

## 47. Zoology

### B.Sc. Zoology-I

Total Mark: 100

#### Appendix 'A'

##### (Outlines of Tests)

Paper-A:	Principles in Animal Life (Written)	:	35 Marks
Paper-B:	Invertebrates Diversity (Written) Classification, Phylogeny and Organization	:	35 Marks
Paper-C:	Practical-I	:	15 Marks
Paper-D:	Practical-II	:	15 Marks

#### Appendix 'B'

##### (Syllabi and Courses of Reading)

### Paper-A: Principles in Animal Life

35 Marks

#### 1. Place of Zoology in Science:

A One-World View: Genetic Unity. The Fundamental Unit of Life, Evolutionary Oneness and the Diversity of Life, Environment and World Resources; What is Zoology ? The Classification of Animals; The Scientific Method.

#### 2. The Chemical Bases of Animal Life:

Atoms and Elements: Building Blocks of All Matter, Compounds and Molecules: Aggregates of Atoms, Acids, Bases, and Buffers, The Molecules of Animals; Fractional account of Carbohydrates, Lipids, Proteins, Nucleotides and Nucleic Acids based on their structural aspects.

#### 3. Cells, Tissues, Organs, and Organ System of Animals:

Structure and Functions of Cell Membranes ; Various Movements across Membranes ; Cytoplasm, Organelles, and Cellular Components ; Functional account of Ribosome's, Endoplasmic Reticulum, Golgi Apparatus, Lysosomes, Mitochondria, Cytoskeleton, Cilia and Flagella, Centrioles and Microtubules, and Vacuoles based on their structural aspects. The Nucleus: Nuclear Envelope, Chromosomes and Nucleolus. Tissues; Diversity in Epithelial Tissue, Connective Tissue, A Muscle Tissue and Nervous Tissue to perform various functions. Structural integrations for functions in Organs and Organ Systems.

#### 4. Energy and Enzymes: Life's Driving and Controlling Forces:

Energy and the Laws of Energy Transformation; Activation Energy ; Enzymes; Structure, Function and Factors Affecting their Activity; Cofactors and Coenzymes ; ATP : How Cells Convert Energy? An Overview.

**5. How Animals Harvest Energy Stored in Nutrients:**

Glycolysis: The First Phase of Nutrient Metabolism, Fermentation: "Life without Oxygen; Aerobic Respiration ; The Major Source of ATP: Metabolism of Fats and Proteins; Control of Metabolism; The Metabolic Pool.

**6. Cell Division:**

Mitosis, Cytokinesis, and the Cell Cycle: An Overview, Control of the Cell Cycle Meiosis; The Basis of Sexual Reproduction; Gamete Formation

**7. Inheritance Patterns:**

The Birth of Modern Genetics ;Mendelian Inheritance Patterns ; Other Inheritance Patterns, Environmental Effects and Gene Expression.

**8. Chromosomes and Gene Linkage:**

Eukaryotic Chromosomes, Linkage Relationships, Changes in Chromosome Number and Structure.

**9. Molecular Genetics : Ultimate Cellular Control:**

DNA: The Genetic Material; DNA Replication in Eukaryotes, Genes in Action; Control of Gene Expression in Eukaryotes; Mutations ; Applications of Genetic Technologies Recombinant DNA.

**10. Ecology I : Individuals and Populations:**

Animals and Their Abiotic Environment; Populations; Interspecific Interactions.

**11. Ecology II : Communities and Ecosystems:**

Community Structure and Diversity; Ecosystems; Ecosystems of the Earth; Ecological Problems, Human Population Growth, Pollution, Resource Depletion and Biodiversity.

**12. Animal Behavior:**

Four Approaches to Animal Behavior, Proximate and Ultimate Causes; Aotin- opomorphism; Development of Behavior, Learning, Control of Behaviour, Communication; Behavioral Ecology; Social Behavior.

**13. Evolution : A Historical Perspective:**

Pre-Darwinian Theories of Change; Lamarck: An Early Proponent of Evolution; Early Development of Darwin's Ideas of Evolution and Evidences; The Theory of Evolution by Natural Selection, Evolutionary Thought after Darwin; Biogeography.

#### **14. Evolution and Gene Frequencies:**

The Modern Synthesis: A Closer Look; The Hardy - Weinberg Theorem Evolutionary Mechanisms; Population Size, Genetic Drift, Neutral Selection, Gene Flow, Mutation, and Balanced Polymorphism, Species and Speciation : Rates of Evolution; Molecular Evolution Mosaic Evolution.

#### **Paper-B: Invertebrates Diversity (Classification, Phylogeny and Organization) 35 Marks**

##### **1. Introduction:**

Classification of Organisms; Evolutionary Relationships and Tree Diagrams; Patterns of Organization.

##### **2. Animal-Like Protists : The Protozoa:**

Evolutionary Perspective ; Life within a Single Plasma Membrane ; Symbiotic Life-styles. Protozoan Taxonomy; (up to phyla, subphyla and super classes, wherever applicable). Pseudopodia and Amoeboid Locomotion; Cilia and Other Pellicular Structures; Nutrition; Genetic Control and Reproduction; Symbiotic Ciliates; Further Phylogenetic Considerations.

##### **3. Multicellular and Tissue Levels of Organization:**

Evolutionary Perspective :Orgins of Multicellularity; Animal Origins. Phylum Porifera; Cell Types, Body Wall, and Skeletons; Water Currents and Body Forms; Maintenance Functions, Reproduction. Phylum Cnidaria (Coelenterate). The Body Wall and Nematocysts: Alternation of Generations; Maintenance Functions ; Reproduction and Classification up to class. Phylum Ctenophore; Further Phylogenetic Considerations.

##### **4. The Triploblastic. Acoelomate Body Plan:**

Evolutionary Perspective; Phylum Platyhelminthes; Classification up to class; The Free-Living Flatworms and the Tapeworms, Phylum Numerate; Phylum Gastrotrich; Further Phylogenetic Considerations.

##### **5. The Pseudocoelomate Body Plan : Ascheiminths:**

Evolutionary Perspective; General Characteristics; Classification up to phyla with External Features; Feeding and the Digestive System; Other Organ Systems ; Reproduction and Development of phylum Rotifera and phylum Nematoda; Phylum Kinorhvncha. Some important Nematode Parasites of Humans,; Further Phylogenetic Considerations.

##### **6. Mollusean Success:**

Evolutionary Perspective; Relationship to other Animals ; Origin of the Coelom ; Mollusean

Characteristics, Classification up to class. The Characteristics of Shell and Associated Structures, Feeding, Digestion, Gas Exchange, Locomotion, Reproduction and Development, other Maintenance Functions and Diversity in Gastropods, Bivalves and Cephalopods: Further Phylogenetic Considerations.

**7. Anelida: The Metameric Body Form:**

Evolutionary Perspective; Relationship to other Animals, Metamerism and Tagmatization, Classification up to class. External Structure and Locomotion, Feeding and the Digestive System, Gas Exchange and Circulation, Nervous and Sensory Functions, Excretion, Regeneration, Reproduction and Development, in Polychaeta, Oligochaeta and Hirudinea, Further Phylogenetic Considerations.

**8. The Arthropods : Blueprint for Success:**

Evolutionary Perspective : Classification and Relationships to Other Animals ; Metamerism and Tagmatization; The Exoskeleton; Metamorphosis; Classification up to class; Further Phylogenetic Considerations.

**9. The Hexapods and Myriapods : Terrestrial Triumphs:**

Evolutionary Perspective: Classification up to class. External Structure and Locomotion, Nutrition and the Digestive System, Gas Exchange, Circulation and Temperature Regulation, Nervous and Sensory Functions, Excretion, Chemical Regulation, Reproduction and Development in Hexapoda, Insects Behavior, Insects and Humans; Further Phylogenetic Considerations.

**10. The Echinoderms:**

Evolutionary Perspective; Relationships to other Animals; Echinoderm Characteristics; Classification up to class. Maintenance Functions, Regeneration, Reproduction, and Development in Asterozoa, Ophiurozoa, Echinozoa, Holothurozoa and Crinozoa; Further Phylogenetic Considerations; Some Lesser-Known Invertebrates; The Lophophorates, Entoprocts, Cycliophores, and Chaetognaths.

**Recommended Books:**

**Principal Reference Book:**

1. Miller, A.S. and Harley, J.B.; 1999 & 2002. ZOOLOGY, 4<sup>th</sup> & 5<sup>th</sup> Edition (International). Singapore: McGraw Hill.

**Additional Readings:**

2. Hickman, C.P., Roberts, L.S., and Larson, A., 2001. INTEGRATED PRINCIPLES OF ZOOLOGY, 11<sup>th</sup> Edition (International). Singapore: McGraw Hill.

3. Pechenik, J.A., 2000. BIOLOGY OF INTERVEBRATES, 4th Edition (International). Singapore: McGraw Hill.
4. Kent, G. C. and Miller, S., 2001. COMPARATIVE ANATOMY OF VERTEBRATES. New York: McGraw Hill.
5. Campbell, N.A., 2002; BIOLOGY Sixth Edition, Menlo Park, California; Benjamin Cummings Publishing Company, Inc.

**Paper-C: Practical-I**

**15 Marks**

1. Tests for different carbohydrates, proteins and lipids.

**Note for 1.** Emphasis on the concept that tests materials have been ultimately obtained from living organisms and constituted their body.

2. Study of the prepared slides of squamous, cuboidal, columnar epithelial tissues, adipose, connective, cartilage bone, blood, nervous, skeletal muscle, smooth muscle and cardiac muscle tissues.

**Note for 2.** Prepared microscopic and or projection slides and or CD ROM computer projections must be used.

3. Plasmolysis and deplasmolysis in blood
4. Protein digestion by pepsin.
5. Study of mitosis in onion root tip.
6. Study of meiosis in grass hopper testis.

**Note for 5-6.** Prepared microscopic and or projection slides and or CD ROM computer projections must be used.

7. Problem based study of Mendelian ratio in animals.
8. Multiple alleles study in blood groups.
9. Survey study of a genetic factor in population and its frequency.
10. Study of chromosomal number and structural change in Drosophila.
11. Study of karyotypes of Drosophila, Mosquito.
12. Study of cytochemical destruction of DNA in protozoa and avian blood cell.
13. Study of stages in the development of an Echinoderm.
14. Study of early stages in the development of a frog, chick and a mammal.

**Note for 10-14.** Prepared slides and preserved specimen and or projection slides and or CD ROM computer projections may be used.

15. Study to demonstrate nervous or endocrine basis of behaviour (conditioned reflex or aggression or parental behaviour).
16. Study to demonstrate social behaviour (honey bee, monkey group in a zoo).
17. Ecological notes on animals of a few model habitats.

18. Field observation and report writing on animals in their ecosystem (a terrestrial and an aquatic ecosystem study).

**Paper-D: Practical-II**

**15 Marks**

1. Study of **Euglena, Amoeba, Entamoeba, Plasmodium, Trypanosoma, Paramecium** as representative of animal like protists.
2. Study of sponges and their various body forms.
3. Study of principal representative classes of phylum Coelentrata.
4. Study of principal representative classes of phylum Platyhelminthes.
5. Study of representative of phylum Rotifera, phylum Nematoda.
6. Study of principal representative classes of phylum Mollusca.
7. Study of principal representative classes of phylum Annelida.
8. Study of principal representative classes of phylum Arthropoda.
9. Study of a representative of classes of phylum Echinodermata

**Recommended Books:**

1. Miller, S.A., 2002. GENERAL ZOOLOGY LABORATORY MANUAL. 5th Edition (International) Singapore: McGraw Hill.
2. Hickman, C.P. and Kats, H.L., 2000. LABORATORY STUDIES IN INTEGRATED PRINCIPLES OF ZOOLOGY. Singapore: McGraw Hill