Syllabus for Zoology Bachelor'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 Bachelor's Candidate.

Unit I: Cell Biology

Cell structure (membrane, cytoplasm, organelles), function, growth, division, and death. Cell processes: cycle regulation, signal transduction, and apoptosis. Cell communication and division (mitosis, meiosis). DNA organization, replication, and diversity of cell types (specialized cells, cancer cells, stem cells).

Unit II: Bio-Chemistry

Structure and function of carbohydrates, lipids, proteins, vitamins, and minerals. Key metabolic pathways: glycolysis, oxidative phosphorylation, gluconeogenesis, ketone bodies, and photosynthesis. Aerobic/anaerobic respiration, energy derivation, regulation, catabolism/anabolism, and metabolic disorders. Digestive organs and cell metabolism.

Unit III: Molecular Biology

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

Unit IV: Ecology

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

Unit V: Evolution

Definition, history, and theories of classification. Trends in biosystematics: chemotaxonomy, cytotaxonomy, molecular taxonomy. Species concepts (typological, nominalistic, biological) and infraspecific categories. Taxonomic keys, their types, and ICZN principles for scientific naming, synonyms, and homonyms.

Unit VI: Biodiversity & Environment Conservation

Biodiversity: genetic, species, and ecosystem diversity, and India's biogeographic classification. Value of biodiversity. Levels of biodiversity and threats. Conservation strategies: in-situ and ex-situ methods. Natural resources: renewable vs. non-renewable and individual roles in conservation.

Unit VII: Immunology

Antigens, immunogenicity, and antigen specificity. MHC types, antigen processing, and presentation. Immunoglobulin structure, antibody production, monoclonal and polyclonal antibodies. Complement system activation pathways. Antigen recognition, lymphocyte activation, and acquired immune responses.

Unit VIII: Genetics

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

Unit IX: BioTechniques

SDS electrophoresis and Western Blotting, ELISA, Dot Blot, Cytotoxic Assay-LDH, Principle and instrumentation of UV-visible and fluorescence spectroscopy. Exercises: Determination of the absorption maxima and molar extinction coefficient . Measurement of fluorescence spectrum.

Unit X: Developmental Biology

Fertilization, zygote formation, cleavage, blastulation, and gastrulation. Axis formation and patterning, morphogenesis, and organogenesis. Role of stem cells in development, regeneration, and differentiation mechanisms.

Unit XI: Biostatistics

Statistics in biology and health sciences. Data types, presentation methods, and introduction to statistical software (R/SPSS). Basic probability theory, distributions, and Central Limit Theorem. One-way and two-way ANOVA, assumptions, post-hoc tests, and result interpretation.

Unit XII: Animal Physiology

digestion and nutrition, metabolism, gas exchange, circulation, excretion, neurophysiology, and muscle physiology.

Unit XIII: Recombinant DNA technology

Media preparation, E. coli culturing, gene cloning, and functional analysis. PCR optimization, primer design, DNA ligation, and recombinant selection. Practical exercises include DNA amplification, purification, restriction digestion, ligation, and E. coli transformation.

Section 2: Fundamental Skills

Please Note: A Total of 28 Questions will be asked, combining the following topics, with the difficulty level commensurate to a Bachelor'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 2 skills. Each skill contains 10 questions.