ANDHRA PRADESH

RECRUITMENT OF ASSISTANT PROFESSORS IN THE UNIVERSITY

SYLLABUS FOR THE SCREENING TEST

ZOOLOGY

SUBJECT CODE – 67

UNIT-I

- General characters **of Invertebrates and Vertebrates**.
- **Respiration and Excretion:** Annelida, Arthropoda, Mollusca and Vertebrata.
- Respiratory, Circulatory, Nervous and Reproductive systems in Vertebrates.
- An overview concept of animal behavior; Social organization – insects and primates.

UNIT-II

- Biodiversity and its patterns.
- Nomenclature: ICZN and Molecular Taxonomy
- Wildlife protection acts; organizations involved in protection of Biodiversity.
- Environmental laws in India – legislation and execution.
- Satellite Remote Sensing and GIS programmes; Environmental Impact Assessment (EIA).

UNIT-III

Developmental biology

- Spermatogenesis and Oogenesis
- Fertilization and Early Development
- Hormonal regulation in insects and amphibians.
- Placenta ant its types
- Aging and senescence.
- Regeneration and Teratogenesis

UNIT-IV

Biomolecules; Genetics and Evolution

- Bio-molecules-Carbohydrates, Proteins, Lipids and Nucleic Acids.
- Protein Synthesis and Processing; Nucleic acids – nitrogen bases, nucleosides, nucleotides, physicochemical properties of nucleic acids.
- Types and Structure of RNA & DNA.
- Gene Expression : Control of Gene Expression at Transcription and Translation Level
- Organization of Gene and Chromosome
- Cell Cycle and Cell Division
- Human Genetics: Human Genome Project, Pedigree Analysis and Chromosomal Abnormalities.
- Population genetics: Concepts of Evolution; Theories of Organic Evolution.
- Concepts and rate of change in gene frequency.

UNIT-V

- **Bio-energetics:** Enzyme activity, Pathways of cellular metabolism
- **Respiration:** Mechanism of gaseous exchange, Neural and Chemical regulation in Animals.
- **Blood:** Composition, respiratory pigments and function.
- **Muscle:** Structure and its functions.
- Micro anatomy of neurons and nerve cells and their signaling.
- **Excretion and Osmoregulation:** Structure and function of kidneys in animals; regulation of water and electrolyte balance.
- **Endocrinology and reproduction:** Endocrine glands in animals, mechanism of hormonal action, regulation in reproduction; growth and development.

UNIT-VI

- **Ecology:** Ecosystem structure and function.
- Concept of productivity; trophic dynamic view of ecosystem and energy flow.
- **Population ecology:** Population characteristics, life tables generation

- **Biomonitoring:** Biological monitoring programme; principles of conservation and conservation of ecosystems
- An overview on sustainable development of ecosystems.
- Acid rains- its effects on biological systems.
- Heavy metals,Bioaccumulation, Bioremediation

UNIT-VII

- **Nucleic acid blotting techniques:** Southern, Northern and Western blotting techniques, Polymerase Chain Reaction (PCR) and DNA fingerprinting.
- NMR spectroscopy; instrumentation and applications of UV.
- **Bio-informatics:** Scope, importance and status of bio-informatics.
- **Bio-statistics:** Measures of central tendency and dispersal – mean, median and mode; Probability distributions - binomial, Poisson and normal; Sampling distribution.
- Standard deviation, standard error and confidence interval; Regression and Correlation.
- **Tests of significance:** Levels of significance, X^2 test, t-test and Analysis of Variance (ANOVA). Usage of Statistical Package for Social Sciences (SPSS).

UNIT-VIII

Genetic Engineering and Microbiology

- **Genetic Engineering:** Recombinant DNA technology, tools of genetic engineering Properties and functions.
- **Applications** of biotechnology in veterinary science and medicine.
- **Gene Cloning:** Enzymes used in Gene Cloning
- **Gene therapy:** Adenosine Deaminase (ADA) deficiency, Duchenne Muscular Dystrophy (DMD), haemophilia, phenylketonuria and thalassaemia; Enzymes used in Gene Cloning.
- **Microbial diseases** and their control: Bacterial diseases- tuberculosis, plague, anthrax, tetanus, cholera; Viral diseases- influenza, AIDS, rabies, hepatitis, poliomyelitis, ebola; Fungal diseases- superficial mycosis, cutaneous mycosis, subcutaneous mycosis, systemic mycosis; Protozoan diseases- amoebiasis, malaria.
- **Microbiology of fermented food**: Diary products, meat and fish.

- **Industrial microbiology:** Types of fermentation process; alcoholic beverages; manufacture of various chemicals - lactic acid, acetic acid and citric acid.

UNIT-IX

Ichthyology

- **Age and Growth:** Methods for studying age and growth, Length-Weight relationship and Condition factor.
- **Endocrine glands:** Structure and function of pituitary gland, thyroid gland, ultimobranchial glands, chromaffin tissue, adrenocortical tissue and corpuscles of stannius.
- Culture practices of fish and shrimp; Culture of Ornamental Fishes; Concept of Monoculture, polyculture, integrated fish farming and Organic Aquaculture.
- Bundh breeding and Induced breeding of carp by hypophysation and use of synthetic hormones.
- **Fish and Shrimp diseases:** Bacterial, viral, fungal, protozoan, crustacean and Helminth diseases.
- **Fish diseases-** bacterial, viral and fungal

UNIT-X

Limnology and Aquaculture Management

- **Temperature and Light:** Thermal stratification and its overall impact, thermal classification of lakes; Factors affecting light penetration in natural waters.
- **Dissolved oxygen and Carbon dioxide:** Sources, losses and distribution patterns.
- **Bio-geochemical cycles:** General account of nutrients; Nitrogen and Phosphorus cycles.
- **Plankton and Benthos:** Composition, classification and distribution patterns in lakes and rivers.
- Design and construction of fish & shrimp farm and hatchery.
- Techniques and management practices adopted for the Reservoir Fisheries in India.

UNIT-XI

- **Water pollution and analysis:** Sources of water pollution, physical and chemical characterization of water, minor components of water, important trace elements in water; biological investigation of water – DO, BOD; microbiological examination of water, water pollution and diseases.
- **Sewage treatment and analysis:** Treatment of domestic sewage, primary treatment of sewage, chemical treatment of sewage, biological treatment, tertiary treatment of sewage, disposal of sewage, characterization and analysis of sewage – DO, COD, BOD.
- Microbiological approach of waste water treatment.
- **Pollution**: Industrial, Pesticide, Thermal and Radiation pollutions.
- Bioremediation - solid and liquid waste treatment; Bioleaching – Microbial recovery of metals and acid mine drainage; Bio-fertilizers and Bio-pesticides in agricultural production.
- Bioethics: Introduction – causes of unethical acts, ignorance of laws, policies and procedures, recognition, friendship, personal gains.
- Professional ethics – professional conduct. Ethical decision making, ethical dilemmas. Teaching ethical values to scientists, good laboratory practices, good manufacturing practices, laboratory accreditation.
- Socio-economic and legal impacts of biotechnology, national and international guidelines, experimental protocols approval, levels of containment.

UNIT XII

Cell Biology &Immunology

- Cell Membrane Structure and Function: Phospholipid Bilayer and Membrane Proteins, Diffusion, Osmosis, Active Transport, Ion Channels, Ion Pumps and Electrical properties of Cell Membrane.
- Cell-Cell Signaling, Cell surface receptors, Second messenger system, MAP kinase pathways
- Apoptosis: Definition, mechanism and significance
- Cell-Cell adhesion and communication: Ca++ dependent homophilic cell-cell adhesion, Ca++ independent homophilic adhesion

- Gap junctions and connexins, Integrins, Collagen.
- **Cells of the immune system:** Origin of the cells - Stem cells; Lymphoid lineage – T-lymphocytes, B-lymphocytes, Null cells; Myeloid lineage – Monocytes, Polymorphonuclear (PMN) leukocytes; Accessory cells.
- **Antigens, Antibodies and MHC**
- **HIV, AIDS, ELISA, RPR**
- Types of Immune system; Tolerance and Hypersensitivity.
- Autoimmune diseases.