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Syllabus for Ph.D. Entrance Examination

PAPER-I

(RESEARCH METHODOLOGY)

1. Basic concept of research problem

- Rationale of research
- Identification of research problem
- Research objective
- Types of research- fundamentals/applied/action/quantitative/qualitative

2. Review of literatures

- Primary source
- Secondary source
- Searching e-resources, using research engines
- Searching database
- Writing literature review

3. Methods of research

- Concept and formulation of hypothesis
- Survey method
- Experimental method (variable, designs)
- Historical methos
- Content analysis

4. Sampling of data

- Concept of sampling
- Probability sampling techniques
- Non probability sampling techniques
- Sampling error

5. Collection of data

- Primary data generation
- Secondary data collection
- Methods of data generation/collection- by experiments, questionnaire, interview schedule, focus groups etc.

6. Analysis of data

- Statistical analysis techniques
- Qualitative analysis techniques
- Application of computer in research data analysis

7. Reports preparation

- Structure and component of research report
- Organization of data
- Indexing of journal and research output
- Citation, reference, bibliography

- Copyright, plagiarism, originality of research work
- 8. Research ethics**
- Ethics in research
 - National and International regulations/law/ethics related to research on human, Animals and Environments

Paper -II

(Zoology)

Unit - I

Non-chordates and chordates: General characteristics of kingdom animalia and basis of classification, basic body plan, concept of invertebrate v/s vertebrata, introduction to invertebrates with their general characters, organisation of coelom major and minor phyla, larval system, general characters and diversity of chordates: fishes, reptiles and birds, mammals, comparative anatomy of various organ system in vertebrates.

Unit-II

Biochemistry: Composition, structure and function of biomolecules, principles of biophysical chemistry, principles of catalysis, enzymes and enzyme kinetics, conformation of nucleic acids, protein, metabolism of carbohydrates, lipids, amino acids, nucleotides and vitamins.

Molecular and Cell Biology: Membrane structure and function, intracellular organelles, organization of genes and chromosomes, cell division and cell cycle, DNA replication, repair and recombination, RNA synthesis and processing, protein synthesis and processing.

Unit-III

DEVELOPMENTAL BIOLOGY: Basic concepts of development potency, commitment, specification, induction, competence, determination and differentiation, morphogenetic gradients, cell fate and cell lineages, stem cells, gametogenesis, fertilization and early development, morphogenesis and organogenesis in animals, programmed cell death, regeneration, aging and senescence.

SYSTEM PHYSIOLOGY ANIMAL: Blood and circulation, sense organs, cardiovascular system, respiratory system, nervous system, excretory system, digestive system, reproductive system, endocrinology and endocrine glands, mechanism of hormone action, hormones and diseases, hormone regulation.

Unit-IV

INHERITANCE BIOLOGY: Mendelian principles, Concept of gene, Extensions of Mendelian principle, sex linkage, microbial genetic, human genetics, pedigree analysis, karyotypes, genetic disorders, quantitative genetics, recombination, mutation, structural and numerical alterations of chromosome.

ECOLOGICAL PRINCIPLES:Environment, habitat and niche, population ecology, population interactions and characteristics, life history strategies (r and K selection); concept of meta-population, species interactions, community ecology, ecological succession, ecosystem ecology, ecosystem structure and function; energy flow, mineral cycling (C, N, P), applied ecology&conservation biology.

Unit-V

METHODS IN BIOLOGY: Microscopy, chromatography, electrophoresis, immunological & cell imaging and histology methods, mass spectrometry & spectroscopy, immunoassays, Polymerase Chain Reaction (PCR), isolation and purification of RNA, DNA (genomic and plasmid) and proteins, different separation methods, analysis of RNA, DNA and proteins, gelelectrophoresis, Isoelectric focusing gels, gene cloning, cDNA libraries, protein sequencing methods, DNA sequencing methods, RFLP, RAPD and AFLP techniques, gene editing techniques, computational biology & bioinformatics, cell culture techniques.

IMPORTANT NOTE

There will be a total of 50 multiple choice questions (MCQs) for each of the two papers. Paper-I will focus on Research Methodology and Paper-II will cover specific Subject.

Each question in both papers carries 1 mark and will have a total of 50 marks for each paper. The duration for solving each paper is 1 hour. Students must appear for both Paper-I and Paper-II as specifies for the entrance. After completion and submission of Paper-I, the question Paper-II will be provided to the students.

Scheme:

Paper-I Research Methodology

Number of questions- 50 MCQs covering whole syllabus

Maximum Marks- 50

Duration- 1 hr

Paper-II Zoology

Number of questions- 50 MCQs covering whole syllabus

Maximum Marks- 50

Duration- 1 hr