

**DETAILED SYLLABUS FOR THE POST OF
WILDLIFE ASSISTANT**

(Category Nos: 500/2019)

(TOTAL MARKS ±100)

PART I : ZOOLOGY (25 Marks)

Module I: Taxonomic principles & Animal Diversity (Marks 3)

Molecular systematics, DNA barcoding, Nomenclature: Binomial and Trinomial nomenclature; International Code of Zoological Nomenclature (ICZN),

Kingdom Animalia: [Salient features of the Major Phyla of animals and their diversity, classification of each phylum down to classes and examples: Study of animal diversity with typical examples from each class, with emphasis on ecological and adaptive features & economic importance].

Module II: Ethology & Evolution (Marks 2)

Definition and History of ethology. Motivation models. Types of behaviours – innate and learnt. Types of learning with examples, Neural mechanisms in behaviour.

Direct evidences of evolution – Recapitulation Theory of Haeckel, Geological time scale, Homologous organs and analogous organs. Lamarckism Weismann's Germplasm theory, Darwinism, Neo-Darwinism,

Population genetics and evolution: Hardy-Weinberg Equilibrium, gene pool, gene frequency: Bottleneck effect and founder effect. Genetic drift and natural selection, punctuated equilibrium and its relevance. Microevolution, Macroevolution, Adaptive radiation -Darwin finches.

Module III: Zoogeography, Biostatics & Bioinformatics (Marks 2)

Geographical distribution of animals, Zoogeographical realms, Biogeography of India.

Role of statistics in life sciences; Sample & Sampling techniques, Collection of data, classification of data, Presentation of data, Measures of Central Tendency.

Biological databases: features of a good database. Classification format of biological databases. Human Genome Project.

Module IV: Biophysics & Biochemistry (Marks 3)

Microscopy: Light microscope, Phase contrast microscope, fluorescent microscope, Electron microscope. Micrometry, Camera Lucida.

Separation techniques: Chromatography, centrifugation, Electrophoresis.

Spectrophotometer: Colorimeter.

Basic structure, biological importance and classification of Carbohydrates, Proteins & Lipids.

Nucleic acids, Watson – Crick model of DNA, Different forms of DNA, secondary and tertiary structure of tRNA.

Enzymes: Chemical nature of enzymes, enzyme activation, enzyme inhibition, allosteric enzymes, isoenzymes, co-enzymes. Glycolysis, Krebs's cycle, glycogenesis, glycogenolysis, gluconeogenesis and HMP pathway.

Module V: Physiology (Marks 3)

Regulation of digestive activity: Nervous and hormonal control, Nutritional requirements – carbohydrates, proteins, lipids, minerals, vitamins sources and deficiency disorders. Digestion of carbohydrate, protein & lipids

Transport of respiratory gases. Respiratory disturbances. Blood: functions and composition, Types of heart, Human heart, ECG; Common cardio-vascular problems. Types of excretion, urea cycle. Human kidney: Urine formation, Mechanism of concentration of urine, hormonal regulation of kidney

function, renal disorders. Hormones- classification and mechanism of hormone action. Major endocrine glands and their hormones, functions and disorders.

Structure of vertebrate skeletal muscle, Mechanism of muscle contraction:

Spermatogenesis, oogenesis, gonadal hormones and their functions. Hormonal control of human reproduction - Female reproductive cycles.

Ultra structure of neuron. Nerve impulse production, transmission of impulse along the nerve fiber, interneuron (synaptic) transmission. Neural disorders.

Module VI: Immunology & Cell Biology (Marks 3)

Innate and acquired immunity, passive and active immunity. Immunization, Vaccines. Mechanisms of innate immunity. Cells of the immune system. Lymphoid organs

Monoclonal & polyclonal antibodies. Hyper sensitivity, types of immunity: humoral and cell mediated immunity.

Cell structure and functions: Plasma membrane, Endoplasmic reticulum, Ribosomes, Golgi bodies, Lysosomes, Mitochondria, Cytoskeleton, Microbodies.

Module VII: Molecular biology, Genetics & Biotechnology (Marks 3)

DNA as genetic material, Modern concepts of gene. Structure and types of DNA & RNA. DNA Replication, DNA repair, Gene and genetic code, Transcription, Translation.

Mendelian Genetics, Allelic & Non Allelic interaction of genes. Multiple alleles, Sex determination, Recombination and Linkage, Sex Linked inheritance,

Autosomal abnormalities, Sex chromosomal abnormalities, Single gene disorder, Autosomal single gene disorder, Inborn errors of metabolism.

Recombinant DNA Technology: Cloning vectors. Blotting Techniques. DNA Finger printing

Module VIII: Ecology & Biodiversity Conservation (Marks 6)

Ecosystem: Components (Abiotic and Biotic), Functions, limiting factors, Biogeochemical cycles, Renewable and Non-renewable resources.

Population ecology: Properties of Population – Density, Natality, mortality, age distribution, biotic potential, environmental resistance, energy carrying capacity. Population growth forms (J and S curves). Emigration, immigration, migration and population fluctuation.

Community ecology: Definition and characters. Community Structure, stratification, Ecotone and Edge effect, Ecological indicators. Community periodicity. Ecological succession- Basic types of succession. Process in succession.

Habitat ecology: Marine, Fresh water & Terrestrial ecology. Population interactions.

Biodiversity: Types, concept and importance. Global environmental issues. National environmental issues. Toxic products and disaster. Local environmental issues. Threats to water resources of Kerala.

Ecological tools and techniques: Commonly used techniques for study of animal populations.

Components of biodiversity, diversity indices, Levels of diversity in community and ecosystem diversity: Alpha, beta and gamma diversities. Hot spots of biodiversity. Hotspots in Indian region.

Biodiversity of Western Ghats. Threats to biodiversity, Threatened fauna- IUCN categories.

Conservation of biodiversity and wildlife: conservation measures. Biodiversity conservation strategies, Ex-situ conservation & In situ conservation. Man-animal conflict. Water conservation. Global strategy for conservation. Environmental laws. WWF, CITES, National parks, Sanctuaries, forest types in India and Kerala, mangrove forest.

PART II : BOTANY (25 Marks)

MODULE 1: PLANT SYSTEMATICS AND MORPHOLOGY: Types of classification: Artificial, Natural and Phylogenetic-Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy-Taxonomic literature- Floras, e-Flora, Monographs, Revisions, Journals and online resources & Databases. Taxonomic literature- Floras, e-Flora, Monographs, Revisions, Journals and online resources & Databases. Cytotaxonomy, Types of inflorescence - Aestivation – Placentation- Floral diagram-Floral formula. Fruit types: Simple, Multiple, Aggregate. Seed structure - dicot and monocot -Seeds: Albuminous, ex-albuminous.

MODULE 2: ENVIRONMENTAL STUDIES AND BIODIVERSITY: Ecosystem-components: Biotic and abiotic-Ecological succession -Food chain- Food web- Ecological pyramid -Natural resources- Renewable, Non renewable-Forest types-reforestation. Ecosystem types: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem (brief account only).

Biodiversity: Concepts, Convention of Biodiversity - Earth Summit-Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism. IUCN categories, RED data book.

Hot spots of India - North Eastern Himalayas, Western Ghats; Endemism.

IUCN categories, RED data book.

MODULE 3: CELL BIOLOGY:Ultra structure of cell wall, molecular organization of cell membranes-Nucleic acids - Structure of DNA, types and functions of RNA-Euchromatin and Heterochromatin, Karyotype-Special types of chromosomes: Lamp brush Polytene and B – chromosomes-Mitochondrial and plastid DNA, plasmids-Cell division: mitosis, meiosis and their significance-Linkage: A brief account and theories of Linkage- Numerical aberrations- Aneuploidy, Euploidy, Haploidy, Polyploidy-Structural aberrations- deletion, duplication, Inversion, translocation.

MODULE 4: GENETICS: Mendelian principles: Mendelian ratios, Monohybrid, dihybrid cross-back cross, test cross-Laws of inheritance. Genetic interactions – Epistasis: Dominant, Recessive, Complementary, Supplementary and inhibitory genes-Linkage: A brief account and theories of Linkage. Crossing over: Mechanism and theories of crossing over. Multiple alleles-General account- ABO blood group-Rh factor.

MODULE 5: PLANT PHYSIOLOGY AND BIOCHEMISTRY: Absorption of water-organs of absorption, root and root hair, Imbibition, Diffusion and osmosis- Plasmolysis- Active and passive absorption-Ascent of sap-Transpiration: Cuticular and lenticular-hydroponics-aeroponics.

Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson

enhancement effect; concept of two photosystems; mechanism of photosynthetic electron transport and Factors effecting Photosynthesis, photophosphorylation. Carbon assimilation pathways: C3, C4 and CAM. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system,

mechanism of oxidative phosphorylation, pentose phosphate pathway.

Growth and Development: Physiological effects of phytohormones–Auxins, gibberellins, cytokinins,

ABA, ethylene and Brassinosteroids.

MODULE 6: MOLECULAR BIOLOGY AND BIOTECHNOLOGY: Replication in eukaryotes and prokaryotes, Mechanism of transcription in Prokaryotes and Eukaryotes, translation. Regulation of gene expression in prokaryotes (Lac and Trp. Operons)- Tissue culture: Introduction, sterilization procedures, explants, culture media – composition and preparation; Micropropagation. Organ culture: Vegetative Organs-Root, Shoot, Leaf culture (Reproductive Organs-Anther, Ovary, Ovule, Embryo culture. Callus culture, Cell and Protoplast culture. Somatic hybrids and Cybrids. Gene cloning-Vectors – cloning vehicles (Plasmid , Cosmids, Bacteriophages , & Phasmids) application of r DNA technology. Gene Libraries: Genomic Libraries, cDNA Libraries, Polymerase chain reaction and its applications. Method of gene transfer in plants (*Agrobacterium* and Microprojectile).

PART III : Forestry (25 Marks)

Forest & Forestry

Forest – various definitions. Classification of forests – based on method of regeneration, age, composition, objects of management, growing stock, ownership and legal status. State of the forests – global, Indian and Kerala scenario- Distribution, species composition and characteristic features with special reference to Kerala. Forestry – definition, history and development of Indian Forestry. Branches of Forestry and their relationships. Forest types in India and Kerala – systems of classification - Champion & Seth revised classification.

Silviculture

Silviculture and Silvics- Objectives and scope. Factors of Locality- Climatic-edaphic- topographic and biotic. Regeneration of forests – Natural regeneration from seed. Natural regeneration from vegetative parts - coppice - root suckers. Artificial regeneration –objectives - essential considerations

Forest management, policy and legislation

Forest Management - Definition, scope, objects and principles. Organization and control of forest property and personnel. Rotation -definitions-various types of rotations-length of rotations-choice of type and kind of rotation. National forest policies-scope and importance-comparative analysis of forest policies of 1894, 1952 and 1988. Significance and provisions of Indian Forest Act 1927, Wildlife Protection Act 1972 and amendments, Forest Conservation Act 1980 and KFA 1961.

Wildlife

Wildlife – Definition and values of wildlife. Behaviour of wild animals. Adaptations of wild animals – aestivation, hibernation, torpor and diapause. IUCN revised red list categories and criteria. Wildlife census – Purpose and techniques. Direct and indirect methods. Threats to wildlife. Ex situ and In situ methods of conservation. Protected areas – concept and design.

Protected area network in India and in Kerala. Central Zoo Authority of India. Introduction and reintroduction of species. Wildlife corridors. MAB and CITES. Human-Wildlife conflict – Reasons, social and economic dimensions-Mitigation and preventive measures- Conflict management in protected areas. Wildlife rescue and Rehabilitation- Basic equipments and field gears. Basic procedures in capturing, handling and releasing of wild animals with minimal stress. Immobilization of wild animals – use of tranquilizers. Translocation of animals. Zoonoses- Concept-Definition-Types-Impacts-Factors of spread-Control. Prevention and control of important zoonoses of wildlife and public health significance.

PART IV : VETERINARY SCIENCE (25 Marks)

1. Veterinary Anatomy and Physiology (3 marks)

Comparative anatomy of bones and joints of the body of herbivores, carnivores and omnivores - Comparative anatomy of organs of digestive, respiratory and urogenital systems – Digestion in monogastric and polygastric animals – Reproduction – Thermoregulation – Wild animal behavior

2. Livestock Production Management (5 marks)

Taxonomy of important wild animals - Status and conservation practices of wild life in India - Management of wild animals - Restraining, capture, handling and physical examination of wild animals - Protection of wild life in nature and captivity - Acts and rules related to wild animals - Human and animal welfare in relation to ecosystem and environmental factors - Animal welfare during natural calamities and disaster management.

3. Animal Nutrition (4 marks)

Feeding habits and feeds of wild animals - Nutrient requirements of ruminants, non-ruminants and carnivores - importance of nutrients in wild animal production and health

4. Veterinary Pathology, Microbiology and Parasitology (5 marks)

Pathological changes affecting digestive, respiratory, musculoskeletal and urogenital systems of wild animals – Pathology and diagnosis of important bacterial, viral and parasitic diseases of wild animals

5. Veterinary clinical and Preventive medicine(5 Marks)

Health and diseases-Infectious diseases caused by bacteria, viruses, parasites, fungus-
Prevention and control-vaccinations- diseases affecting digestive, respiratory, musculo-skeletal
and urogenital systems of wild animals- Metabolic and deficiency diseases and their control

6. Veterinary Public Health and Epidemiology (3 marks)

Epidemiology, clinical manifestations and management of zoonotic diseases - Role of wild
animals and birds in transmission of zoonoses – Environmental pollution

7. Animal – Man Conflict

8. Rescue and Rehabilitation of Orphan or displaced animals

9. Importance of Our Health

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper