

**KAKATIYA UNIVERSITY, WARANGAL, (TS)**  
Ph.D Entrance Test  
**ZOOLOGY - SYLLABUSs**

**Unit-I: Biosystematics & Structure, Function Of Invertebrates**

1. Concepts of species & hierarchical taxa, Biological nomenclature, Classical & quantitative methods of taxonomy of animals.
2. Classification of animals; General characters and Classification of Invertebrates.
3. Nutrition, Locomotion and Reproduction in Protozoa, Diseases of Protozoa.
4. Patterns of feeding and Respiratory organs in invertebrates
5. Organs of Excretion in invertebrates, Coelom formation.
6. Trends in Evolution of nervous system in invertebrates.
7. Common Helminthic parasites of Man and their life cycles.
8. Crustacean Larvae, useful and harmful insects, metamorphosis in insects.
9. Respiration in Mollusca, Pearl formation and Pearl Industry.
10. Larvae of Echinoderm and Evolutionary significance of invertebrate larval forms.

**Unit-II: Structure & Function Of Vertebrates**

1. Origin of Chordata, phylogeny and affinities of Hemichordata Retrogressive metamorphosis,
2. Vertebrate integument development and structure of skin in vertebrates.
3. Comparative account of jaw suspension, vertebral column; girdles and limbs.
4. Comparative account of Respiratory systems of vertebrates.
5. Comparative account of Circulatory systems- Evolution of heart and aortic arches,
6. Comparative account of excretory systems in vertebrates.
7. Comparative anatomy of brain in relation to its function.
8. Comparative account of Central, peripheral and autonomous nervous systems.
9. Adaptations of flight in birds, Migration of birds. Sense organs of chordates.

**Unit-III: Animal Physiology & Ethology**

1. Digestive system - Digestion, absorption, energy balance, BMR.
2. Respiratory system - transport of gases, exchange of gases, neural and chemical regulation of respiration.
3. Blood and circulation - Blood corpuscles, plasma function, blood volume, blood volume regulation, haemoglobin, haemostasis.
4. Cardiovascular System - ECG and its principle and significance, cardiac cycle, heart as a pump, blood pressure.
5. Excretory system - urine formation, regulation of water balance, acid-base balance.
6. Thermoregulation - Comfort zone, body temperature – physical, chemical, neural regulation, acclimatization.
7. Nervous system - Neurons, action potential, neural control of muscle tone and posture. Sense organs - Vision, hearing and tactile response.



8. Endocrinology and reproduction - Endocrine glands, basic mechanism of hormone action, gametogenesis, ovulation, neuroendocrine regulation.
9. Approaches and methods in study of behavior; Biological clocks; Social communication; Social dominance; Use of space and territoriality;
10. Parental care; Aggressive behavior; Habitat selection and optimality in foraging.

#### Unit-IV: Genetics & Evolution

1. Mendelian principles- Dominance, segregation, independent assortment.
2. Concept of gene, Extensions of Mendelian principles. linkage and crossing over.
3. Gene pool, Gene frequency; Hardy-Weinberg Law; genetic drift; Speciation.
4. Gene mapping methods, mapping by using somatic cell hybrids.
5. Inheritance of Mitochondrial and chloroplast genes.
6. Methods of genetic transfers – transformation, conjugation, transduction and sex-duction, karyotypes.
7. Polygenic inheritance, QTL mapping and Mutation.
8. Structural and numerical alterations of chromosomes.
9. Lamarckism, Darwinism, Mendelism, The modern synthesis theory of evolution.
10. Molecular divergence and molecular clocks; Molecular tools in phylogeny.

#### Unit-V: Biochemistry

1. Structure of atoms, molecules and chemical bonds.
2. Composition, structure and function of biomolecules.
3. Principles of biophysical chemistry (pH, buffer, reaction kinetics, thermodynamics, colligative properties).
4. Stabilizing interactions.
5. Bioenergetics, glycolysis, oxidative phosphorylation, coupled reaction.
6. Metabolism of carbohydrates, lipids, amino acids nucleotides and vitamins.
7. Enzymes and enzyme kinetics, enzyme regulation,
8. Mechanism of enzyme catalysis, isozymes.
9. Ramachandran plot, secondary structure, domains, motif and folds.
10. Helix (A, B, Z), t-RNA, micro-RNA.

#### Unit-VI: Environmental Biology

1. Ecosystem structure and function; energy flow and biogeochemical cycling.
2. Physical environment; biotic environment; biotic and abiotic interactions.
3. Concept of habitat and niche; Different types of Ecosystems.
4. Characteristics of a population; population growth curves; population regulation; concept of meta-population.
5. Types of species interactions, interspecific competition.
6. Nature of communities; levels of species diversity and its measurement; edges and ecotones.
7. Ecological Succession
8. Major terrestrial biomes; bio-geographical zones of India.
9. Environmental pollution; global environmental problems; biodiversity: status, monitoring and documentation.
10. Principles of conservation, Indian case studies on conservation/management strategy (Project Tiger, Biosphere reserves).



### Unit-VII: Methods in Biology

1. Light microscopy, resolving powers of different microscopes, scanning and transmission electron microscopes.
2. General principles for the preparation of Tissue for Histological studies.
3. Detection of molecules using ELISA, RIA, Western blot, immune-precipitation, flo-cytometry, in situ localization by techniques such as FISH and GISH.
4. Different Statistical methods used in Biology. Radiolabeling Techniques.
5. Types of Cell Culture techniques, cryo-preserving technique.
6. Electrophysiological methods.
7. Molecular analysis using UV/visible, fluorescence, circular dichroism, NMR and ESR spectroscopy.
8. Molecular structure determination using X-ray diffraction and NMR, different types of mass spectrometry.
9. In vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms.
10. RFLP, RAPD and AFLP techniques.

### Unit-VIII: IMMUNOLOGY

1. Cells and tissues of the immune system.
2. Innate and adaptive immune system. Cells and molecules involved in innate and adaptive immunity.
3. Antigens, antigenicity and immunogenicity.
4. Activation and differentiation of B and T cells, B and T cell receptors.
5. B and T cell epitopes, structure and function of antibody molecules, monoclonal antibodies.
6. Antigen-antibody interactions, MHC molecules, antigen processing and presentation.
7. The complement system, Toll-like receptors, cell-mediated effector functions.
8. Inflammation, hypersensitivity and autoimmunity, immune response during different infections, Vaccines.
9. General features of tumours immunity, immune responses to tumours.
10. Bone marrow transplantation immunology.

### Unit-IX: Cell & Molecular Biology

1. Structural organization and function of intracellular organelles.
2. Structure of chromatin and chromosomes, heterochromatin, euchromatin, transposons.
3. Cell division. Cell cycle and its regulation.
4. Signal transduction pathways.
5. Apoptosis, therapeutic interventions of uncontrolled cell growth.
6. DNA replication, DNA damage and repair, DNA recombination.
7. Protein synthesis; Control of gene expression at transcription and translation level.
8. Transgenic animals and plants, molecular approaches to diagnosis and strain identification.
9. Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems.
10. Genomics and its application to health and agriculture, including gene therapy.

*Immunology?*

*Approved the  
Syllabus  
Avinash  
Bogalwar*



**Model Question Paper**  
**Ph.D Entrance Test in ZOOLOGY**

Max. Marks: 100  
Time: ~~3~~ 2 hours ~~30 min~~ <sup>45</sup>

The examiner will set 100 questions (cover the entire syllabus), each having four options: (1), (2), (3) and (4). All questions will be compulsory. The objective type questions are the following four types:

1. **General Multiple Choice Questions:** Choosing one answer from given alternatives (each response can be given in a different mark) (60 questions: one six questions from each unit)
2. **Multiple response:** Choosing a number of answers from a list (10 questions: one question from each unit)
3. **True/False:** applied to a statement (10 questions: one question from each unit)
4. **Assertion/Reason:** Select correct reason for a particular assertion (10 questions: one question from each unit)
5. **Match the following:** Can be used for simple statements in continuous text (10 questions: one question from each unit)

Unannounced

✓ Approved the  
syllabus  
✓ ✓ ✓

20/05/2022  
Bos Chaitan Persu