

## **B.sc. Part-I Zoology Theory**

### **PAPER-I**

#### **A: PROTOZOA, PORIFERA, COELENTERATA**

General classification of the non-chordate phyla upto classes. The structure, habits and post embryonic development including larval forms of the non-chordate types and special topics against each phylum mentioned below:

**Protozoa-** *Monocystis, Leishmania*

- Protozoa and human diseases

**Porifera-** *Sycon*

- Canal system in Porifera

**Coelenterata-** *Obelia*

General characters and affinities of Ctenophora;  
Coral reef formation.

#### **B: PHYSIOLOGY**

**Physiology of processes in animals with special reference to man**

**Physiology of**

- Circulation,
- Digestion,
- Respiration,
- Excretion

**Endocrine system:**

Functions of various glands and their secretions.

## **PAPER II**

### **A: PLATYHELMINTHES, ASCHELMINTHES AND ANNELIDA**

**Platyhelminthes** – *Schistosoma*

Host- parasite relationship

Parasitic adaptations in Platyhelminthes

**Aschelminthes** - *Wuchereria bancrofti*

**Annelida**- *Nereis, Hirudinaria*;

Segmental organs

### **B: BIOCHEMISTRY**

Characteristics, classification and nature of proteins, carbohydrates and lipids.

Glycolysis, Krebs` cycle, oxidative phosphorylation, gluconeogenesis, Cori Cycle

Enzymes-nature, properties, classification, co-enzymes, Prosthetic group, mode of action of enzymes with special reference to induced fit theory.

Vitamins, classification, importance and sources of vitamins.

## **PAPER III**

### **A: ARTHROPODA, MOLLUSCA, ECHINODERMATA AND HEMICHORDATA**

#### **Arthropoda- *Palaemon***

General character and affinities of *Peripatus*

#### **Mollusca- *Pila***

- Torsion and detorsion

#### **Echinodermata- *Asterias***

- Water vascular system in Echinodermata

#### **Hemichordata – *Balanoglossus***

- Affinities of Hemichordata

## **B: TAXONOMY AND EVOLUTION**

### **TAXONOMY**

Principles of systematics and taxonomy

Evolutionary history of taxonomy

Objectives of classification

- Theories of classification, grouping and ranking, Diversity of individuals
- Principles of hierarchy

Definition, use and application of International code of Zoological Nomenclature

### **EVOLUTION**

#### **Synthetic theory of evolution**

- Selection, Mutation
- Migration, Genetic drift
- Isolation, Speciation

## **B. Sc. Part II- Zoology Theory**

### **PAPER-I**

#### **PROTOCHORDATES, ANIMAL DISTRIBUTION AND ECOLOGY**

##### **PROTOCHORDATA (Urochordata, and Cephalochordata)**

- General characters, anatomy and histology
- Post embryonic development of Amphioxus and Ascidian

##### **ANIMAL DISTRIBUTION**

- Geological and geographical distribution of animals
- Zoo-geographical regions of the world with their faunal characteristics with special reference to mammals

##### **ECOLOGY**

- Structure and function of ecosystem
  - Ecological, environmental factors and limiting factors
  - Trophic levels, Energy flow and concept of pyramids
  - Biogeochemical cycles
  - Adaptation of animals in deserts and freshwaters

**PAPER-II**  
**VERTEBRATA**

**Agnatha**

- General characters and classification

**Gnathostomata**

General characters, classification and comparative anatomy of the

- Integumentary,
- Circulatory,
- Digestive,
- Respiratory
- Nervous systems with special reference to **Scoliodon, Rana, Varanus, Columba and Lepus.**
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**Special topics**

- Parental care, origin and evolution of Amphibia
  
- Sphenodon as living fossil
  
- Biting mechanism of poisonous snakes; snake venom and antivenom
  
- Flight adaptation of birds

**PAPER-III**  
**GENETICS AND CELL BIOLOGY**

**GENETICS**

- Mendel's law of inheritance
- Linkage, crossing over and chromosome mapping
- Sex linkage and sex determination in Drosophila and man
- Dosage compensation and Lyon's hypothesis
- Blood group and haemoglobin genetics in man
- Inborn errors of metabolism in man
- DNA and RNA structure
- Evidence that nucleic acids are the genetic material-transformation in pneumococcus
- Hershey-Chase experiment
- RNA as genetic material in small viruses
- Replication of DNA-Messelson and Stahl's experiment
- Genetic code
- Molecular basis of mutation

**CELL BIOLOGY**

- Principles of fixation and staining.
- Fundamentals of TEM and SEM
- Cell cycle, mitosis and meiosis
- Nucleus, Nuclear membrane and nucleolus
- Structure and chemical composition of eukaryotic chromosomes
- Nucleosome structure
- Structure and functions of plasma membrane
- Golgi apparatus, mitochondria, lysosomes, endoplasmic reticulum and ribosomes.

## **B. Sc. Part III- Zoology Theory**

### **PAPER-I**

#### **A: MOLECULAR BIOLOGY AND GENETIC ENGINEERING**

##### **MOLECULAR BIOLOGY**

- Eukaryotic genome organizations
- Unique and repetitive DNA sequences
- Molecular basis of gene regulation in prokaryotes; inducible, repressible systems
- Immune system
  - Cellular components of the immune system
  - Immunoglobulin
  - Major histocompatibility complex
- Somatic cell genetics
  - Heterokaryons and cell hybrids
  - Gene regulation in Heterokaryons and somatic cells

##### **GENETIC ENGINEERING**

- Scope of genetic engineering
- Restriction enzymes and their use in gene cloning
- Nucleotide sequencing, isolation and analysis of mRNA
- In vitro synthesis of recombinant DNA and gene cloning techniques
- Application of recombinant DNA technology in biology, medicine, industry and agriculture
- Potential hazards of recombinant DNA technology

**PAPER- II**  
**ECONOMIC ZOOLOGY AND ENVIRONMENTAL BIOLOGY**

**ECONOMIC ZOOLOGY**

- Protozoa: Protozoan parasitic diseases of man and domestic animals with special reference to zoonotic significance of *Entamoeba histolytica*.
- Platyhelminthes: Life cycle and zoonotic significance of *Diphyllobothrium latum*
- Aschelminthes; Life cycle and zoonotic significance of *Dracunculus medinensis*
- Arthropoda: Life cycle and zoonotic significance of representative tick.
- Beneficial and harmful insects.
- Interrelationship of mosquito with malaria, yellow fever, dengue, encephalitis and dermatobia their prevention and control.
- Aquaculture: Basic concepts, management and economics (including Pear Fishery)

**ENVIRONMENTAL BIOLOGY**

Environmental pollution

- Air Pollution

Nature of pollutants, their sources and effects on human, plants and animals and their control

- Water pollution

Sources, consequences and control

- Soil pollution

Sources, nature and harmful effects

- Deforestation and desertification, Chipko movement, deforestation and overgrazing
- Environmental hazards of radiation, General Principles of radiation biology.
- Toxicants and industrial effluents, Absorption, distribution and excretion of toxicants and their undesirable effects, Biological factors affecting toxicity.
- Environmental health  
Water in relation to human disease, urbanization stress and health  
Basic concepts of environmental monitoring.

**PAPER III**  
**DEVELOPMENTAL BIOLOGY AND ETHOLOGY**

**DEVELOPMENTAL BIOLOGY**

**Asexual reproduction**

- The morphogenetic processes and the stages (blastema, blastogenesis and blastozoids).
- The kinds (fission, budding, gemmule formation).
- Comparison between blastogenesis and embryogenesis

**Sexual reproduction**

- Gametogenesis (spermatogenesis and oogenesis)
- Parthenogenesis

**Metamorphosis**

- The morphogenetic processes and causation in amphibians.
- Tissue reactivity and induction process

**Regeneration**

- The morphogenetic processes in regeneration
- Amphibian limb regeneration
- Histology of regeneration process (metaplasia)
- Factors influencing regeneration (stimulation, suppression)

**Growth**

- Concept of growth, degrowth and cell death
- Mechanism of growth
- Growth curves and their interpretation
- Type of cell growth

**ETHOLOGY**

Innate and learned behaviour

Imprinting and Fixed Action Patterns

Methods used in Ethological studies

**Fighting behaviour**

- How animals mark their territories and defend them

**Social behaviour**

- Advantages of being social
- How animals establish social hierarchies, communicate

Courtship displays and courtship behaviour

Nesting behaviour

- How animals construct a protective home to rear their young

Migratory behaviour of fish

Migratory behaviour of birds and navigation



#### Recommended books for B.Sc. I

1. Modern textbook of Zoology Invertebrate by R.L.Kotpal
2. Invertebrate Zoology by E.L.Jordan.
3. Animal physiology and Biochemistry by R.A.Agarwal,A.K.Srivastav and Kausal Kumar.
4. Animal physiology and Biochemistry by H.R.Singh and Neeraj Kumar.
5. Animal taxonomy and Museology by Dalela and Sharma.
6. Organic evolution and animal distribution by Veer Bala Rastogi.
7. A manual of practical zoology Invertebrate by P.S.Verma.

#### Recommended books for B.Sc. II

1. Chordate Zoology by Jordan and Verma.
2. Modern textbook of Zoology Vertebrate by R.L.Kotpal.
3. Cell biology, Genetics, Molecular biology, Evolution and Ecology by Verma and Agarwal.
4. Genetics by P.K.Gupta.
5. Introduction to animal ecology and environmental biology by H.R.Singh.
6. Organic evolution and animal distribution by Veer Bala Rastogi.
7. A manual of practical zoology Chordates by P.S.Verma.

## **List of Reference Books for B.Sc. 3<sup>rd</sup> Year**

### **Paper I: Molecular Biology and Genetic Engineering**

1. Biotechnology by B.D. Singh
2. Molecular Biology and Genetic Engineering by P.K. Gupta
3. The Cell: A Molecular Biology Approach by Cooper and Hausman
4. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology by Andreas Hofmann and Samuel Clokle
5. Kuby Immunology by Punt, Stranford, Jones and Owen

### **Paper II: Economic Zoology and Environmental Biology**

1. Economic Zoology by G.S. Shukla and V.B. Upadhyaya
2. Economic Zoology by Vinita Jaiswal and K.K. Jaiswal
3. Environmental Biology by P.S. Verma and V.K. Agarwal
4. Environmental Biology and Toxicology by P.D. Sharma
5. A Textbook of Environmental Studies by Asthana and Asthana

### **Paper III: Developmental Biology and Ethology**

1. Animal Behaviour by Manning and Dawkins
2. Developmental Biology by Shastri and Shukla
3. Animal Behaviour by Reena Mathur
4. An Introduction to Embryology by B.J. Balinsky and B.C. Fabian