

TAMIL NADU PUBLIC SERVICE COMMISSION

BIOLOGY (PG DEGREE STANDARD)

Code No.227

FOR THE POST OF JUNIOR SCIENTIFIC OFFICER

UNIT-I

General classification and salient features of Invertebrata and vertebrata – Metamorphosis and regeneration in lower forms of animal – Economic importance of oyster, honey bee, Silkworm – Agricultural pests and their control – Larval forms of crustacean and Echinodermata - Classification and identification of poisonous and nonpoisonous snakes and types of snake venom. Evolution: Theories, types and factors influencing evolution Evidences of human evolution – Human genetics: Pedigree analysis, lod score for linkage testing, Karyotyping, Significance of human genome project.

UNIT-II

Structural organization and importance of animal cells - Muscle cells – Cardiac, Striated and non-striated muscle cells– HepatocytesNeurons, Nephrons, Karatocytes, immune and endocrine cells. Functions of hormones and their receptors – Impact of sex hormones in human behavior. Chronobiology: importance of circadian rhythm and human biological clock – DNA analysis in paternity testing – Cell counting of WBC and RBC.Functions and disorders of Digestive, Respiratory, Cardiovascular Nervous, Muscular, Excretory, Reproductive and Integumentary systems. Developmental biology: production of sperm and egg, Fertilization – Zygote, Cleavage. Blastulation, gastrulation and formation of germ layers in animals and organogenesis – determination of sex by Amniocentosis. Entomology: Insect classification – Beneficial and harmful insects – Role of insects in decomposition of decayed materials – Exploiting insect olfaction in forensic studies – Importance of ants, blowflies and beetles in forensic investigation.

UNIT – III

Fundamentals of Anthropology

Meaning – Scope and branches of Anthropology – Basic concepts / principles of Physical or Biological Anthropology – Anthropology and its relation with other Social, Biological and Medical Sciences – Analysis of kinship – Health and Ethno medicine – Population dynamicswith special

reference to Tamil Nadu – Applied and developmental Anthropology – Tribal, Rural and Urban Communities

Research Methodology- Anthropological research – Fieldwork Tradition, Methods and Techniques, Qualitative and Quantitative research Methods, Observation, Case study, Ethnography, Life histories and Personal documents, Visual Anthropology, Genealogical Methods.

UNIT – IV

Physical / Biological Anthropology

Position of human being in the animal kingdom – Human Evolution - Theories of human evolution, Human growth and development – Factors affecting for growth, Demographic growth variation, Sex and Gender – Bio-cultural dimensions, Race and Ethnicity - Major racial groups of India, Ethnicity and contemporary relevance – Applied physical anthropology - Anthropometry and its uses, DNA Technology, genetic diseases, Forensic Anthropology and criminal investigations.

UNIT-V

Chemistry of Biomolecules

Carbohydrates – Structure and functions [Mono, Di & Polysaccharides] – Disorders of Carbohydrate Metabolism and its laboratory diagnosis.

Proteins and Amino acids – Types, structure and function.

Lipids – Types structure and functions. Sterols –Cholesterol. Disorders of lipid metabolism and its laboratory diagnosis.

Nucleic acid – DNA – Types, structure and functions
RNA – Types, structure and functions

Enzymes – Classification and properties of enzymes, Coenzymes, Marker enzymes

Hormones- Classes and functions of hormones

UNIT-VI

Biochemical and Molecular Techniques

Blood and its composition – WBC, RBC and Platelets. Blood clotting, Blood grouping, Cross matching and compatibility tests, Blood smear analysis, HLA typing.

Antigens and Immunoglobins – Classes and functions.

Collection and Preservation of Biological fluids [Blood, Urine, CSF, Amniotic fluid, Semen, Sputum and Saliva]. Normal and Abnormal constituents of Biological fluids.

Isolation of DNA from blood sample, Agarose gel Electrophoresis, PCR, DNA Sequencing, RAPD, RFLP, DNA Finger printing -STR Typing.

Isolation of Proteins from blood sample, SDS PAGE, RIA, ELISA, FISH.

Ames test, Comet Assay.

UNIT- VII

Origin of Microbiology, Contribution of Louis Pasteur, Alexander Flemming, Waksman, Robert Koch. Microscopy; Brightfield, Phase contrast, Fluorescent, Electron Microscopy and Confocal Microscopy. Staining techniques.

Cultivation of Microorganisms, Preparation of culture media, Sterilization techniques, Preservation techniques, Identification of Microorganisms; Conventional and Molecular techniques.

Host parasite interaction, Microbial diseases, Nosocomial infection, Zoonotic diseases, Food borne diseases, Microbial diseases of medical negligence. Bioterrorism and Biohazards.

UNIT- VIII

DNA profiling, Genetic code, Mutation and DNA polymorphism, Microbial nanotechnology, Infectomics.

Biodeterioration of fibres and leather, Bioremediation, Bioconversion - Biogas technology, Environmental microbiology - Microbiology of air, water and soil. Role of microbes in production of fermentation products.

Production of antibiotics, Enzymes, Pigments, Insulin, Interferon, Monoclonal antibodies and Growth Hormones. Recombinants DNA technology.

Microbial biofertilizers, Microbial biopesticides and Microbial degradation of synthetic pesticides.

UNIT – IX

Plant Diversity, Cell Biology – Taxonomy and Paleo botany, Plant Physiology Plant biochemistry, Plant pathology

Plant Diversity – Algae, Fungi, Bryophyte, pteridophytes, Gymnosperms, lichen.

Cell Biology – Cell structure and functions

Taxonomy– Principals of Taxonomy and phylogeny of angiosperms, Nomenclature of plants, Monocotyledons and dicotyledons

Paleo botany – Fossil plants

Plant Physiology and Plant biochemistry – Ezymes, Protein, Aminoacid and photo synthesis, respiration

Plant pathology – Bacterial, Fungal and Viral Diseases of Plants.

UNIT- X

Plant Anatomy, Embryology, Genetics, Economic Botany, Ethnobotany, Environmental Botany

Plant Anatomy – Cell cycle, Cell division, Tissue system and secondary growth, Fruit wall and seed coat.

Embryology – Embryogenesis, Polyembryony, Double fertilization, Somatic Embryogenesis and Pollen grains.

Genetics – Mendelism, Linkage, crossing-over, chromosome mapping, RAPD and RFLP Techniques.

Economic Botany – Wood and Wood products, Fatty Oils and Vegetable Oils. Tannins and Dyes.

Ethnobotany – Ethno Medicinal Plants, Narcotic Plants.

Environmental Botany – Plant adaptations, Hydrophytes, Xerophytes, Mesophytes, Epiphytes, Halophytes and Mangrove vegetation. Ecological Indicators, Forest and Forest Management.