Syllabus for Ph.D., Entrance Examination
Biochemistry
Faculty of Applied Science &Technology

CHEMICAL BONDING AND STEREOCHEMISTRY:

Chemical bonds - covalent bond, covalent - coordination bond, ionic bond, hydrogen bond and hydrophobic interactions. Optical and geometrical isomerism, recimization, sterioisomers, enantiomers, diasteromers and chirality.

BIOMOLECULES:

Classification, chemistry, properties and uses of monosaccharides, disaccharides, oligosaccharides, amino acids, fatty acids, and nucleotides, Vitamins and Minerals - classification of vitamins, general study on sources and use of fat soluble and water-soluble vitamins. Detailed studies, deficiency symptoms and uses of Vitamin A, Vitamin D, thiamin, riboflavin, ascorbic acid, niacin. Sources and functions of sodium, potassium, iodine, magnesium, iron and zinc

BIOLOGICAL MACROMOLECULES:

Polysaccharides - structure, classification, significance and uses of homo and heteropolysaccharides, Proteins - structural and functional classification of proteins and protein diversity. Structural hierarchy - primary, secondary, tertiary and quaternary structure of Proteins. n-terminal, c-terminal detection of protein and complete protein sequencing, Lipids - structure and classification and properties of storage lipids and structural lipids, Nucleic acids - study of RNA, DNA and topology of DNA, Watson and Crick model of DNA. DNA as hereditary molecule, types of RNA and DNA molecules found in biological diversity as hereditary molecules.

ENZYMOLOGY:

Definition, classification, and nomenclature of enzymes. Core enzyme and holoenzymes. Enzyme assay techniques, enzyme catalysis and enzyme kinetics. Study of Michaelis Manton equation, lb plot and their significance. Enzyme inhibition. Active site conformation and active site investigation. Mechanism of activity of RNAse, chymotrypsin and carboxypeptidase

METABOLISM:

Carbohydrate Metabolism - catabolism of starch, glycolysis, TCA cycle, pentose phosphate pathway and gluconeogenesis, Amino Acid Metabolism - biosynthesis and degradation of aromatic amino acids and alpha-glutarate family amino acids, Lipid Metabolism - biosynthesis and degradation of even chain fatty acids, tag and structural lipids, Nucleotide Metabolism - biosynthesis and biodegradation of purine and pyramidine nucleotides.

BIOANALYTICAL TECNIQUES:

Basic principles of sedimentation, preparative centrifugation, analytical centrifugation; Adsorption chromatography, Ion-exchange chromatography, Molecular exclusion chromatography, Thin-layer chromatography, Gas chromatography, HPLC; Electrophoresis of proteins and nucleic acids, UV-Vis spectroscopy, Fluorescence spectroscopy, Circular dichroism spectroscopy, X-ray spectroscopy, ESR, NMR; Immuno precipitation, Immuno blotting; light microscope, electron microscope.