

**SYLLABUS**  
**FOR**  
**Ph.D Entrance Examination**  
**(PET)**  
**IN**  
**ZOOLOGY**



**University Department of Zoology**  
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# **SYLLABUS FOR Ph.D. ENTRANCE TEST IN ZOOLOGY**

## **PART-A**

Part-A shall consist of 50 objective type compulsory questions of 1 mark each based on research methodology. It shall be of generic nature, intended to assess the research aptitude of the candidate. It will primarily be designed to test reasoning ability, data interpretation, and quantitative aptitude of the candidate.

## **PART-B**

Part-B shall also consist of 50 objective type compulsory questions of 1 mark each based on the syllabus of the subject at Masters Level as per the broad headings below:

### **1 Biosystematics, Taxonomy and Evolution-**

- 1.1 Importance and application of biosystematics in biology.
- 1.2 Chemotaxonomy; Cytotaxonomy; Molecular taxonomy.
- 1.3 Species concept and Speciation; Theories of organic evolution with emphasis on Darwinism and its shortcomings; Synthetic theory of evolution.
- 1.4 Molecular phylogeny – construction of phylogenetic tree, Nucleic acid phylogeny – DNA – DNA hybridization.
- 1.5 Restriction enzymes; Site mapping technique; Nucleotide sequence comparison.
- 1.6 Reproductive Isolation.

### **2 Structure and function of Invertebrates**

- 2.1 Locomotion:
  - 2.1.1 Modern concept of Flagellar and Ciliary movement in Protozoa.
  - 2.1.2 Hydrostatic movements in Echinodermata.
  - 2.1.3 Filter feeding in Polychaeta.
- 2.2 Respiration: Respiration in Arthropoda.
- 2.3 Excretion and Osmoregulation in Annelids.
- 2.4 Malpighian tubules in insects.

### **3. Environmental Biology and Ecotoxicology**

- 3.1 Population: Characteristics
- 3.2 Competition- Intra and Interspecific competition
- 3.3 Community

3.3.1 Community organization

3.3.2 Nature of communities

3.3.3 Niche concept

3.4 Biodiversity: Levels, Uses, Distribution, Indices, Hot Spot and Conservation  
Of Biodiversity.

3.5 Ecological Restoration:

3.5.1 Rehabilitation and Bioremediation concept.

3.5.2 Environmental limitation for bioremediation.

3.5.3 Biosensors

3.5.4 Environmental Impact Assessment (EIA): Purpose, aim, process.

3.6 Environmental Pollution

3.6.1 Major Anthropogenic problems: Acid rain, Green House effect,  
Smog, Ozone depletion.

3.7 Ecological Toxicology

3.7.1 Toxicology: Definition and scope; Acute and chronic toxicity.

3.7.2 Toxic chemicals in the environment (As, Cd, Pb, Hg, CO, O<sup>3</sup>,  
PAN, Pesticides and Carcinogens in air)

3.7.3 Toxicity testing- Bioassay, Estimation of LC 50 and LD 50

#### **4. Biostatistics**

4.1 Sampling: Concept of sampling and sampling methods

4.2 Test of significance for large sample (Z-test) and for small sample (t-test)

4.3 Hypothesis formulation and testing of Hypothesis: Chi-square analysis.

4.4 Probability distributions and their properties

4.5 Correlation: types of correlation, Karl Pearson coefficient of correlation,  
Rank correlation.

4.6 Regression analysis: Regression lines, Regression equations.

## **5. Reproductive Physiology and Endocrinology:**

5.1 Histophysiology of Testis, Ovary and Mammary glands

5.2 Hormone and reproduction

5.3 Endocrine glands and their hormones:

5.3.1 Adenohypophysis and neurohypophysis

5.3.2 Thyroid

5.3.3 Adrenal

5.3.4 Hormonal control of fuel metabolism: Insulin, Glucagon

And Epinephrine.

## **6. Immunology**

6.1 Biology of vertebrate Immune System: Innate and Acquired Immunity.

6.2 Organization and structure of Lymphoid organs.

6.3 Cells of the immune system:

6.3.1 T- cell generation activation and differentiation

6.3.2 B-cell - generation activation and differentiation

6.4 Antigens:

6.4.1 Nature of antigens and superantigens

6.4.2 Antigenicity and immunogenicity

6.5 Cytokines: Structure, functions and their receptors.

6.6 Complement system: Component and functions; Hypersensitivity (DTH)

## **7 Tools and techniques in Biology: General Principle and applications of-**

7.1 Colorimetry,

7.2 Spectrophotometry: Visible, UV visible, Ultra centrifuge

7.3 Separation techniques:

7.3.1 Chromatography: principle, type and application.

7.3.2 Electrophoresis: Principles

7.4 Sterilization: Principles and types

## 7.5 Histological techniques: Principles of tissue fixation-

### 7.5.1 Microtomy, Staining and Mounting

### 7.5.2 General protein localization by Mercury Bromophenol Blue

Proteins with – NH<sub>2</sub> groups by Ninhydrin-Schiff reaction.

### 7.5.3 DNA by Feulgen reaction

## 7.6 Autoclave

## 8. Molecular Cell Biology

### 8.1 Microscopy: Principle and applications- electron microscope.

### 8.2 Molecular biology techniques:

#### 8.2.1 Southern blotting; Northern blotting: Western blotting

#### 8.2.2 Polymerase Chain Reaction (PCR)

### 8.3 Cell division and cell cycle

### 8.4 Bio-membranes: Fluid Mosaic model

### 8.5 Cell transport

### 8.6 Nucleus: Structure of nuclear membrane and nuclear transport.

### 8.7 Cytoskeleton: Assembly of cytoskeleton filaments; Molecular motors

And their roles.

### 8.8 Programmed cell death (Apoptosis)

### 8.9 Ultrastructure of chromatin fibre: Telomere and its maintenance.

### 8.10 Cell junction and cell-cell adhesion.

## 9. Genetics

### 9.1 Mendelism and its variations

#### 9.1.1 Discussion on problems related to Mendelism

### 9.2 Gene mapping methods:

#### 9.2.1 Linkage maps

#### 9.2.2 Mapping with molecular markers

#### 9.2.3 RFLP

9.3 Sex determination in drosophila

9.4 Human Gene Regulation

9.4.1 Lac operon

9.4.2 Trp operon

## 10. Developmental Biology

10.1 Fertilization: Molecular events in fertilization.

10.1.1 Prevention of polyspermy

10.2 Organizer concept

10.3 Cell lineage in *Coenorhabditis elegans*

10.4 Determination of body axes in drosophila: Antero-posterior and Dorso-

Ventral

X.....X.....X.....X.