

M.Sc. Zoology

PART-A

BIOLOGY OF INVERTEBRATES, VERTEBRATES AND CELL BIOLOGY

Protozoa to Annelida

- Phylum protozoa : General characters and outline classification up to classes.
Type study : *Paramecium*.
Phylum Porifera : General characters and outline classification up to classes.
Type study : *Sycon*; Canal system in sponges.
Phylum Coelenterata : General characters and outline classification up to classes.
Type study : *Obelia*, Polymorphism in Coelenterates; Corals and Coral reef formation.
Phylum Platyhelminthes : General characters and outline classification up to classes.
Type study : *Fasciola hepatica*.
Phylum Nematelminthes: General characters and outline classification up to classes.
Type study : *Ascaris lumbricoides*.
Phylum Annelida : General characters and outline classification up to classes
Type study : Leech; Coelom and coelomoducts in Annelids.

Arthropoda to Hemichordata : Phylum Arthropoda: General characters and outline classification up to classes.
Type study: Prawn; Crustacean larvae; *Peripatus* - Characters and significance. Phylum Mollusca: General Characters and outline classification up to classes. Type study: *Pila*; Pearl formation in Molluscs. Phylum Echinodermata: General characters and outline classification up to classes. Type study: Star fish. General characters of Hemichordata: Structure and affinities of *Balanoglossus*.

Cell Biology : Cell theory. Ultra structure of Animal cell. Structure of Plasma membrane - Fluid-mosaic model. Transport functions of Plasma membrane - Passive transport, active transport (Antiport, symport and uniport) and bulk transport. Structure and functions of Endoplasmic reticulum, Golgi body, Ribosomes, lysosomes and Mitochondria. Chromosomes - nomenclature types and structure, Giant Chromosomes - Polytene and Lampbrush chromosomes. Cell division - Cell-cycle stages (G₁, S, G₂ and M phases), Cell - Cycle check points and regulation. Mitosis; Meiosis - and its significance.

Biomolecules of the cell

Carbohydrates : Classification of Carbohydrates
Structure of Monosaccharides (Glucose and Fructose)
Structure of Disaccharides (Lactose and Sucrose)
Structure of Polysaccharides (Starch, Glycogen and Chitin)

Proteins: Amino acids : General Properties, nomenclature, classification and structure
Classification of proteins based on functions, chemical nature and nutrition, peptide bond and structure (Primary, secondary, tertiary and quaternary structures)

Lipids : Classification. Structure of Fatty acids (Saturated and unsaturated) Triacylglycerols, Phospholipids (Lecithin and cephalin) and Steroids (Cholesterol).

Nucleic acids : Structure of purines, pyrimidines, ribose and deoxyribose sugars. Watson and Crick model of DNA and Chargaff's rule. Structure of RNA, Types of RNA - rRNA and mRNA. Biology of chordates, Embryology, ecology and zoogeography

Protochordata to Amphibia : Protochordates: Salient features of Urochordata and Cephalochordata. Structure and life-history of *Herdmania*. Significance of retrogressive metamorphosis General characters of Chordates. General characters of fishes, classification up to sub-class level with examples. Type study - *Scoliodon* (Morphology, respiratory system, circulatory) system, Urinogenital system, nervous system and sense organs) Types of scales. General characters and classification of Amphibia up to order level. Type study- *Rana* (Morphology, digestive system, respiratory system, circulatory system, excretory system, nervous system and reproductive system). Parental care in amphibia.

Reptilian to Mammalia : General characters and classification of Reptilia up to order level. Type study - *Calotes*: Digestive system, respiratory system, circulatory system, nervous system and urinogenital system. General characters and classifications of Aves up to order level with examples *Columba livia* (Exoskeleton, respiratory system, circulatory system excretory system, nervous system and reproductive system). Flight adaptations in birds; Significance of migration in birds. General characters and classification of Mammalia up to order level with examples. Dentition in mammals.

PART-B

EMBRYOLOGY, ECOLOGY, ANIMAL PHYSIOLOGY, GENETICS AND EVOLUTION

EMBRYOLOGY : Gametogenesis and Fertilization, Types of eggs and cleavages, Development of frog up to gastrulation and formation of primary germ layers Foetal membranes and their significance, Placenta: Types and functions

ECOLOGY : Biogeochemical cycles - Gaseous cycles of Nitrogen and Carbon dioxide. Sedimentary cycle-phosphorus. Definition of community - Habitat and ecological niche Community interactions : Brief account of competitive, predation, mutualism, commensalism and parasitism. Ecological succession. Population ecology: Density, mortality and natality, growth curves Population regulation mechanisms - both biotic and abiotic Zoogeography: Zoogeographical realms. Fauna of Oriental, Ethiopian and Australian regions.

PHYSIOLOGY OF DIGESTION : Definition of digestion and types of digestion – extra and intracellular. Digestion of carbohydrates, proteins, lipids and cellulose. Absorption and assimilation of digested food materials. Gastrointestinal hormones – control of digestion.

PHYSIOLOGY OF RESPIRATION : Types of respiration – external and internal respiration. Structure of mammalian lung and gaseous exchange. Transport of oxygen – formation of oxyhemoglobin and affinity of hemoglobin to oxygen, oxygen dissociation curves. Transport of CO₂ – Chloride shift. Bohr effect Cellular respiration – Main steps of glycolysis. Krebs cycle, electron transport. Oxidative phosphorylation and ATP production.

PHYSIOLOGY OF CIRCULATION : Open and closed circulation Structure of mammalian heart and its working mechanism. Heart beat and cardiac cycle. Myogenic and neurogenic hearts. Regulation of heart rate – Tachycardia and Bradycardia.

PHYSIOLOGY OF EXCRETION : Definition of excretion Forms of nitrogenous waste products and their formation: Classification of animals on the basis of excretory products. Gross organization of mammalian excretory system and structure of kidney. Structure and function of Nephron – Counter current mechanism

PHYSIOLOGY OF MUSCLE CONTRACTION : General structure and types of muscles. Ultra structure of skeletal muscle. Sliding filament theory of muscle contraction. Chemical changes during muscle contraction – role of calcium, ATP utilization and its replenishment.

PHYSIOLOGY OF NERVE IMPULSE : Structure of nerve cell. Nature of nerve impulse – resting potential and action potential. Properties of nerve impulse – threshold value, refractory period, all or none response. Conduction of nerve impulse along an axon – local circuit theory and Salutory conduction theory. Structure of synapse, mechanisms of synaptic transmission – electrical and chemical

PHYSIOLOGY OF ENDOCRINE SYSTEM : Relationship between hypothalamus and pituitary gland Hormones of hypothalamus. Hormones of Adenohypophysis and Neurohypophysis. Hormones of pineal gland, thyroid gland, parathyroid, thymus, adrenal and pancreas. Endocrine control of mammalian reproduction – Male and female hormones - Hormonal control of menstrual cycle in humans.

PHYSIOLOGY OF HOMEOSTASIS : Concept of Homeostasis and its basic working mechanism. Mechanism of Homeostasis – Giving three illustrations viz., Hormonal Control of glucose levels, Water and ionic regulation by fresh water and Marine animals and temperature regulation in man

GENETICS : Mendel's laws – Law of segregation and independent assortment: Gene interaction - Incomplete dominance Co-dominance and epistasis Identification of DNA as genetic material – Griffith's experiment and Hershey – Chase Experiment. Central dogma of molecular biology – Brief account of DNA (Semi conservative method) Replication fork (continuous and discontinuous synthesis); Transcription – Brief account of initiation, elongation and termination in eukaryotes: Translation; Genetic code: gene regulation as exemplified by Lac operon. Human karyotyping, bar bodies and Lyon hypothesis and Amniocentesis, chromosomal disorders – autosomal and sex chromosomal.

ORGANIC EVOLUTION : Genetic basis of Evolution. Gene pool and gene frequencies, Hardy – Weinberg's law. Force of destabilization, natural selection, genetic drift, Mutation, Isolation and Migration Speciation – Allopatry and sympatry Evolution of Man

APPLIED ZOOLOGY:

FISHERIES AND AQUACULTURE : Capture fisheries – Introduction. Types of fisheries, Fishery resource from Freshwater. Fin-fish and shell-fish fisheries. Fishing gears and fishing crafts. Site selection criteria. Aquaculture systems. Induced breeding. Hatchery design and Management. Shrimp and prawn culture. Post-harvest technology. Preservation and processing – Freezing, solar drying, canning, salting smoking

CLINICAL SCIENCE : Hematology. Blood composition and functions. Blood groups and Rh factor, transfusion problems. Blood diseases – Anemia, Leukemia, Leucocytosis, Leucopaenia. Biopsy and autopsy – Clinical importance

Immunology: Types of immunity – Innate and acquired, organs of immune system. Antigens – Haptens and epitopes. Structure and biological properties of human immunoglobulin G (IgG). Humoral immunity and cell mediate immunity, B and T-Cell. Hypersensitivity – immediate and delayed

ANIMAL BIOTECHNOLOGY : Animal Biotechnology: Scope of Biotechnology, Cloning vectors – Characteristics of vectors, Plasmids. Gene Cloning – Enzymatic cleavage of DNA, Restriction enzymes. (Endonucleases) and Ligation. Transgenesis and Production of transgenic animals (Fish and Goat) Application of Stem Cell technology in Cell based therapy. (Diabetes and Parkinson's diseases).

MODEL QUESTION PAPER

Time : 90 Minutes Max Marks : 100

The question paper consists of 100 questions covering the entire syllabus.

ELIGIBILITY CRITERIA

M. Sc. (Zoology) : Candidates must have passed Degree Examination conducted by Kakatiya University or an examination recognized as equivalent by the Kakatiya University **with the subject** the candidate is intending to appear for the Entrance Test and they must have secured at least 45% marks in the subject concerned (40% for SC/ST).


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