M.Sc. ZOOLOGY

Semester III

(2020-21)
UNIT 1
- Origin of Chordate-Concept of Protochordata
- Origin, evolution general organization and affinities of Ostracoderm.
- General organization, specialized, generalized and degenerated characters of Cyclostomes.
- Origin, evolution general organization of early Gnathostomes.
- General account of Elasmobranchi, Holocephali, Dipnoi and Crossopterygii.

UNIT-2
- Development, structure and functions of integument and its derivatives (Glands, scales, feathers and hairs)
- Respiratory system: Characters of respiratory tissue, external and internal
- Respiration. Comparative account of respiratory organs.
- Comparative account of Digestive System.

UNIT-3
- Evolution of heart.
- Evolution of aortic arches and portal systems.
- Blood circulation in various vertebrates groups.
- Comparative account of jaw suspensorium and vertebral column.
UNIT-4

- Evolution of urinogenital system in vertebrates.(Reptiles,Birds and Mammals)
- Comparative account of organs of olfactory and taste.
- Comparative anatomy of brain and spinal cord.(Reptiles,Birds and Mammals)
- Account of peripheral and autonomous nervous system in mammals.

UNIT-5

- Comparative account of lateral line system.
- Comparative account of electroreception.
- Flight adaptations in Birds and Mammals.
- Aquatic adaptations in birds and mammals.

SUGGESTED READING

3. Kent, C.G. Comparative anatomy of vertebrates
7. Sedgwick, A.A. Students Text Book of Zoology, Vol.II.
    New York.
Unit-1

- Limnology – Definition, historical development and scope of Limnology.
- Types of freshwater habitats and their ecosystem -
  - Ponds, Streams and rivers.
- Morphometry – Use of various morphometric parameters and Zonation.

Unit-2

**Physico – Chemical Characteristics.**

- Light and Temperature-
  - Light as an ecological parameter in freshwater.
  - Temperature- Radiation, Stratification and Heat Budget.
- Dissolved Solids – Carbonate, Bicarbonates, Phosphate and Nitrate.
- Physico – Chemical characteristics of freshwater with special reference to different parameters- Turbidity, dissolved gases( Oxygen, Carbon dioxide, Hydrogen Sulphide), Seasonal changes in dissolved gases and pH.

Unit-3.

- Study of Biota
  - Phytoplankton, Zooplankton and their inter-relationship.
  - Aquatic insects, birds and their environmental significance.
  - Ecological classification of aquatic fauna higher aquatic plants and their significance.

Unit-4

- Methods of water quality testing BOD and COD.
- Bioindicators- Aquatic flora and fauna in relation to water quality in an aquatic environment.

Unit-5

- Causes of pollution of Aquatic Resources, their management and conservation.
- Resource Conservation – Aquatic pollution, control, legislation, regulation on discharge of industrial effluents and domestic wastes in rivers and reservoirs.
- Use and misuse of inland waters.
Suggested Readings:

- Anathakrishnan: Bioresources Ecology
- Goldman: Limnology
- Odum: Ecology
- Pawlosuske: Physico-chemical methods for water
- Wetzel: Limnology
- Trivedi & Goyal: Chemical and biological methods for water pollution studies
- Welch: Limnology Vols. I-II
- Perkins: Ecology
- Arora: Fundamentals of environmental biology
MSc Third Semester- Zoology (2020-21)
PAPER- III
ECO- TOXICOLOGY

Max. Marks : 35

Unit-1
1. General principles of Environmental Biology with emphasis on ecosystems.
2. Abiotic and biotic factors of ecosystems.
3. Communities of the environment, their structure & significance.

Unit-2
1. Productivity, Production and analysis.
2. Recycling and reuse technologies for solid and liquid wastes and their role in environmental conservation.
3. Remote sensing—basic concepts and applications of remote sensing techniques in environmental conservation.
4. Environmental indicators and their role in environmental balance.

Unit-3
1. Kinds of environmental pollution and their control methods.
2. Radioactive compounds and their impact on the environment.
3. Vehicular exhaust pollution, causes and remedies.

Unit-4.
1. Toxicology—Basic concepts, Principles and various types of toxicological agents.
2. Toxicity testing principles, hazards, risks and their control methods.
3. Food toxicants and their control methods.
4. Public Health Hazards due to environmental disasters.

Unit-5
1. Pesticides, types, nature and their effects on environment.
2. Important heavy metals and their role in environment.
3. Agrochemical use and misuse, alternatives.
4. Occupational Health Hazards and their Control.
SUGGESTED READINGS:

1. Trivedi and Goel: Chemical and biological methods for water
2. Odum: Fundamentals of Ecology
Unit-1
• Aquaculture: history, definition, scope & importance.
• Fishery resources of India in general & Madhya Pradesh in particular.
• Abiotic & biotic factors of water necessary for fish life.
• Ecological characteristics of lakes & rivers.
• General ecological characteristics of reservoirs of India.

Unit-2
• Fish culture: - Mono and composite Fish culture.
• Fresh water prawn culture and its prospects in India.
• Culture of oysters & pearl.
• Sewage fed fish culture, paddy cum fish culture
• Frog culture.

Unit-3
• Fish breeding in natural conditions , bundh breeding, hypophysation & stripping.
• Transport of live fish & seed.
• Different types of crafts & gears used for fish catching.
• Preservation and processing of fish.
• Common weeds of fish ponds and methods of their eradication.

Unit-4
1. Fresh water fish farm engineering:Designing, layout & construction of different types of fish ponds.
2. Setting and management of fresh water aquarium.
3. Aquarium fishes:Types,characteristics & breeding.
4. By products of fish Industry & their utility.

Unit-5
• Water pollution, its effects on fisheries and methods of its abatment.
• Common fish diseases & their control.
• Biochemical composition and nutritional value of fish.
• Fisheries economics and marketing.
• Fisheries managements and extension.
Suggested Readings:

- C.B.L. Shrivastava: Fishes of India
- Jhingaran: Fish and fisheries of India
- S.S. Khanna: An Introduction to fishes
- R.S. Rath: Fresh water Aquaculture
- Gopalji Shrivastava: Fishes of U.P. & Bihar
- H.D. Kumar: Sustainability & Management of Aquaculture
- A.J.K. Mainan: Identification of fishes
- S.K. Gupta: Fish & Fisheries
- P.D. Pandey: Fish & Fisheries
- K.P. Vishwas: Fish & Fisheries
M.Sc. Third Semester- Zoology (2020-21)

PRACTICAL I: RELATED TO I & II THEORY PAPERS

1. Study of Specimens, slides and bones related to theory papers.
2. Major Dissection- Various systems of Labeo, Wallago,
3. Minor Dissection-
   (a) Accessory respiratory organs of Anabas, Clarias, Heteropneustes.
   (b) Herdmania-Neural gland & Nerve ganglia
   (c) Amphioxus-Wheel organ & Oral hood
4. Estimation of DO, chloride, BOD,COD,Hardness, pH and Alkalinity of water.
5. Study of fresh water ecosystem.

Scheme for Practical Examination

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<th>Max.M. 50</th>
<th>Min.M. 20</th>
<th>Time 4Hr.</th>
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<td>1. Major Dissection ................................10 Marks</td>
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<td>2. Minor Dissection ...................................04 Marks</td>
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<td>3. Spotting .............................................12 Marks</td>
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<td>4. Limnological exercise .............................10 Marks</td>
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<td>5. Practical Record ....................................05 Marks</td>
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<td>6. Viva Voce .............................................05 Marks</td>
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<td>7. Collection ............................................04 Marks</td>
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**M.Sc. Third Semester- Zoology (2020-21)**

**PRACTICAL II: RELATED TO III & IV THEORY PAPERS**

- Study of plankton.
- Preparation and Maintenance of Aquarium.
- Collection and Study of common weeds of fish ponds.
- Methods of culture related to theory papers/ visit to fish pond.
- Study of abiotic factors of water related to fish life.
- Determination of different toxic chemicals in samples of soil, water and air.
- Toxicological testing methods, General tests, acute toxicity test and LD 50 test.
- Identification and comments on Aquaculture animals

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**Scheme of practical examination**

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<th>Max.M. 50</th>
<th>Min.M. 20</th>
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<td>1. Spotting</td>
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<td>2. Exercise on toxicology</td>
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<tr>
<td>3. Study of culture methods related to theory</td>
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<td>4. Maintenance of aquarium</td>
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<td>5. Viva Voce</td>
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**TOTAL…..50**