Syllabus for Zoology Master's

Section 1: Subject Knowledge

Please Note: A Total of 40 Questions will be asked, combining the following topics, with the difficulty level commensurate to a Master's Candidate.

Unit I: Genetics and Cytogenetics

Mendelian genetics, complex inheritance patterns, gene interactions, and quantitative traits. Molecular basis of gene structure and function: DNA replication, transcription, translation, and regulation. Epigenetics, population genetics, genomics, and CRISPR genetic engineering.

Unit II: Principles of Gene Manipulation

Media preparation, E. coli culturing, and gene cloning. PCR optimization, primer design, and DNA ligation. Recombinant selection, DNA amplification, purification, restriction digestion, ligation, and E. coli transformation.

Unit III: Comparative Animal Physiology Digestion and nutrition, metabolism, gas exchange, circulation, excretion, neurophysiology, and muscle physiology.

Unit IV: Metabolism

Structure, function, and interactions of carbohydrates, lipids, proteins, and nucleic acids. Cell membrane dynamics, transport mechanisms, and cytoskeleton components (actin filaments, microtubules, intermediate filaments) involved in cell motility and motor protein functions.

Unit V: Developmental Biology

Fertilization, zygote formation, cleavage, blastulation, and gastrulation. Axis formation, patterning, and morphogenesis. Organogenesis (heart, brain, limbs) and stem cells' role in development, regeneration, and differentiation.

Unit VI: Systematics, Biodiversity and Evolution

Definition, history, and theories of classification. Trends in biosystematics: chemotaxonomy, cytotaxonomy, and molecular taxonomy. Species concepts and infraspecific categories. Taxonomic keys and their types. ICZN principles, scientific naming rules, synonyms, homonyms, and tautonymy.

Unit VII: Immunology

Physical, chemical, and biological barriers. Pattern recognition receptors (PRRs), complement system, and inflammatory response. Phagocytosis, antigen presentation, and development of T and B lymphocytes. Antigen recognition (BCR, TCR), clonal selection, T-cell activation, and differentiation.

Unit VIII: Molecular Cell Biology

DNA structure, replication, transcription, and RNA processing. Translation and protein synthesis. Gene expression regulation (epigenetics, histone modifications, non-coding RNA). Stem cells, differentiation, embryogenesis, and cell fate determination.

Unit IX: Ecology

Biodiversity, Climate change, Community ecology, Ecosystem, Environment Impact Assessment (EcIA), Environmental governance, Includes environmental laws, policies, and treaties, Animal ecology, Behavioral ecology.

Section 2: Fundamental Skills

Please Note: A Total of 24 Questions will be asked, combining the following topics, with the difficulty level commensurate to a Master's Candidate.

Unit I: Data Analysis Unit II: Math and Statistics Unit III: Lab skills Unit IV: Reading and Writing

Section 3: Specific Skill Proficiency

This section has more than 30 skills. You can select the ones you are proficient in from the enrollment form. You can choose a maximum of 4 skills. Each skill contains 10 questions.

