

**VIDYASAGAR UNIVERSITY**  
**DIRECTORATE OF DISTANCE EDUCATION**

Midnapore - 721102



**SYLLABUS**  
for the  
**MASTER OF SCIENCE**  
Course of Study  
in  
**ZOOLOGY**

## M. Sc. Fart - I : ZOOLOGY

### Theoretical (300 marks)

- Paper- I : Gr.- A. Unit- I : 25 marks : Non-Chordates
- Paper- I : Gr.- A. Unit- II : 25 marks : Chordates
- Paper- I : Gr.- B. Unit- I : 25 marks : Applied Zoology
- Paper- I : Gr.- B. Unit- II : 25 marks : Biosystematics
- Paper- II : Gr.- A. Unit- I : 25 marks : Cytogenetics,
- Paper- II : Gr.- A. Unit- II : 25 marks : Molecular Biology &  
Biotechnology
- Paper- II : Gr.- B. Unit- I : 25 marks : Histology & Physiology
- Paper- II : Gr.- B. Unit- II : 25 marks : Biophysics & Biochemistry
- Paper- III : Gr.- A. Unit- I : 25 marks : Ecology
- Paper- III : Gr.- A. Unit- II : 25 marks : Ethology
- Paper- III : Gr.- B. Unit- I : 25 marks : Immunology
- Paper- III : Gr.- B. Unit- II : 25 marks : Biostatistics

### Practical (200 marks)

- Paper- IV : Based on paper- I : 70 Marks including excursion report
- Paper- V : Based on paper- II : 65 marks
- Paper- VI : Based on paper- III : 65 marks

**M. Sc. Part - I: ZOOLOGY**

**Paper - I : Group - A : Unit - I : 25 Marks**

**(Non-chordate)**

1. Origin & Evolution of Metazoa. Phylogenetic overview of major invertebrate phyla.
2. Comparative account about different larval forms of coelomate non-chordates.
3. Biology of the free living nematods - feeding mechanisms and life cycle ; role of nematodes in ecosystem.
4. Bryozoa - anatomical peculiarities, feeding mechanisms and phylogenetic relationship.
5. Rotifera - general organisation, mastax, reproduction and cyclomorphosis.
6. Conservation of invertebrates : approaches and setting priorities - invertebrate diversity, importance and threats.

**Paper - I : Group - A : Unit - II : 25 Marks**

**(Chordate)**

1. Classification of fishes : principle of classification, extinct fish group, detailed study of major fish orders with examples.
2. General structure of endostyle and iodine binding in lower chordates.
3. Origin, evolution and distribution of Primates with special reference to India.
4. Migration of fishes and birds.

5. Functional anatomy of organs of excretion and osmoregulation.
6. Evolution of urinogenital system with special reference to the separation of the two systems.
7. Anatomy of respiratory organs.
8. General considerations of organs of hearing, balance and echolocation.
9. Structure and modification of jaw suspension.
10. Integument, epidermal glands in tetrapods, hair, horn, claw, nail and hoof.

**Paper - I : Group - B : Unit - I : 25 Marks**

**(Applied Zoology)**

1. General characters and classifications of Insects up to order ; insects' digestive system with special emphasis to midgut, filter chamber and peritrophic membrane ; insects' neuro-endocrine system, integument, moulting and metamorphosis.
2. Biology, nature of damage and control of insects' pests (jute, cashew, betelvine and stored grains) ; integrated approaches to pest management.
3. Social organization of termites ; prospects and problems of sericulture in drought prone lateritic tracts ; modern technologies - in apiculture.
4. Biofertilisers with special emphasis to vermitechnology.
5. Concept of capture and culture fisheries ; inland and marine fisheries of fin fishes and shell fishes - present status and prospect.

**Paper - I : Group - B : Unit - II : 25 Marks.**

**(Biosystematics)**

1. Principle of taxonomy as applied to the systematics and classification of animal kingdom.
2. Basic rules of nomenclature (as per ICZN).
3. Type concept : holotype, paratype, syntype etc.
4. Species concept : biological species, sibling species, allopatric species, sympatric species.
5.  $\alpha$ ,  $\beta$ ,  $\gamma$  taxonomy and key to the identification.
6. Trends in modern biosystematics : morphological approach, immature stages and embryological approach, ecological approach, behavioural approach, cytological approach, biochemical approach, numerical approach, differential systematics.
7. Importance of taxonomy in applied biology : agricultural and forestry, biological control, public health, wild life management, national defence, environmental problems, soil fertility, mineral prospecting, quarantine, commercial application.

**Paper - II : Group - A : Unit - I : 25 Marks**

**(Cytogenetics)**

1. Recombination in bacteria : Sexual conjugation, the F factor, conjugation mapping, recombination mapping, the F factor and sexduction, specialized transduction, episomes and plasmids.
2. Genetic fine structure : The rII locus, complex loci,

complementation mapping, deletion detection and deletion mapping, rII fine structure.

3. **Gene frequencies and equilibrium** : Gene frequencies, gene pool, attainment of equilibrium at two loci, codominance in natural population, dominance in natural population, sex linkage in natural population.
4. **Mutation and DNA repair mechanism** : Ionizing radiation, Chemical mutagen, ultraviolet irradiation, DNA repair, target hypothesis.
5. **Genetic code** : The triplet code, overlapping genes & reading frame, universal code, degeneracy of code, Wobble hypothesis.
6. **Transposable elements** : Mobile elements in bacteria and eukaryots : insertion sequence, simple and composite transposon, structure of TN3 and TN 10, cointegrate structure, several types of transposable elements in *Drosophila melanogaster*, AC-DS element, RNA dependent transposition.
7. **Cancer** : Oncogene, protooncogene, tumorigenic virus, provirus and distinguish between V-src and C-src. structure and function of various sarcoma virus, structure and function of SV40 and polyoma virus, philadelphia chromosome.
8. **Cell cycle** : Anaphase movement is diphasic, mitotic apparatus.
9. **Polytene chromosome** : Structure and function.

**Paper - II : Group - A : Unit - II : 25 Marks**

**(Molecular Biology)**

1. Nucleosome particle and the structure of chromatin.

2. **DNA replication** : Semidiscontinuous DNA synthesis, single replicon & multiple replicon, oriC, enzymatic apparatus for DNA replication, topology of DNA.
3. **Constitution of eukaryotic genome** : C - value paradox, non repetitive and repetitive DNA sequences, satellite DNA, the Alu family.
4. **Production of template** : The basic transcription apparatus; sigma factor and core enzyme. structure of promoter, inhibition of transcription, elongation and termination.
5. **RNA processing** - mechanism of RNA splicing, basic differences between hnRNA and mRNA.
6. **Protein synthesis** : A special inhibitor tRNA, inhibition complex, activation of amino acid, factor involved in initiation, elongation and termination.
7. **Control of prokaryotic gene expression** : The lactose operon ; lactose & allolactose, promoter under positive control, operon under negative control, genetics of lac operon.
8. **Genetic engineering** : Plasmid, engineering the plasmid, getting plasmid into the bacteria, screening the bacterial colonies hybridization, making a probe, cloning and gene libraries.

**Paper - II : Group - B : Unit - I : 25 Marks**

**(Histology and Physiology)**

**Histology**

1. **Fixation** : General principles and purpose : classification and properties of fixatives ; composition and mechanism of actions of common fixatives.

2. **Biological Staining** : General principles and purpose ; chromogens and auxochroms ; dye diversity ; special shift ; physical & chemical classification of dyes, vital dyes, nomenclature of dyes, dyes of different origin and their subsequent extraction & processing ; general principle of mordanting.

**Physiology**

3. **Membrane structure**. active and passive transport, transmembrane transport of sodium ions. ionophores.
4. **Mechanisms of action of peptide and steroid hormones**.
5. **Origin and propagation of nerve impulse, neurotransmitter and neuromodulator**.
6. **Homeostasis**.
7. **Regulation of blood volume, heart rate and blood pressure**.
8. **Role of vitamins in metabolism**.
9. **Physiological role of Na, K, Ca, and P**

**Paper - II : Group - B : Unit - II : 25 Marks**

**(Biophysics and Biochemistry)**

**Biophysics**

1. **Properties of matter** : Law of partial pressure of gases and its biological applications. Diffusion - Fick's law, Grahams law, facilitated diffusion, factors affecting diffusion, biological applications, Viscosity - factors effecting viscosities of liquids and gases, Poisseuille's law, Ostwald viscometer, biological applications of viscosity. Centrifugation - moving boundary

