MOHAMMAD ALI JAUHAR UNIVDERSITY, RAMPUR (UP)
Ph.D. Entrance Exam Syllabus Zoology

Part-I

Research Methodology

Research Aptitude

- Research: Meaning, Types, and Characteristics
- Positivism and Post-positivistic approach to research
- Methods of Research: Experimental, Descriptive, Historical, Qualitative, and Quantitative methods
- Steps of Research
- Thesis and Article writing: Format and styles of referencing
- Application of ICT in research
- Research ethics

Communication

- Communication: Meaning, types, and characteristics of communication
- Effective communication: Verbal and Non-verbal, Inter-Cultural and group communications, Classroom communication
- Barriers to effective communication
- Mass-Media and Society

Data Interpretation

- Sources, acquisition, and classification of Data
- Quantitative and Qualitative Data
- Graphical representation (Bar-chart, Histograms, Pie-chart, Table-chart, and Line-chart) and mapping of Data
- Data Interpretation
- Data and Governance

Information and Communication Technology (ICT)

- ICT: General abbreviations and terminology
- Basics of Internet, Intranet, E-mail, Audio and Video-conferencing
- Digital initiatives in higher education
- ICT and Governan

Part-II

Cell Biology: Cell and its Organelles, Protein translation and modification in the ER, Intracellular traffic, Vesicular traffic in secretory pathway, Protein sorting, Organization of cytoskeleton, Intermediate filaments, Microtubules, Actin filaments, Cilia and centrioles, Cell cycle, Cell division, Cell signaling, Cell-cell adhesion and communication, Cell matrix adhesion, Collagen, Fibrous protein of the matrix, Non-collagen component of the extracellular matrix, Neurons and Muscles, Cell separation and cell culture**.**

Microbiology: History, Spontaneous generation, Golden era of microbiology, Kingdom classification, Techniques used in microbial classification, Ultrastructure of bacterial cell, Viruses, Nutritional classification, Culture media, Pure culture, Cultivation of anaerobic bacteria, Preservation methods, Microbial growth and control, Microbial genetics, Microbes in agriculture, Environmental microbiology, Basics of microbial pathogenesis, Diagnostic methods.

Biochemistry: Biomolecules, Protein structure, functions and characterization, Isolation and chromatographic purification of proteins, Sequence determination, Protein stability, Structural

motifs commonly found in various proteins, Basic concepts of protein structure and folding, Folding pathways, Enzymes, Basic concepts of metabolism, Carbohydrate metabolism, Lipid metabolism, Amino acid metabolism, Urea cycle, Nucleotide biosynthesis and metabolism, Salvage pathways, Metabolic disorders, Synthesis of secondary metabolites.

Molecular Biology: Structure of Nucleic Acids, Genome organization in prokaryotes and eukaryotes, Chromatin organization and packaging, Repetitive and unique sequences, Satellite DNA, DNA methylation, Telomeres and telomerase, DNA topology, Knots and links, Linking number, Writhing and twisting, DNA supercoiling, Topoisomers, DNA replication, DNA Repair and Recombination, Transcription, Genetic code, Ribosome and Translation, Operons, Gene regulation and silencing.

General Zoology: Invertebrates and Vertebrates, Anatomy, Physiology, Homeostasis, Skeletal System and Muscles, Neuro-Endocrine System, Circulatory system, Digestive and excretory systems, Structural and functional characteristics of reproductive system**.**

Developmental Biology: Gametogenesis, Fertilization and Early Development,Morphogenesis and organogenesis in animals (Drosophila and amphibia), Vulva formation in Caenorhabditiselegans, Tetrapod limb development, Metamorphosis of insects and amphibians, Regeneration, Plant development, Pollination and fertilization, Seed formation, Genetic and hormonal regulation of reproduction.

Biodiversity and Environment: Types, components and significance of biodiversity, Gradients of biodiversity, Levels of biodiversity, Megadiversity zones, Hot spots, Key stone, umbrella and flagship species, Threats to biodiversity, IUCN Red list categories, Rare and Endemic species, Major terrestrial biomes, Biogeographical zones of India, Biodiversity conservation, Bioprospecting, Biodiversity Convention and Biodiversity Act, National and international programs for biodiversity conservation, Environmental pollution and management.

Ecological Principles: Habitat and Niche, Structure and function of ecosystem, Ecological pyramids, Carrying capacity, Components of ecosystem, Food web, Bioaccumulation and Biomagnification, Biogeochemical cycles, Population and community ecology, Interactions, Ecological succession, Environmental Impact Assessment, Environmental laws, Conference of Parties.

Immunology: History, Cells, Tissue Organization and Immune Response Mechanisms, Structure and Functions of B, T and NK Cells, Complement System and Histocompatibility, Blood grouping, Agglutination, Precipitation, Immunodiffusion, Immuno-electrophoresis, Coomb's test, RIA, ELISA, ELISPOT, Antibody engineering, Production of hybridoma and monoclonal antibodies, Diseases of relevance to the immune system, Vaccines**.**

Genetics: Historical perspectives, Basic principles of Mendelian Inheritance, Alleles and multiple alleles, Human pedigree analysis, Linkage analysis and gene mapping in eukaryotes, Coupling and repulsion phases, Crossover and recombination., Chromosome Aberration, Complementation analysis and fine structure of gene, Complementation and recombination, Concept of cistron, Chloroplast and Mitochondrial inheritance, Population genetics, Calculation of allele frequencies, Calculating frequency of sex-linked alleles.

Genetic Engineering: Isolation of nucleic acids, Restriction and modifying enzymes, Cloning and expression vectors, Gene libraries, Mechanism of transformation of bacterial and nonbacterial cells, Gel retardation, DNA footprinting, S1 mapping, Exon trapping, Ribonuclease protection assay, R looping, DNA fingerprinting, DNA sequencing, DNA hybridization, Site directed mutagenesis, Genome editing with CRISPR/Cas, Applications and ethical issues of genetic engineering.