INSTITUTE OF ADVANCED STUDIES IN EDUCATION

(DEEMED TO BE UNIVERSITY)

of

GANDHI VIDYA MANDIR, SARDARSHAHR

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SYLLABUS

SCHEME OF EXAMINATION AND COURSE OF STUDY

FACULTY OF SCIENCE

DEPARTMENT OF ZOOLOGY

ENTRANCE TEST FOR Ph.D.

Session – 2023-24

IASE(Deemed to be University), Gandhi Vidya Mandir, Sardarshahr
Department of Zoology
Entrance Test for Ph.D. : 2023-24

Subject – ZOOLOGY

SYLLABUS

Duration: 1 Hours Max. Marks : 50

The question paper will contain 50 Multiple Choice Questions of 1 marks each. Answers will be made on OMR sheet. Question papers in Science subjects will be in English only

1. Biodiversity and Taxonomy : Species concept, Biological nomenclature theories of biological classification, Structural biochemical and molecular systematics, DNAfinger printing, numerical taxonomy, Biodiveristy, characterization, generation, maintenance and loss, Magnitude and distribution of biodiversity, economic value, wildlife biology, conservation strategies.
2. Animal behaviour: Feeding, learning, social and sexual behaviour of animals, Parental care, Circadian rhythms, Mimicry, Migration of fishes and birds, Sociobiology.
3. Parasitology: Important human and veterinary parasites (protozoans and helminths), Life cycle and biology of Plasmodium, Trypanosoma, Ascaris, Wuchereria, Fasciola,Schistosoma and Leishmania, Molecular, cellular and physiological basis of host-parasite interactions.
4. Fisheries: Fish and Fisheries in India with respect to the management of fresh water, estuarine, coastal water systems and man-made reservoirs, Fish food value, preservation, and marketing.
5. Evolutionary biology : Origin of life (including aspects of prebiotic environment and molecular evolution), Concepts of evolution, Theories of organic evolution, Mechanisms of speciation, Hardy-Weinberg genetic equilibrium, genetic polymorphism and selection, Origin and evolution of economically important microbes, plants and animals.
6. Environmental biology : Concept and dynamics of ecosystem, components, food chain and energy flow, productivity and biogeochemical cycles, Types of ecosystems, Population ecology and biological control, Community structure and organisation, Environmental pollution, Sustainable development, Economic importance of microbes, plants and animals.
7. Physiology: Thermoregulation, digestion, respiration, circulation, excretion, Physiology of reproduction, Nervous system, CNS, Neuro-endocrinology, Types of endocrine glands, classification of hormones, mechanism of their action, Stress and adaptation.
8. Cell Biology: Structure and function of cells and intracellular organelles (of both prokaryotes and eukaryotes), Mechanism of cell division (mitosis and meiosis) and cell differentiation; Cell-cell interaction, Malignant growth, Immune cells, Structure of prokaryotic and eukaryotic cell, Membrane structure and function, Intracellular compartments, protein sorting, secretory and endocytic pathways, Cytoskeleton, Nucleus, Mitochondria and chloroplasts and their genetic organisation, cell cycle, Structure and organisation of chromatin, polytene and lamphrush chromosomes, Biochemistry and molecular biology of cancer, Oncogenes, Chemical carcinogenesis.
9. Biochemistry : Structure of atoms, molecules and chemical bonds, Principles of physical chemistry, Thermodynamics, kinetics, dissociation and association constants, Van der Waal's electrostatic, hydrogen bonding and hydrophobic interactions, Structure, function and metabolism of carbohydrates, lipids and proteins, Enzymes and coenzyme, Respiration and photosynthesis, Enzyme kinetics (negative and positive cooperativity), Regulation of enzymatic activity, Active sites, Coenzymes, Activators and inhibitors, Isoenzymes, Allosteric enzymes, Ribozyme and Abzyme.

10. Metabolism: Glycolysis and TCA cycle, Glycogen breakdown and synthesis, Gluconeogenesis, interconversion of hexoses and pentoses, Amino acid metabolism, Coordinated control of metabolism, Biosynthesis of purines and pyrimidines, Oxidation of lipids, Biosynthesis of fatty acids, Triglycerides, Phospholipids, Sterols.Energy metabolism (concept of free energy), Thermodynamic principles in biology, Energy rich bonds, Weak interactions, Coupled reactions and oxidative phosphorylations, Group transfers, Bioenergetics.
11. Genetics : Principles of Mendelian inheritance, chromosome structure and function, Linkage and genetic mapping, Extrachromosomal inheritance (episomes, mitochondria and chloroplasts), chromosome aberrations, Transposons, Sex-linked inheritance and genetic disorders, Somatic cell genetics, Genetic and metabolic disorders, Hormonal imbalances, Drug metabolism and detoxification, Genetic load and genetic counselling.
12. Molecular Biology: The law of DNA constancy and C-value paradox, Numerical changes in chromosomes, Prokaryotic genome organization, Eukaryotic genome organisation (structure of chromatin, coding and non-coding sequences, satellite DNA), Fine structure of gene, DNA replication, amplification and rearrangements, DNA damage and repair.
13. 14. Organization of transcriptional units: Mechanism of transcription of prokaryotes and eukaryotes, RNA processing , Ribonucleoproteins, Structure of mRNA, Genetic code and protein synthesis. Regulation of gene expression in pro-and eukaryotes, Attenuation and antitermination, Operon concept, DNA methylation, Transposition, Regulatory sequences and transcription factors, Genomics, Proteomics.
14. Recombinant DNA technology: Principles and methods of genetic engineering and Gene targeting, DNA ligases, Topoisomerases, Gyrases, Methylases, Nucleases, Restriction endonucleases, Plasmids and bacteriophage based vectors, cDNA and genomic libraries. Applications of recombinant DNA technology in agriculture, health, pharmaceutical and other industry. Cell and tissue culture in plants and animals, Primary culture, Cell line, Cell clones, Callus cultures, Transgenic biology.
15. Developmental Biology: Gametogenesis in animals , Molecular events during fertilization,Cleavage patterns and fatemaps, Concepts of determination, competence and induction,totipotency and nuclear transfer experiments, Cell differentiation and differential gene activity. Morphogenetic determinants in egg cytoplasm, Role of maternal contributions in early embryonic development, Genetic regulation of early embryonic development in Drosophila.
16. Immunology: Antigens, Structure and functions of different classes of immunoglobulins, Primary and secondary immune response, Lymphocytes and accessory cells, Humoral and cell mediated immunity, MHC, Mechanism of immune response and generation of immunological diversity; Genetic control of immune response, Application of immunological techniques.
17. Microscopy: Principles and applications of light, phase contrast, fluorescence, scanning and transmission electron microscopy, Cytophotometry and flow cytometry, Principles of histology and histochemistry.
18. Separation techniques: Principles and applications of gel-filtration, ion-exchange and affinity chromatography, Thin layer and gas chromatography, High pressure liquid chromatography (HPLC), Electrophoresis and electrofocusing, Ultracentrifugation (velocity and buoyant density).
19. Techniques in Molecular Biology: Principles and techniques of nucleic acid hybridization and Cot curves, Sequencing of proteins and nucleic acids, Southern, Northern and South-Western blotting, Polymerase chain reaction, Methods for measuring nucleic acid and protein interactions.
20. Characterization of biomolecules: Principles of biophysical methods used for analysis of biopolymer structure, X-ray diffraction, fluorescence, UV, ORD/CD Visible, NMR and ESR spectroscopy, Atomic absorption spectroscopy.

21. Radiobiochemistry: Principles and applications of tracer techniques in biology, Radiation dosimetry, Radioactive isotopes and half life of isotopes, Effect of radiation on biological system, Autoradiography, Cerenkov radiation, Liquid scintillation spectroscopy.
22. Animal tissue culture: Principles, significance, scope of animal tissue culture, establishment of cell lines, organ culture methods, behaviour of organ explants, transplants and cell hybridization.
23. Biostatistics: Principles and practice of statistical methods in biological research, samples and populations; average, statistics of dispersion, coefficient of variation, Standard error, Confidence limits, Probability distributions (binomial, Poisson and normal);Tests of statistical significance, Simple correlation of regression, Analysis of variance.

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