



THIRUVALLUVAR UNIVERSITY
திருவள்ளூர் பல்கலைக்கழகம்
Serkkadu, Vellore-115.

Entrance exam syllabus for Zoology

Unit-I: Invertebrates and Chordates

Classification- Principles and theories of classifications of animals- Binomial nomenclature- Trinomial nomenclature- Reproduction, feeding parasitic adaptations in protozoa. Reproductive system- Nervous system- Digestive system- Respiratory system- Excretory system structure and functions in metazoa and higher invertebrates like arthropod, annelid, Molluscs. Salient features of Prochordates,-Amphioxus- Ascidian - Balanoglossus. Comparative anatomy of circulatory, reproductive, nervous, respiration and digestive system of chordates.

Unit-II: Cell and Molecular Biology

Prokaryotic Cell, Eukaryotic Cell, Structure- Ultra structure and function of Endoplasmic reticulum, Ribosome, Golgi bodies, Mitochondria, Lysosome. Nucleo cytoplasmic interactions, nuclear receptors, plasma membrane structure, Passive and active transport, Cellular communication, DNA – Chemical composition -Watson Crick model of DNA, Types of DNA, DNA Replication, types, enzymology and mechanism of semi conservative mode of replication – DNA damage and repair. RNA- Chemical composition-Types Mechanism of protein synthesis. Conjugation, Transformation, Transduction and Sexduction. Chromosome mapping in prokaryotes (Virus & Bacteria) and eukaryotes (Drosophila and man). Gene regulation-Gene action-Operon concept- GAL & LAC operon system. Evidences of regulation of gene action. Inborn errors of metabolism, with reference to protein lipid, carbohydrate & nucleic acid.

Unit-III: Genetics and Biostatistics

Mendelian Theories, Monohybrid Crosses, Dihybrid crosses, Dominant and Recessive alleles, Incomplete dominance, Codominance, Heterodominance, Lethal alleles, Multihybrid crosses, back cross and test cross, Gene interaction. Non epistatic genetic interaction. Human genetics- karyotype and nomenclature of metaphase chromosome bands; chromosome anomalies and diseases- chromosomal anomalies in malignancy (chronic myeloid leukemia, Burkitt's lymphoma, retinoblastoma and Wilms' tumor); genetic analysis of complex traits -complex pattern of inheritance, quantitative traits, threshold traits; human genome and mapping.

Population, Sample, variable, parameter, primary and secondary data, screening and representation of data. Frequency distribution, tabulation, bar diagram, histograms, per diagram, and cumulative frequency curves. Mean, median, mode, quartiles and percentiles, measures of dispersion : range, variance, standard deviation , coefficient of variation, symmetry : measures of skewness and kurtosis Simple linear regression and correlations. Understand and interpret results from Analysis of Variance (ANOVA).

Unit-IV Environmental Biology and Evolution

Ecosystem and Community - Review of concept of ecosystem - Natural and Man-made ecosystem, with examples. Energy flow - Trophic structure and levels - Pyramids, food chain and web - ecological efficiencies, and productivity and its measurement. Structure and distribution - Growth curves - Groups, natality, Mortality – Density indices, Life study tables - factors affecting population growth – Genetics drift-Carrying capacity. Population regulation and human population control. Renewable and non - renewable resources - animal resources. Conventional and non - conventional energy sources. Review of Biogeochemical cycles: Nitrogen, Phosphorous and sulphur. Principles of conservation – ethics and values of wild life, National parks, Rain water harvesting. Bioremediation - Need & Scope of Bioremediation - Environmental applications – Phytoremediation – Biomagnification -Bioavailability. Theories of evolution, Adaptation - Nature and types of adaptation - Adaptive trends quantifying adaptation - Batesian and Mullerian mimicry Polymorphism and Evolutions. Speciation - Structure of species - clones, peripheral population and peripheral isolates. Human evolution – Sociobiology.

Unit-V: Animal Physiology

Nutritive requirements – Digestion and adsorption of proteins, carbohydrates and lipids. Role of gastrointestinal hormones in digestion. Respiration: The exchange of gases- integumentary respiration, branchial respiration and gill respiration - physiology of respiration in Man. Respiratory Pigments, BMR. Circulation: Types of hearts - physiology of cardiac muscle - heart beat and its regulation – Composition of blood coagulation. Excretion: Nitrogenous waste- Ammoniotelism, Ureotelism, Uricotelism – Structure of mammalian kidney – Nephron - formation of urine - physiology of excretion in Man. Osmoregulation: Osmo – iono regulation in crustaceans, fishes, birds and mammals - hormonal control. Neuro muscular co-ordination - types of neurons, transmissions of nerve impulse and reflex action. Chemical composition of muscle fiber and physiology of muscle contraction. Endocrine glands with special reference to man - Hormones and Functions. Receptors –Classification & function – Mechanism of hearing – Physiology of vision in man. Chronobiology - (types - trophism, taxis, kinesis, reflex, learning). Temperature regulation: Poikilotherms, homeotherms and heterotherms - hibernation, aestivation - diapause.

Unit-VI: Microbiology and Immunology

Sterilization: Principles - dry heat, moist heat, filtration, Tyndilization, pasteurization, Radiation - disinfection - Antimicrobial chemotherapy - Antibiotics source - Tests for sensitivity to antimicrobial agents and its quality control. Culture techniques - media preparation - preservation of cultures - Aerobic and anaerobic culture techniques- pure and mixed cultures. Microbial ecology, role of microorganisms in the productivity of ecosystems - Interactions between microorganisms and plants and animal- Microbiology of soil, water and air. Industrial microbiology - Industrial uses of microbes - fermentation products, bioconversions - bioremediation. Products of industrial microbiology - Penicillin, fuel ethanol, vinegar, vitamin B12, citric acid,

glutamic acid, protease. Food and Dairy microbiology - Microbes in food - Role of microbes in food production. Dairy and non-dairy products - fermented foods and alcoholic beverages. Pharmaceuticals (antibiotics, vaccines etc.)

Antigens-Immunogenicity Vs Antigenicity, Haptens. Factors influencing Immunogenicity. Epitopes - B cell epitope and T cell epitope. Antigen - Antibody interaction and immunodiagnostics. MHC - Restriction, Organization and inheritance of MHC, Antigen processing and presentation. Immunoglobulin - structure, isotypes and biological function. Immune response theories. Antigenic determinant on immunoglobulin - isotype, allotype and idiotype. B-cell receptor, immunoglobulin super family, Monoclonal antibody, Polyclonal antibody. T cell receptor, cytokine, adhesion molecules. Complement, Hypersensitive reaction, Transplantation immunology. Vaccines - Principles and types of Vaccines - DNA Recombinant Vaccine, Serum therapy. Genetic rearrangements in progenitor cells, oncogenes, tumor suppressor genes, cancer and the cell cycle, virus-induced cancer, metastasis, interaction of cancer cells with normal cells, apoptosis, therapeutic interventions of uncontrolled cell growth.

Unit-VII: Biochemistry and Biophysics

Atoms, Molecules, Electronic configuration, types of bonds, Electrostatic forces, Vanderwall's forces, Hydrophobic, Hydrophilic interactions. Law of Thermodynamics. Entropy, Enthalpy, free energy oxidation and oxireduction. Bioluminisance. Classification of Protein, Carbohydrate and lipid and their metabolism. Hormones, enzymes, vitamins, aminoacids classification and structure.

Unit-VIII: Developmental Biology

Types of egg and sperm, Gametogenesis, Fertilization. Types of cleavage, blastula, gastrula and neurula. Morphogenetic movements. Gradient pole theory. Organogenesis, metamorphosis and hormonal control. Teratogenesis, ageing and transgenesis. Role of cell death in development cell adhesion and communication.

Unit-IX: Entomology

Classification of insects. Insects as pollinator, predators and scavengers. Apiculture, sericulture and Lac culture. Insect as crop pest, paddy, sugarcane, beverages. Pests of stored products, mode of infestation. Mosquito borne diseases, mode of parasite transmission, control Housefly and Diseases.

Unit-X Fisheries and Aquaculture

Capture and culture-fisheries status-Fin and shell fisheries-edible fishes, crustaceans. Distribution and abundance of natural seed resources, Artificial seed production-Breeding-Infectious bacterial and Viral diseases-Diagnosis, prevention and control. Aquaculture farm management. Traditional, extensive, semi extensive and intensive aquaculture system. Integrated aquaculture system.