modern research procedures in Gel Electrophoresis. Define basic principal & development of Chromatography along with modern research procedures in Chromatography [Malditof / Selditof].	2

BIOCHEMISTRY PRACTICALS:

Practical Analysis of Normal & Abnormal Urinary Constituents.
Practical Performance: Mechanism of Buffer Action.
Practical Estimation of Uric Acid.
Practical Analysis of Serum Enzymes: LDH, CPK, AP, AST, ALT.
Practical Analysis of Blood Glucose Level.
Practical Assessment of Glucose Tolerance Test.
Practical performance of Detection of Glycomes.
Analysis of human sera for fasting & fed glucose levels.
Performance & evaluation of GTT.
Practical Performance of Bilirubin Estimation in Human Sera.

Biochemical Technology.

Chromatography.
Electrophoresis.
Spectrophotometry.
PCR Technology.

SYLLABUS / COURSE DETAILS FOR: