Cluster University Srinagar

ENTRANCE TEST SYLLABUS FOR ADMISSION TO 5-YEAR INTEGRATED, 3-YEAR HONOR'S & PROFESSIONAL PROGRAMMES SESSION 2019

BIOCHEMISTRY

Maximum Marks: 100

Theory: Marks 70 **Time: 3 hours**

Practicals: Marks 30 (External : 20 and Internal : 10)

Unit-I : Mammalian Hormones derived from lipids **07 marks**

General introduction to hormones, Physiological and Biochemical role of Steroidal hormones: Cortisol, Cortisone, Aldosterone, Testosterone, Progesterone and Cholecalciferol; Eicosanoids: Prostaglandins, Thromboxanes and Leucotrienes.

Unit-II: Hormones derived from Aminoacids, Peptides and Proteins **07 marks**

Physiological and biochemical role of: Thyroxine (T_4 and T_3), adrenalin and nor-adrenalin, Vasopressin, ACTH, Angiotensin and Erythropoietin, Insulin, Glucagon, growth hormone, parathormone, and calcitonin.

Unit-III: Enzymes **07 marks**

Introduction to a biochemical reaction. Cofactors and coenzymes. Nature and classification of enzymes, giving at least two examples in each group. Enzyme assay, unit of activity. Factors affecting enzyme activity, e.g. effect of substrate, pH, temp., activators and inhibitors. Michaelis-Menten Equation and Significance of Km.

Unit-IV: Lipid Metabolism **07 marks**

Action of lipases, activation and transport of fatty acids, b-oxidation, ketosis. Malonyl SCOA formation and Biosynthesis of fatty acids. Brief account of cholesterol biogenesis and arterosclerosis.

Unit-V: Nucleic acid Metabolism **07 marks**

Biosynthetic pathways for purines and pyrimidine-nucleotides. Salvage pathways. Hyper-uricemia gout and Lesch-Nyhan syndrome. Synthesis of deoxyribo nucleoside diphosphates and triphosphates.

Unit-VI: Carbohydrate Metabolism – Part I **07 marks**

Interconversion of hexoses (Fructose, Galactose, Mannose). Aerobic and anaerobic glycolysis; Aspartate–Malate and a-glycero phosphate Shuttle pathways. Hexose monophosphate/Pentose Phosphate Reductive Pathway. Glucuronic acid pathway. Glycogenesis/starch synthesis and glycogenolysis.

Unit-VII: Carbohydrate Metabolism – Part II **07 marks**

Citric acid / Tricarboxylic acid cycle and its amphibolic role. Electron Transport Chain and bioenergetics. Gluconeogenesis and photosynthesis : (C_3, C_4 and CAM pathways).

Code : 234

BIOCHEMISTRY

Maximum Marks: 100

Theory: 70 **Practical: 30**

Time 3 hrs.

Note : Each unit comprises of 10 lectures and 10 marks.

Unit-I : Biophysical Chemistry — 05 marks

Water, pH, pKa, buffers, Hydrophilicity, hydrophobicity. Hydrogen-bonding, vander Waal and ionic interactions. Osmosis, diffusion, dialysis.

Unit-II : Cell and subcellular Organeller Structure and Function - Part I — 06 marks

Plasma membrane: fluid mosaic model, extrinsic, intrinsic and transmembrane proteins. Transport: uniport, antiport and symport. Endoplasmic reticulum, Golgi apparatus, lysosomes and vacuoles.

Unit-III : Cell and subcellular Organeller Structure and Function - Part II — 06 marks

Nucleus, Ribosomes, Mitochondrion, Chloroplasts: Nucleolus/nucleolo-nucleosomal region, Inner-mitochondrial membrane and matrix, organization of chloroplast and ribosome.

Unit-IV : Digestion and Absorption of Food — 06 marks

Digestion and absorption of carbohydrates, proteins and lipids. Role of enzymes in digestion, bile salts in emulsification of lipids and other factors in absorption. Role of non-digestable dietry constituents.

Unit-V : Chemistry of Carbohydrates — 06 marks

Classification of carbohydrates, Isomerism in monosaccharides: Spatial/stereo-isomerism: Epimerism and anomerism. Optical isomerism. Important disaccharides: Sucrose, lactose, maltose etc. Important polysaccharides: Starch/glycogen, cellulose, chitin and glycosamine, glycans.

Unit-VI : Chemistry of Amino Acids and Proteins — 06 marks

Amino acids of proteins. Essential and non-essential amino acids. Classification of amino acids based on R group, charge, hydrophobicity, aromatic, heterocyclic and sulfur-containing. Peptide bond. Classification of proteins based on function e.g. Structural, transport, catalytic, regulatory, hormones, antibodies and chromoproteins.

Unit VII: Chemistry of Lipids — 06 marks

Classification : Fatty acids (Odd and even C; saturated, usaturated, branched), glycerides. Phospholipids (phosphoglycerides: Lecithins, cephalins, phosphoionisitides and phosphosphingolipids). Glycolipids and Lipoproteins.

Unit VIII: Chemistry of Nucleic Acids — 06 marks

Introduction to nucleotides and deoxyribonucleotides.

Organization of nucleotides in DNA and RNA

Structure of B-DNA. Types of RNA : mRNA, tRNA, rRNA.

Unit IX: Water-soluble Vitamins — 06 marks

Structure, physiological and biochemical (coenzyme) role of : Thiamine, Riboflavin, Niacin, Pyridoxine, Coenzyme A, Biotin; Cyanocobalamine, Folic acid, Vitamin-C.

Unit X: Fat-soluble Vitamins — 06 marks

Structure, physiological and biochemical/hormonal role of : Vitamin A (with emphasis on Visual cycle), Vitamin D (and its role in bone formation), Vitamin E (with emphasis on its role as biological antioxidant) and Vitamin K (with stress on its role in blood coagulation).

Unit XI: Nutrition : Macro and Micro — 06 marks

Introduction, calorific values of carbohydrates, proteins and lipids. Class A and Class B proteins/Essential amino acids. Essential fatty acids. Protein-/calorie malnutrition. Importance of minerals, iron, calcium, phosphorus, Iodine, Copper, Na^+, K^+, Zinc. Brief introduction to anaemia, rickets and Goiter.

Unit XII: Instrumentation — 05 marks

Introduction to : pH metry, colorimetry, centrifugation, electrophoresis, chromatography (adsorption, Ion-exchange, gel-filtration).