

## **Syllabus for Zoology [Ph.D. Entrance Test 2025-26]**

### **SECTION-C**

Taxonomy & Functional Anatomy of invertebrates and vertebrates (cladistics, life cycles, parasitism, metamorphosis, comparative anatomy, insect pests, aquaculture)

structure and function of biomolecules. Membrane structure and transport, DNA replication, repair, and recombination. Transcription and translation in prokaryotes and eukaryotes, regulation of gene expression: operons, epigenetics, RNA interference, gametogenesis, fertilization, cleavage, and gastrulation. Organogenesis Axis formation and patterning in *Drosophila*, *Xenopus*, chick, and mouse models. Cell-cell communication in development: induction, organizer, gradient theory. Stem cells and regenerative biology. Environmental regulation of growth, teratogenesis

Mendelian principles and extensions (linkage, crossing over, chromosomal mapping). Sex determination and sex-linked inheritance. Mutation types, mutagenesis, and DNA repair mechanisms. Population genetics: Hardy–Weinberg equilibrium, genetic drift, inbreeding, natural selection. Origin of life theories. Microevolution: mutation, genetic drift, migration, selection. Hardy–Weinberg equilibrium and its deviations. Macroevolution: speciation, adaptive radiation, and extinction. Molecular evolution: neutral theory, molecular clocks. Human evolution, fossil records, and molecular evidence.

Comparative physiology of digestion, circulation, respiration, excretion, and nervous systems. Muscle physiology: ultrastructure, contraction mechanism, types of muscles. Neurophysiology: impulse conduction, neurotransmitters, synaptic transmission. Thermoregulation, osmoregulation, and ionic balance. Stress physiology and adaptation. Structure and function of vertebrate endocrine glands. Hormones: biosynthesis, secretion, transport, mechanism of action. Regulation of growth, metabolism, reproduction, and stress response. Endocrine disorders (hypo/hyper-secretion syndromes). Comparative endocrinology of invertebrates and vertebrates.

Ecosystem structure and function, energy flow, productivity, and ecological pyramids. Population dynamics: growth models, interactions (competition, predation, parasitism, mutualism). Community ecology: succession, diversity indices, niche concepts. Ecological adaptations in terrestrial and aquatic environments. Applied ecology: conservation biology, biodiversity hotspots, environmental pollution, and impact assessment.