

Syllabus for Ph.D Medical Biochemistry Entrance Examination

1. Composition and functions of cell and subcellular organelles. Plasma membrane structure, chemical composition and functions. Transport mechanism across the plasma membrane.
2. Basic biochemistry, chemical properties, classifications, structure and functions of Biomolecules – carbohydrates, lipids, aminoacids, proteins, Purine & Pyrimidine nucleotides, nucleic acids, hormones, hemoglobin, myoglobins and plasma proteins.
3. Classification of enzymes, co-enzymes, mode of action of enzymes, Michaelis constant, enzyme kinetics, factors influencing enzyme activity, enzyme inhibition: competitive inhibition, non-competitive inhibition, suicide inhibition. Specificity of enzymes. Clinical enzymology.
4. Balanced diet, PEM, Fat soluble vitamins (A,D,E,K)- chemistry, functions, requirements and deficiency manifestations. Water soluble vitamins (B,C)- chemistry, functions, requirements and deficiency manifestations. Functions, requirements and deficiency manifestations of major and trace elements.
5. Redox potential, Biological oxidation, high energy compounds, organization of electron transport chain, flow of electrons, Oxidative phosphorylation, Chemi- osmotic theory, ATP synthase, inhibitors of ATP synthesis, Uncouplers of Oxidative phosphorylation. Free radicals, Reactive oxygen species, free radical scavenger systems, Lipid peroxidation, Chain breaking anti-oxidants, Preventive anti- oxidants.
6. Digestion and absorption of carbohydrates, Proteins and lipids. Digestion of medium chain fatty acids, absorption of amino acids.
7. Major and minor metabolic pathways of glucose: Glycolysis, Gluconeogenesis, Glycogen synthesis and breakdown, Hexose monophosphate shunt pathway, Uronic acid pathway, galactose, mannose and fructose metabolism. Metabolism of fatty acids. Synthesis of triglycerides, Cholesterol, Lipoproteins and Amino acid metabolism, Urea cycle. Citric acid cycle, significance of TCA cycle, amphibolic role, regulation. Metabolic adaptations during starvation and metabolic profile in organs. Detoxification and biotransformation of Xenobiotics.
8. Basics of purine and pyridine nucleotides metabolism. Basics of replication of DNA, transcription, post-transcriptional processing, genetic code, translation, post-translational processing. Recombinant DNA technology. Molecular biology techniques: blotting techniques, DNA finger printing, RFLP, DNA sequencing, PCR, hybridoma technology.
9. Basic elements of Immunology, structure of immunoglobulins, classes of immunoglobulins, immunodeficiency states, molecular structure of antigens, HLA antigens, cytokines, and lymphokines.
10. Mechanisms of acid-base balance, Henderson-Hasselbalch equation, buffers, Acidosis and Alkalosis. Electrolyte concentration of body fluid compartments, regulation of sodium and water balance. Body fluids & its composition: milk, colostrum, Aqueous humor, cerebrospinal fluid, amniotic fluid, urine- normal and abnormal constituents. Liver function tests, Kidney function tests and pancreatic function test.