Zoology

DEGREE STANDARD

Unit I – INVERTEBRATA

Principles of taxonomy - Bionomical nomenclature - Rules of nomenclature - Classification of Animal Kingdom - General Characters and classification up to orders from protozoa to Echinodermata - Protozontype study - *Paramecium* and *Plasmodium* - Parasite protozoans (*Entamoeba*, *Trypanosoma* and *Leishmania* - Porifera - Type study *Leucosolenia* - General Topic - History, Skeleton and canal system in sponges - Coelenterata - Type study - *Obelia* and *Aurelia* - General topic - Coral and coral reefs - Polymorphism, Economic importance - Platyhelminthes - Type Study - *Fasciola* and *Taenia* - General Topic: Parasitic adaptation - Aschelminthes - Type Study - *Ascaris* - General Topic - Nematode parasites and diseases (*Enterobius vermicularis*, *Ancylostoma duodenale* and *Wuchereria bancrofti*) - Annelida -Type study - Earthworm and Hirudinaria General Topic - Metamerism - Trochophore larva and its significance - vermiculture - Nephridia - Econonic importance - Arthropoda - Type study - *Penaeus* - General topic - Affinities of *Peripatus* - Crustacean larvae and their significance - Mouth parts of insects - Economic importance of insects - social life of insects - Mollusca - Type study - *Pila* and *Lamellidens* - General Topics - Foot in Mollusca - Economic importance - Torsion in Gastropods - Echinodermata - Type study - *Asterias* - General Topic - Echinoderm larvae and their significance - water vascular system in Echinoderms.

UNIT II - CHORDATA

Origin of chordates - General characters and outline classification of Phylum chordata with examples - General characters and classification upto mammalia. **Prochordates** - Type study - Hemichordata - *Balanoglossus* - Urochordata - *Ascidian* - Cephalochordata - *Branchiostoma* (*Amphioxus*). **Agnatha** - Type study - *Petromyzon* - General topic - Affinities of cyclostomata. **Pisces** - Type study - *Scoliodon sorrokowah* and *Mugil cephalus* - General Affinities of Dipnoi - Types of scales and fins - Accessory respiratory organs - Air bladder - Migration- Parental care - Economic Importance. **Amphibia** - Type study *Rana hexadactyla* - General - Origin of Amphibia - Adaptive features of Anura; Urodela and Apoda - Neoteny in urodela - Parental care in Amphibia. **Reptilia -** Type Study - *Calotes versicolor* - General - Origin of reptiles - snakes of India - poison apparatus and biting mechanism of snakes. **Aves** - Type study - *Columba livia* - General topics: Origin of birds - Ratitae - Flight adaptation - Migration in birds - Palate in birds - Birds are glorified reptiles. **Mammalia** - Type study - Rabbit - General topics - Adaptive radiation in mammals. Egg laying mammals - Marsupials - Aquatic mammals - flying mammals - Dentition in mammals.

Unit III - CELL AND MOLECULAR BIOLOGY

Compound microscope - Phase contrast microscope – Electron microscope - Light and Dark field microscopes - Cytological techniques - fixation - staining - centrifugation- sedimentation co-efficient - **History of cell biology** - Cell theory - cell as the basic unit of living organism - Prokaryotic and Eukaryotic cell - ultrastructure of an animal cell - plasma membrane - Lipid bilayer, unit membrane, fluid mosaic and functions of plasma membrane - Cell organelles - ERC - Ribosomes - Golgi complex - Lysosomes - Centrioles and mitochondria - Nucleus - Nucleolus - structure and functions of chromosomes - heterochromatin and euchromatin - Giant chromosome - Polytene and Lambrush chromosome - cell cycle - mitosis and meiosis. Cancer - types - causes - diagnosis - characteristics and treatment - Gene responsible for aging - stem cells.

Nucleic acids - Molecular structure of DNA and RNA - Types of RNA - DNA replication - Role of RNA and ribosome in protein synthesis - Regulation of Protein synthesis.

UNIT IV - GENETICS

Mendelian principles - Gene interactions - Multiple alleles - ABO blood group and Rh factor - Multiple factors - skin colour - Sex determination - Linkage and crossing over - chromosomal aberrations. Extra chromosomes - Allosomal and Autosomal aberrations - Mendelian traits - Pedigree studies - Eugenics - Genetics and society. Nucleic acids - DNA and RNA - Chemical basis of hereditary - Gene mutation - Genetics of bacteria - Genetic code - Gene action - Regulation of gene expression - Insertion elements and transposons - Genetic cloning.

UNIT V - ANIMAL PHYSIOLOGY

Nutrition - Types of nutrition - food - feeding mechanism. Digestive enzymes and their role in digestion - Respiration - Respiratory organs - Mechanism of respiration - Transport of gases - chloride shifting - Haldane and Bohr's effect. Circulation - Structure of human heart - cardiac cycle - origin of heart beat - pace maker regulation of heart beat - ECG - Blood pressure. Blood - excretion - kidney - nephron - mechanism of urine formation in mammals - hormonal control of excretion. Osmoregulation and thermoregulation. Muscular system - Types of muscles - structure and chemical composition of skeletal muscle - mechanism of muscle contraction. Nervous system - Structure of neuron - Types of neuron - nerve impulse in myelinated and non- myelinated neuron - action potential – synapse - neuromuscular junction and reflex action - reflex arc. Photoreceptor - phonoreceptor - physiology - equilibrium - chemoreceptors. Endocrine

system - endocrine glands - hormones of pituitary gland - pineal gland - thyroid gland - parathyroid gland - thymus - adrenal gland – pancreas. Defects of hormones - Human reproductive hormones - Menstrual cycle in human.

UNIT VI - BIOCHEMISTRY & BIOTECHNOLOGY

Biological properties - Classification - Structure of carbohydrates, proteins and fats. Metabolism of carbohydrates, proteins and lipids. Glycolysis - Glycogenolysis - Gluconeogenesis - Glycogenesis. Kreb's cycle - Oxidative phosphorylation - Electron transport system. Deamination - Transamination - fate of keto acids. Nitrogen metabolism - Beta oxidation of fatty acids - BMI and BMR - Biotechnology - Scope and importance of Biotechnology - DNA Recombinant Technology - Application of genetic recombinant technology in human health and agriculture - Genetic engineering - Restriction enzymes - ligase - polymerase and reverse transcriptase - PCR, Gene cloning - cloning vectors - plasmids - cDNA library - Gene Bank. Production of biotechnological products - SCP - Biofertilizers - Biofuel - Biopesticides - Biogas production - Solid and liquid waste management. Enzyme Biotechnology - Sources and production of commercially important enzymes - cellulase, amylase, pectinase and proteinase.

UNIT VII - DEVELOPMENTAL BIOLOGY

Origin of germ cells - Gametogenesis - Process of spermatogenesis and oogenesis - Types of sperms - Types of eggs and egg membranes - Structure of sperm and ovum in mammals - Fertilization - Acrosomal reaction - Cortical reaction, physiological and biochemical changes and significance. Cleavage - Types of cleavage patterns - Controlling factors and laws in cleavage - Fate maps in frog and chick. Blastulation and gastrulation in amphioxus, frog and chick. Organogenesis - Development of brain, eye and ear in vertebrate animals - Extra-embryonic membranes - Placentation in mammals - Mechanism of induction - Human reproduction - Puberty - Menstrual cycle- Menopause - Pregnancy and related problems - Artificial insemination - Cryopreservation - IVF - Embryo transfer and its advantages - Test tube baby - Amniocentesis - Super ovulation - Artificial Reproductive Technology (ART) and embryo manipulation - Ethics in ART - Stem cells.

UNIT VIII - ENVIRONMENTAL BIOLOGY & EVOLUTION

Scope - Concept - Braches in Ecology - Autecology and Synecology - Micro and macro environment. Types of media and substratum - their influence on animals. Biosphere - Hydrosphere, Lithosphere, Stratosphere - Biocoenosis and biogeocoenosis - Abiotic factors - Water, soil, light and temperature - Biotic factors. Animal relationships - Symbiosis, Commensalism, Mutualism, Antagonism, Predation, Parasitism and Competition. Biogeochemical cycles - Nitrogen, Carbon and Oxygen - Ecosystem - Pond ecosystem - Primary and secondary production - food chain - food web. Trophic levels - Energy flow - Ecological pyramids - Biomass, number and energy. Terrestrial Ecology - Biomes - Characters - tundra, grass land, forest and desert biomes - Types of forests in India - Adaptations of animals inhabiting deserts - Freshwater, Marine and Estuarine Ecology - their characteristics - Biotic communities and their adaptations. Population Ecology - Community Ecology - Pollution - air, water and land - wild life management. Preservation - laws enforced - sanctuaries - natural resources management. Renewable and non-renewable resources. Evolution - Theories and trends - Lamarckism and Neo Lamarckism - Darwinian theory - Geological time Scale - Fossil and Fossilization - Dating of fossil - living and extinct fossils. Mimicry & coloration - Convergent, Divergent and parallel Evolution - Coevolution - Isolating Mechanisms - different types - species concept - definition and origin of species - Allopatric and sympatric speciation - genetic drift - Founder's principle.

UNIT IX- ECONOMIC ENTOMOLOGY AND PEST CONTROL

Economic importance of honey bees, silkworm and lac insects. Insects damage to the plants, animals and man - Insects pests of stored grains - Insect vector of plants, animals and man - Insects affecting health of domestic animals and human - Pest control methods - Physical, mechanical and chemical methods - Classification of pesticides and their modes of action - Plant protection appliances. Basic principles of insecticide formulations and their application in pest control - pesticides and environmental pollution - precautions in handling pesticides - integrated post management.

UNIT X- ECONOMIC ZOOLOGY

Poultry Farming: Important breeds of poultry - chick rearing - Role of egg in human nutrition - processing of egg, meat and by-products of poultry - major diseases of chick.

Dairy Farming: Important breeds of dairy - Nutritive value of milk and meat - dairy by-products.

Aquaculture: Important culturable freshwater, brackish water and marine fishes and shell fishes - Polyculture, integrated culture - live feed organisms in aquaculture. Nutritive value of fish meat - fishery by-products.

Pearl and edible oyster culture: Culture of pearl - Biology of *Pinctada fucata* - Preparation of graft, tissue and nucleus. Techniques of edible oyster culture - induced breading - Harvesting.

UNIT –XI - MICROBIOLOGY AND IMMUNOLOGY

Classification of microbes - structure of bacteria - economic importance of bacteria. Viruses - Types of viruses - Herpes Virus, TMV, Polyoma viruses, Bacteriophages and virion. Sterilization - Physical and chemical methods. Types of bacterial culture. Microorganisms of different soils in extreme environments - Thermophilic, Methanogenic and Halophilic. Food borne infections and intoxications - *Clostridium*, *Salmonella* - *Staphylococcus* - Common bacterial, viral and fungal diseases of human.

History of immunology - Blood transfusion - Rh factor - Compatibilities - Innate and acquired Immunity. Structure, composition and functions of cells and organs involved in immune system - virulence and host resistance related immunity. Antigens - types, properties - haptens - adjuvants - vaccines - types - toxoids - antitoxins. Immunoglobulins- structure, types and properties - theories of antibody production - complement structure- properties - function and pathway. Antigen - antibody reaction - *in vitro* methods - agglutination - precipitation - complement fixation - Immunofluorescence - ELISA - RIA - Western blot.