VINOBA BHAVE UNIVERSITY

SYLLABUS FOR PH. D ENTRANCE TEST ZOOLOGY (2017)

Time 3 Hours **FM 100**

Structure and Function of Invertebrate

Locomotion: Modern concept of Flageller and Ciliary movement in protozoa, Hydrostatic movements in Echinodermata
Filter feeding in polychaeta.
Respiration - Respiration in Arthropoda
Excretion and osmoregulation in annelids Malpighian tubules in insects

Basic concept of Population Genetics, Animal Systematics and Evolution

Importance and application of biosystematics in biology.
Chemotaxonomy Cytotaxonomy, Molecular taxonomy,
Species and species concept.
Theories of organic evolution with emphasis on Darwinism and its shortcoming
Synthetic theory of Evolution
Molecular phylogeny – Construction of phylogenetic tree, Nucleic acid phylogeny – DNA – DNA hybridization, restriction enzyme site mapping technique, nucleotide sequence comparison.
Reproductive Isolation

Tools and Techniques

General Principle and applications of Colorimetry, Spectrophotometry: Visible, UV visible, Ultra centrifuge
Separation techniques: Chromatography, principle type and application, Electrophoresis, Principles,
Sterilization: Principles and types
Histological techniques: Principles of tissue fixation, Microtomy, Staining, Mounting
General protein localization by Mercury Bromophenol Blue
Proteins with – NH2 groups by Ninhydrin-Schiff reaction
DNA by Feulgen reaction

Reproductive Physiology and Endocrinology

Histology of mammalian reproductive system: Histophysiology of testis. Ovary and Mammary gland.
Hormone and Reproduction
Endocrine glands and their hormones: Adenohypophysis, Neurohypophysis, Thyroid Adrenal
Hormonal control of fuel metabolism: Insulin Glucagon Epinephrine

Biostatistics

Sampling: Concept of sampling and sampling methods, Test of significance for large sample (Z-test) and for small sample (t-test).
Hypothesis formulation and testing of Hypothesis
Chi-square analysis.
Probability distributions and their properties.
Correlation: types of correlation, Karl Pearson coefficient of correlation, Rank correlation
Regression analysis: Regression lines, Regression equations.

Immunology

Biology of vertebrate Immune System, Innate and Acquired Immunity
Organization and structure of Iymphoid organs, Cells of the immune system:
T- cell generation activation and differentiation
B-cell - generation activation and differentiation
Lymphocyte traffic
Antigen - Nature of antigens and superantigens, Antigenicity and immunogenicity
Cytokines: Structure and functions and their receptors
Complement system: Component and functions
Hypersensitivity

Cell Biology

Microscopy, principle & applications - Electron microscope
Autoradiography.
Molecular biology techniques: Southern blotting, Northern blotting, Western blotting
Polymerase chain reaction (PCR)
Cell Division and cell cycle
Bio-membrane: Molecular organization, Fluid-Mosaic model, Transport across the cell membrane
Nucleus - Structure of Nuclear membrane and nuclear transport
Cytoskeleton- Assembly of cytoskeleton filaments Molecular motors and their roles.
Programmed cell death (Apoptosis).
Ultra structure of chromatin fibre
Telomere and its maintenance.
Cell junction and Cell-Cell adhesion

Genetics:

Mendelism and its variations, discussion on problems related to Mendelism.
Gene mapping methods – linkage maps, mapping with molecular markers, RFLP
Sex determination in *Drosophila* and Human
Gene regulation: Lac operon, Trp operon

Environment Biology

Population: Characteristics, Competition- intra and interspecific competition.
Community organization, Nature of communities, Analysis of community structure.
Biodiversity
Ecological restoration rehabilitation and Bioremediation concept, Environmental limitation for bioremediation
Biosensors, Bioaccumulation and biomagnifications.
Major Anthropogenic problems: Acid rain, green house effects, Smog, Ozone depletion,
Environmental Impact Assessment (EIA), purpose, aim, process