MOHAMMAD ALI JAUHAR UNIVERSITY,RAMPUR SYLLABUS FOR PHD ENTRANCE

BIOCHEMISTRY

Research Methodology (Compulsory)

1. **Basic concept of research problem** • Rationale of research • Identification of research problem • Research objective • Types of research- fundamental/ applied/ action/ quantitative/ qualitative etc and research process.
2. **Review of literatures** • Primary source • Secondary source • Searching e-resources, using search engines • Searching data base • Writing literature review
3. **Methods of research** • Concept and formulation of hypothesis • Survey method Experimental method (variable, designs) • Historical methods.
4. **Sampling of data** • Concept of sampling • Probability sampling techniques Non probability sampling techniques • Sampling error.
5. **Collection of data** • Primary data generation • Secondary data collection Methods of data generation/ collection- by experiments, questionnaire, interview schedule & focus groups.
6. **Analysis of data** • Statistical analysis techniques • Qualitative analysis techniques Application of computer in research data analysis**.**
7. **Report preparation** • Structure and component of research report • Organization of data • Indexing of journal and research output • Citation, references, bibliography Copyright, plagiarism, originality of research work and basic of statistics / Statistical Inferences.

Biochemistry (Core)

I. History and Evolution of Biochemistry Historical milestones in the development of biochemistry. Discovery of enzymes,vitamins, hormones, nucleic acids. Birth of molecular biology and its integration into biochemistry. Key experiments that shaped biochemical understanding (e.g. urea synthesis), central dogma, Meselson- Stahl Experiment).Development of clinical biochemistry as a discipline. Nobel Prize contribution in biochemistry.

II. Biomolecules and Structural Biochemistry Structure and function properties of carbohydrates, lipids, proteins, and nucleic acids. Primary , secondary, tertiary and quaternary structure of proteins Physical and chemical properties of biomolecules. Role of water ,pH, buffers and electrolytes in biological systems. Biological oxidation and reduction reactions. Thermodynamics and bioenergetics in biological system.

Properties of biological membranes and membranes transport mechanism

III. Enzymology Classification and nomenclature of enzymes, Mechanism of enzyme action and active site structure, Enzyme kinetics including Michaelis-Menten and Lineweaver-Burk analysis, Regulation of enzyme active: allosteric regulation, feedback inhibition, Enzyme inhibition: competitive, on-competitive ,uncompetitive,

Isoenzymes and their clinical significance ,Enzyme assays and enzyme immobilization

IV. Metabolism and Bioenergetics Metabolism of carbohydrates, lipids, amino acid, and nucleotides, Integration and regulation of metabolic pathways in different nutritional states, Metabolism of phosphorylation, purines, pyrimidines, and heme,Hormonal regulation of metabolism, Oxidative phosphorylation and mitochondrial function, Intermediary metabolism and energy balance, Metabolism adaptations in physiological and conditions

V. Molecular Biology and Genetic Biochemistry Structure and function of deoxyribonucleic acid and ribonucleic acid, DNA replication , repair mechanisms and recombination, Transcription and post-transcription modification, Genetic code and protein synthesis including post-translation modifications, Gene expression and regulation in prokaryotes and eukaryotes, Techniques in molecular biology such as polymerase chain reaction,blotting techniques and DNA sequencing, Chromatin structure and epigenetic mechanisms, Gene silencing ,gene editing using clustered regularly interspaced short palindromic repeats and associated proteins, Functional genomics and transcriptomics.

VI. Nutritional and Hormonal Biochemistry Macronutrients and micronutrients: structure, function and dietary sources, Nutritional assessment: anthropometry, biochemical markers, and dietary surveys. Role of vitamins and minerals in metabolism and their deficiencies, Endocrine glands and classification of hormones, Mechanism of hormone action via receptor-mediated pathways, Signal transduction pathways.