SCHOOL OF BIOLOGICAL AND LIFE SCIENCES

PHD ENTRANCE SYLLABUS WINTER 2023-24

Ph.D. Zoology

Non-chordates and chordates: General Characteristics of Kingdom Animalia and Basis of Classification, Introduction to invertebrates with their general characters, Basic body plan, Concept of Invertebrata v/s Vertebrata and Non-Chordata v/s Chordata. Major and Minor Phyla, Organisation of coelom- Acoelomata, Psedocoemata, Locomotion in Invertebrates, Origin of chordates-origin, evolution and adaptive radiation in Cyclostomata and Pisces, economic Importance of Fishes, Reptiles and Birds. Nutrition in Protozoa, Primitive Nervous Systems: Components of behaviour, nerve net in Coelenterates, Echinoderms. Chordata: Origin and diversity of Chordates, General characters. Comparative Anatomy, Epidermal Integument or Skin Functions, Structure its Derivatives (Glands, Scales, and scutes, digital cornification, horns, feathers, hairs), Integument in different classes of Chordates, Endoskeleton in Vertebrates, Digestive System, Respiratory System.

Developmental Biology: Basic concepts of development, Gametogenesis, fertilization and early development, Morphogenesis and organogenesis in animals, programmed cell death, aging and senescence.

Animal Physiology: Blood and circulation, Cardiovascular System, Respiratory system, Nervous system, Sense organs, Excretory system, Digestive system, Endocrinology and reproduction: Endocrine glands, basic mechanism of hormone action, reproductive processes, neuroendocrine regulation.

Molecular Biology: DNA Replication - evidence of semiconservative mode of DNA replication. Prokayotic and Eukaryoyic replication, Transcription - transcription factors, mechanism of transcription in Prokaryotes and eukaryotes, Translation - translation factors, mechanism and process of protein synthesis in Prokaryotes and eukaryotes.

Biochemical & Biophysical Techniques: Principles of biophysical chemistry (pH, buffer, Reaction kinetics, thermodynamics, colligative properties). Animal Tissue Culture, Plant

Tissue Culture, rDNA Technology, Genomics and Proteomics, Genetic Engineering, Fluorescence and Absorbance Spectroscopy, Microscopy.

Biomolecules and enzymology: Classification, composition, structure, properties, functions and uses of carbohydrates, proteins, lipids, nucleic acids and Vitamins and Minerals, enzymes classification, and nomenclature of enzymes. 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. Activity mechanisms of different enzymes.

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.

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

Biostatistics: Hypothesis testing, T -test, Anova, Correlation and regression, Distribution, Mean, median, mode, standard deviation, error, Probability.