ZOOLOGY

Unit 1 : Systematics and Animal Diversity :

Systematics : Principles of Animal taxonomy, Carl Linnaeus taxonomic hierarchy, binomial nomenclature, species concept and taxonomic procedures; Major and minor phyla-diagnostic features with example for each phylum and their classification.

Non-chordata : Organization of Metazoans; amoeboid, flagellate and ciliary locomotion; hydrostatic movement; patterns of feeding and digestion in lower metazoans, respiratory organs and pigments, osmoregulation, excretory organs; primitive and advanced nervous system, sense organs and their importance; larval forms and importance of invertebrate fossils.

Chordata : Origin of chordates, systematic position of protochordates and vertebrates, nature of vertebrate morphology, homology and analogy, parallelism and convergence; classification of vertebrates, vertebrate integument and its derivatives; evolution of circulatory, respiratory and urinary systems; Development and organization of brain, spinal cord, nervous system and sense organs; Adaptive radiation of vertebrates.

Unit 2 : Environmental Biology and Wildlife :

Environment : Abiotic and biotic factors, bio-geochemical cycles, population ecology, demography; air, water and soil pollution; Fresh and marine water ecology; Food chain and food web; Conservation and management of natural resources; Environmental education, Environmental monitoring and EIA; microbial ecology, ecological role of microorganisms.

Wildlife : Values of wildlife, causes of wildlife depletion, human-wildlife conflicts, wildlife and human welfare, conservation strategies - in-situ and ex-situ conservation, wildlife act and legislation, conservation projects in India, Biosphere reserves, National Parks, sanctuaries; Biodiversity profile of India and Karnataka, Biodiversity hotspots.

Unit 3 : Developmental Biology - Molecular events during fertilization, nucleo-cytoplasmic interactions in development, cleavage and gastrulation, morphogenetic determinants, laying down embryonic body plan - Drosophila and mammals; competence, determination; induction, early embryogenesis in Drosophila - gap genes, pair rule genes, segment polarity genes and Homeotic genes, post embryonic development; Role of ecdysone and thyroxin in metamorphosis; sources of cells for regeneration; teratogenesis.

Unit 4 : Biological chemistry – Chemistry of DNA and RNA, Watson-Crick model of DNA, cyclic nucleotides; vitamins as co-enzymes, trace elements; chemical bonds, Vander-waal's force, normality and molarity of solutions; chemistry and biological properties of carbohydrates and lipids; nomenclature of enzymes, enzyme dynamics, enzyme inhibition, ribozymes and abzymes; colorimetry, spectrophotometry, TLC, HPLC, electrophoresis, ELISA.

Unit 5 : Applied Zoology-Insect pests of major crops, plant-insect interaction, insect pest control strategies, IPM; Insect vectors of diseases, epidemiology of - malaria, filariasis, leishmaniasis, Japanese encephalitis, dengue, chikungunya; silkworm races and culture practices, lac culture, venomous insects; fisheries of India, culture practices of-fish, prawn and oyster.

Unit 6 : Basic and advanced genetics- Mendelian principles in haploid organisms (*Chlamydomonas* and *Neurospora*), tetrad analysis, dominance relationships, allelic variation and gene function, types of mutations, molecular mechanisms of mutations, methods of detection of mutations, P-mediated mutagenesis; genome in prokaryotes and eukaryotes, c-value paradox, split genes, mobile genetic elements, mapping of genome, linkage, molecular markers; comparative genomics of *C. elegans, Drosophila*, mouse and *Homo sapiens*; bacterial transformation, transduction and conjugation; morphogenesis and recombination in bacteriophages.

Unit 7 : Cell and Molecular Biology–Ultrastructure of cell organelles and their function; biology of cancer; biology of immune system; gene regulation in prokaryotes and eukaryotes; genetic code; DNA replication, transcription and translation in prokaryotes and eukaryotes, molecular mechanisms of DNA repair, principles and applications of recombinant DNA technology.

Unit 8 : Reproductive Biology and Endocrinology–Functional morphology of female reproductive system - ovary and accessory organs; Functional morphology of male reproductive system - testis and accessory organs; Fertility control methods - barrier, surgical and hormonal; Structure and function of endocrine organs - adrenal, pituitary, thyroid, parathyroid, pancreas, pineal, hypothalamus, ovary and tests; Mechanism of action of endocrine organs.

Unit 9 : Animal Physiology - Aerobic and anaerobic break down of glucose, stepwise release of energy and production of ATP, exchange (at respiratory surface) and transport of respiratory gases; Composition of blood, cardiac cycle, ECG; Different modes of nitrogen excretion, molecular organization of sarcomere and mechanism of muscle contraction; transmission of nerve impulse, sensory transduction, tolerance and resistance; osmoregulation in aqueous and terrestrial environment; thermoregulation.

Unit 10 : Organic Evolution : Darwinism and Neo-Darwinism; Population genetics; Hardy-Weinberg genetic equilibrium and its destabilizing forces; speciation, reproductive isolation, models of speciation, micro and macro-evolution; Neutral theory of evolution, molecular evolution, molecular clock, construction and types of phylogenetic trees.
