SYLLABUS FOR PH. D. ENTRANCE TEST BIOCHEMISTRYUNITRY

UNIT I

BIOLOGICAL MACROMOLECULES: Polysaccharides - structure, classification, significanc, Proteins - structural and functional classification of proteins. Structural hierarchy of Proteins. N-terminal, C-terminal detection of protein and complete protein sequencing, Lipids – structure, classification and properties of 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 SYSTEM

UNIT II

ENZYMOLOGY & METABOLISM: Definition, classification, and nomenclature of enzymes. Enzyme catalysis and enzyme kinetics. Study of Michaelis Mânton equation, Enzyme inhibition. Active site conformation and active site investigation. Mechanism of action of RNAse, chymotrypsin and carboxypeptidase, Allosteric enzymes.

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.

UNIT III

MOLECULAR BIOLOGY & GENETIC ENIGINEERING: DNA Replication - evidence of semiconservative mode of DNA replication. Enzymes of DNA replication in E-coli. Process of DNA replication in E-coli and eukaryotes. Transcription - transcription factors, mechanism of transcription in E-coli and eukaryotes, Translation - translation factors, mechanism and process of protein synthesis in E-coli and eukaryotes. Gene Cloning - methods of gene cloning, vectors for cloning DNA fragments, cDNA, transformation, selection of transformants, expression and over expression, characterization of cloned DNA, production of biosimilars by recombinant DNA technology.

UNIT IV

IMMUNOLOGY: Immunity, types of immunity, immune responsiveness, humoral immune responce, specific and non-specific cell mediated immune response, effector-molecules and cells of immune response. Split-gene concept of immunoglobulin genes, MHC and its significance in immune response.

UNIT V

GENERAL PHYSIOLOGY: Digestive System - digestive system and digestion and absorption of carbohydrates, proteins and lipids, Cardiovascular System - blood volume and composition, circulatory system, mechanism of blood clotting. Nervous System - sensory and motor nervous

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system, action potential, structure of neuron, Excretory System - structure and function of kidney and nephron.

UNIT VI

SEPARATION SCIENCE: Separation of cells and particulate matter by filtration and centrifugation. Velocity sedimentation and density-gradient centrifugation. Chromatography - partition, chromatography, adsorption chromatography. Paper chromatography, thin layer chromatography, column chromatography, high performance liquid chromatography and gas liquid chromatography. Extraction and separation of proteins, enzymes and biosimilars using ion exchange chromatography, gel filtration chromatography and affinity chromatography.

UNIT VII

FOUNDATIONS OF RESEARCH: Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method – Understanding the language of research – Concept, Construct, Definition, Variable.

UNIT VIII

RESEARCH PROCESS: Problem Identification & Formulation – Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance

UNIT VIII

EXPERIMENTAL DESIGN: Concept of Independent & Dependent variables. Qualitative and Quantitative Research: Qualitative research – Quantitative research – Concept of measurement, causality, generalization, replication. Merging the two approaches.

UNIT X

DATA ANALYSIS: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Biological Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism.

References:

1. Biochemistry. Donald Vote, Judith Voet. 4thEdn. John Wiley and Sons, NY.
2. Lehninger. Principles of Biochemistry. Nelson and Cox. 5thEdn.W.H.Freeman and company.
3. Text Book of Biochemistry with clinical correlations. Thomas Devlin. Wiley-Liss.
4. Biochemistry. David Rawn. Neil Patterson Publishers.
5. Biochemistry. Zuby 4th Edn. WMC Brown Publishers.
6. Immunology: International Edition: Janis Kuby, Thomas J. Kindt, Barbara A. Osborne and Richard A. Goldsby. WH Freeman and Co. Ltd.
7. Research methodology: C.R.Kothari.

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