

71. ZOOLOGY**Part-A (40 Marks)**

Animal Physiology, Genetics & Evolution: Physiology of Digestion: Definition of digestion and types of digestion-extra and intracellular; Digestion of Carbohydrates, proteins, lipids and cellulose digestion; 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 lungs and gaseous exchange; Transport of oxygen-formation of oxyhaemoglobin and affinity of hemoglobin for 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 (Chemiosmotic theory);

Physiology of Circulation: Open and closed circulation; Structure of mammalian heart and its working mechanism-Heartbeat and cardiac cycle. Myogenic and neurogenic hearts; Regulation of heart rate-Tachycardia and Bradycardia;

Physiology of Excretion: Definition of excretion; Forms of nitrogenous waste material 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 mechanism 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 salutatory conduction theory; Structure of synapse, mechanism of synaptic transmission – electrical and chemical transmissions;

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 illustration viz., Hormonal control of glucose levels, Water and ionic regulation by freshwater and marine animals and temperature regulation in man;

Genetics: Mendel's laws-Law of segregation and independent assortment; Genetic interactions-Incomplete dominance, codominance and epistasis; Identification of DNA as the genetic material-Griffith's experiment and Hershey-Chase experiment; Central dogma of molecular biology-Brief account of DNA replication (Semi-conservative method), Replication fork (Continuous and discontinuous synthesis); Transcription-Brief account initiation, elongation and termination in eukaryotes; Translation; Genetic code; gene regulation as exemplified by lac operon; Human karyotyping, Barr bodies and Lyon hypothesis and Amniocentesis chromosomal disorders-Autosomal and sex chromosomes;

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.

Fisheries and Aquaculture, Hematology, Immunology, Animal Biotechnology: Fisheries and Aquaculture: Capture fisheries-Introduction; Types of fisheries, Fishery resources from Freshwater, Brackish water and Marine habitats; Finfish and shell fisheries; Fishing gears and fishing crafts; Freshwater, Brackish water and Mariculture; Site selection criteria; Aquaculture systems; induced breeding; Hatchery design and Management; Larval rearing-Nursery ponds, rearing and grow out ponds; Shrimp and Prawn culture; Hatchery systems, Seed transport, common diseases and control; Post-harvest technology; Preservation and processing-Freezing, solar drying, Canning, salting smoking, By product of fish cool mineral;

Clinical Science: Hematology: Blood composition and functions; Blood groups and transfusion problems; Blood diseases-Anemia, Leukemia, Leucocytosis, Leucopenia; Biopsy and autopsy-Clinical importance;

Immunology: 2.2.1. Types of Immunity-Innate and Acquired; Antigens-Haptens and epitopes and their properties; Structure and biological properties of human immunoglobulin G (IgG); Hypersensitivity-immediate and delayed;

Important Human Parasites Blood parasites (structure and Clinical significance of *Plasmodium*); Intestinal parasites-Structure and clinical significance *Entamoeba*, *Giardia*, *Taeniasolium*, *Ancylostoma*, *Enterobius*;

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).

Part-B(60 Marks)

Biology of Invertebrates and Cell Biology: 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 coelenterate: 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 Nematheiminthes: 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; Phylum Arthropoda: General characters and outline classification of up to classes Type study; Prawn; Crustacean larvae; *Peripatus*-Characters and Significance; Phylum Mollusca: General characters and outline classification of up to classes Type study: *Pila*; Pearl formation in Molluscs; Phylum Echinodermata: General characters and outline classification of 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 mode. 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 Mitochondrion; 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 – Nucleoside, Nucleotide, Chargaff's rule Structure of RNA, Types of RNA – rRNA, tRNA and mRNA; **Biology of Chordates, Embryology, Ecology and Zoogeography:** Protochordates: Salient features of Urochordata and Cephalochordata Structure and life-history of *Herdmania*, Significance of retrogressive Metamorphosis; General organization of chordates; General characters of Cyclostomes; General characters of fishes, classification up to sub-class level with examples; Type study – *Scoliodon*: Morphology, respiratory system, circulatory system, excretory system, nervous system and sense organs; Migration in fishes and 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 amphibians; General characters and classification of Reptilia up to order level; Type study-*Calotes*: Morphology, digestive system, respiratory system, circulatory system, urinogenital system and nervous system; General characters and classification of Aves up to order level with examples; Type study-Pigeon (*Columbia livia*): Exoskeleton, respiratory system, circulating system and excretory system; significance of migration in birds; Flight adaptation in birds; General characters and classification of Mammalia up to order level with examples; Dentition in mammals; **Embryology:** Spermatogenesis, Oogenesis and Fertilization; Types of eggs; Types of cleavages; Development of frog up to gastrulation and formation of primary germ layers; Foetal membranes and their significance placenta: types and functions; Regeneration with reference to Turbellarians and lizards; **Ecology and Zoogeography:** Biogeochemical cycles or nutrient cycles-Gaseous cycles of Nitrogen and carbon; Sedimentary cycle – phosphorus; Definition of community-Habitat and ecological niche; Community interactions: Brief account on Competition, predation, mutualism, commensalisms and parasitism; Ecological succession: Primary and Secondary, seral stages, climax community with examples; Population ecology: Density and dispersions of animal populations; growth curves and growth of animal populations-r-selected and k-selected species; Population regulation mechanisms-both biotic and abiotic; Growth of human population its control. Future of human population; Zoogeographical realms and their characteristic fauna.