ADVANCED ZOOLOGY

UNIT - I

Cell Culture and Molecular Techniques: Cloning and sequencing of genes andgenomics, PCR techniques; Microarray and gene expression; Metagenomics and Epigenomics, Gene targeting and its applications, Aseptic technique and preparation of media Equipment and materials for animal cell cultures: Design and layout of culture room, basic equipment's used in cell culture. Studying animal cells: Confocal microscopy, Flow cytometry Natural media, Synthetic media, Nutritional compounds of media, Role of serum in cell culture, Serum free media, Primary culture and its maintenance, techniques of tissue disaggregation, Monolayer and suspension cultures, Products from animal tissue culture. Bacterial culture: Types of cell culture. Insect cell culture; Applications of cell culture.

UNIT - II

Human Disease and Immune System: Genetic basis of humandiseases: Environmental basis of human diseases, Complex disorders, Epigenetics and human diseases; Anatomy and histology of immune system, Humoral and Cell mediated immune responses, Recognition and effector mechanisms of cell mediated and humoral immune responses HLA and human diseases, Inflammation, Immune tolerance and autoimmunity. Immuno-parasitology: Host-Parasite interactions. Immunity to Malarial Parasites and Schistosome Parasites. Evasion of Immune response in malarial and schistosome parasites. Basics of cancer: Cell Cycle and checkpoints; Characteristics of Cancer Cells, Hyperplasia and Neoplasia, Characteristics of Metastatic Cancer Cells, Types and Classification of Cancers; Causes of cancer, Carcinogens, Mutagens, and Oncogenic viruses, Cancer Genetics, Oncogenes and Tumor Suppressors genes; pRb and Control of the Cell Cycle; p53 and Apoptosis: Master Guardian and Executioner: Cell Immortalization Tumorigenesis, Multi-Step Tumorigenesis, Cytoplasmic Signaling Circuitry, Invasion and Metastasis.

UNIT -III

Fish Physiology and Biochemistry: Water as a biological medium- Gas exchange: Osmoregulation; Excretion; Fish immune system and important endocrine glands.Immuno-endocrine interactions; Physiological response to environmental stress. Stress hormones.

Biochemical indicators of Oxidative stress. Xenobiotic metabolism in fish, Biomarkers in Aquatic animals. Protein requirement, evaluation criteria, dietary protein composition, non-protein nitrogen, PUFA. Larval diet - composition. Other essential nutrients regulating growth. Biochemical characteristics of fish tissue-features related to species.Reproductive physiology, gametogenesis- hormonal regulation and environmental control, determination of sex. Energy

pathway related to Carp-metabolism of lipids, proteins, carbohydrates. Physiological adaptation-related to environmental characteristics.

Fish Biotechnology: Selective breeding: Sex reversal - hormonal regulation and practical use; Hybridization; Androgenesis, Gynogenesis; Polyploidy, Transgenesis and genesis engineering: Cryopreservation.

UNIT IV

Aquatic Animal Health: Principles of disease diagnosis in fish. Techniques in healthmanagement: Microbiological, haematological, histopathological, imunological and molecular techniques; Antibody and nucleic acid-based diagnostics. Stress protein; Health management and Herbal immunostimulants; Feed formulation and Preparation of artificial feeds.

Aquatic pollution: Aquatic pollution - Classification of water pollution, Biological effects of organic matter. Toxicity of Industrial effluents and Petroleum Hydrocarbons, Pesticide types and categories.

UNIT V

TOXICOLOGY: Sources, Properties and Mechanism of Action: Toxicity tests and conceptsof LD50 and LC50. Dose-effect and response relationship, Mode of action of toxicants (metals, pesticides, teratogens, environmental carcinogens, ionizing and non-ionizing

radiations).Mutagenesis and carcinogenesis causing toxicants, Bioconcentrations, Biomagnifications,Biotransformation. Biotransformation of Xenobiotics in fish. Toxicant bioassay using fish: Toxicity tests-Toxicant bioassay using fish; Methods of Toxicological analysis. Cytotoxicity and viability assays (NBT assay, Trypan Blue dye exclusion assay, COMET assay, Micro-nuclei assay. ii. Survival assays. ill. Metabolic assays. iv. Transformation assays. v. Inflammation assays.

ANDHRA UNIVERSITY
TRANS-DISCIPLINARY RESEARCH HUB

MODEL QUESTION PAPER

ADVANCED ZOOLOGY

Time: 3 hours **MaxMarks:100**

Answer any five questions.

All questions carry equal marks.

Section-1

1.Describe the basic steps involved in PCR and types of PCR with applications

OR

2. Write a detailed account on various media used in cell culture.

Section- II

3. What is cell mediated immunity? How do you assess cell mediated immuneresponse?

OR

4. Explain the various characteristics of a cancer cell and add a note on types of cancers.

Section- III

5. Describe various endocrine glands and hormones secreted by them with their biological actions.Add a note on immune endocrine interactions.

OR

6 . Give an account on Androgenesis and Gynogenesis.

Section - IV

7. Explain the various Haematological and Immunological techniques used for disease diagnosis in fish health management.

OR

8. Write an essay on the toxicity of Industrial effluents and Petroleum Hydrocarbons.

Section - V

9. Explain the mode of action of toxicants with respect to metals.

OR

10 .Explain the mechanism of Biotransformation of Xenobiotics in fish.