

**B.Sc. V Semester**  
**Course Code - ZOL-501**  
**PAPER – XVII**  
**ECOLOGY**

XV

- 
- |                                           |                                                                                                                                                                 |           |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>1. Introduction :-</b>                 |                                                                                                                                                                 | <b>02</b> |
|                                           | ➤ Definition, basic concept, terminology used in ecology.                                                                                                       |           |
| <b>2. Abiotic environmental factors.</b>  |                                                                                                                                                                 | <b>08</b> |
|                                           | ➤ Temperature; Concept, temperature fluctuation in different environment. Range of temperature tolerance, effect of temperature on animals, Thermal adaptation. |           |
|                                           | ➤ Light-Concept, Light variation in different environment, effect of light on animals.                                                                          |           |
|                                           | ➤ Adaptation to salinity and moisture                                                                                                                           |           |
| <b>3. Biotic environmental factors :-</b> |                                                                                                                                                                 | <b>08</b> |
|                                           | ➤ Composition: - Definition, types, intraspecific and interspecific composition.                                                                                |           |
|                                           | ➤ Predation: - Definition, characteristics of predation.                                                                                                        |           |
|                                           | ➤ Commensalisms: - Definition and types with examples.                                                                                                          |           |
|                                           | ➤ Mutualism: - Definition and example.                                                                                                                          |           |
|                                           | ➤ Parasitism: - Definition and types with examples.                                                                                                             |           |
| <b>4. Population :-</b>                   |                                                                                                                                                                 | <b>06</b> |
|                                           | ➤ Definition and basic concepts                                                                                                                                 |           |
|                                           | ➤ Characteristics of population; Density, Natality, Mortality, Dispersion and Age distribution.                                                                 |           |
|                                           | ➤ Population growth.                                                                                                                                            |           |
|                                           | ➤ Population regulation.                                                                                                                                        |           |
| <b>5. Community :-</b>                    |                                                                                                                                                                 | <b>06</b> |
|                                           | ➤ Definition, basic concept and types.                                                                                                                          |           |
|                                           | ➤ Structure of community; producer, consumers and decomposers.                                                                                                  |           |
|                                           | ➤ Characters; ecological niche, diversity, abundance, dominance, ecotone, edge effect.                                                                          |           |
|                                           | ➤ Community succession; example of succession and climax                                                                                                        |           |
| <b>6. Ecosystem :-</b>                    |                                                                                                                                                                 | <b>15</b> |
|                                           | ➤ Definition, concept and types.                                                                                                                                |           |
|                                           | ➤ Components of ecosystem,                                                                                                                                      |           |
|                                           | ➤ Dynamics of ecosystem: - primary production, secondary production, food chain, food web, tropic level, energy of flow, ecological pyramids.                   |           |
|                                           | ➤ Brief introduction to major ecosystems: - Marine ecosystem, Pond ecosystem, Forest ecosystem and Desert ecosystem.                                            |           |

**Total Periods 45**

B.Sc. V Semester

Course Code - ZOL- 502  
PAPERXVIII - A

XVIII

FISHERY SCIENCE – I  
(Elective Paper)

---

**CAPTURE FISHERIES IN INDIA**

1.	<b>Introduction</b> Definition and history General characters and classification Concept of blue revolution Importance of fishes.	<b>05</b>
2.	<b>Freshwater fisheries.</b> Status of freshwater fisheries, past, present and future Freshwater capture fisheries, cat fishes, trout. Effect of aquatic pollution on fisheries.	<b>10</b>
3.	<b>Revering and reservoir fisheries.</b> Major river systems of India Important fisheries of Indian rivers system Major reservoirs of Maharashtra Reservoir fisheries and its management. Exploitation of reservoir fisheries	<b>10</b>
4.	<b>Brackish water fisheries</b> Principle fisheries of brackish water, milkfish, mullet, tilapia. Fisheries of the chilka, pulicat and Kolleru Lake	<b>08</b>
5.	<b>Marine water fisheries.</b> Oil-sardine Mackeal Ribbon fish fisheries. Bombay-duck Pomfret-fishery	<b>08</b>
6.	<b>Application of remote sensing technique in pelagic fisheries.</b>	<b>04</b>
	<b>Total periods</b>	<b>45</b>

**B.Sc. V Semester**

**Course Code - ZOL- 503**

**PAPER - XIX**



**ECOLOGY (PRACTICAL)**

---

1. Estimation of productivity of pond ecosystem using white and dark bottle method. **02**
2. Determine the following parameters of soil. **04**
  - pH
  - Alkalinity
  - Chlorinity
  - Salinity
  -
3. Analysis of DO, CO<sub>2</sub>, Salinity, Chlorinity of water sample. **04**
4. Study of animal association ship with example (Charts/photo) -Competition, mutualism, parasitism, predation and commensalisms. **01**
5. Estimation of population density by Quadrate method on field and by Simulation method. **04**
6. Preparation of permanent slides of following  
*Spirogyra, Verticella, Odogonium, Daphnia, Cyclops, Mysis, Cypris, keretella*
7. Project report: - Forest or fresh water ecosystem.

**Total practical periods: - 15**

**B.Sc. V Semester**

**Course Code - ZOL- 504**

**PAPER XX - A**

*XVIII* \*

**FISHERY SCIENCE – I (PRACTICAL)  
(Elective Paper)**

---

- |    |                                                                                                                                                   |    |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. | Study of freshwater fishes.<br>Major carps<br>Other carps.<br>Cat fishes<br>Clupoides                                                             | 03 |
| 2. | Study of brackish water fishes.<br><br><i>Hilsa hilsa, Chanos chanos (milkfish), Latis calcarifer, Tilapia</i>                                    | 02 |
| 3. | Study of marine ware fishes.<br>Oil sardine<br>Mackerel<br>Ribbon -fish<br>Bombay-duck<br>Pomfret<br>Sole<br>Polynemus                            | 03 |
| 4. | Water analysis                                                                                                                                    | 05 |
| 5. | Visit to local or any reservoir and marine fish landing centre and student should be submit a project report at the time of practical examination | 02 |

**Total practical periods: - 15**

**Pattern of Question Paper  
B.Sc. V Semester**

**Course Code - ZOL- 501  
PAPER XVII**

**ECOLOGY**

**Time: 01:30 hours**

**Max. Mark:-30**

- N.B. 1) Attempt all questions.  
2) All question carry equal marks.  
3) Illustrate your answer with suitable labeled diagram.
- 

- |     |                                                      |                                                      |
|-----|------------------------------------------------------|------------------------------------------------------|
| Q1. | Long answer question.<br>OR<br>Long answer question. | Based on chapter 1to3<br>OR<br>Based on chapter 1to3 |
| Q2  | Long answer question.<br>OR<br>Long answer question. | Based on chapter 4&5<br>OR<br>Based on chapter 4&5   |
| Q3  | Long answer question.<br>OR<br>Long answer question. | Based on chapter 6<br>OR<br>Based on chapter 6       |

Note: - wherever necessary sub-questions may be asked

**B.Sc. VI Semester**

**Course Code – ZOL - 601**

**PAPER – XXI**



**EVOLUTION**

---

1. Concept of organic evolution :-	<b>06</b>
➤ Definition and concept.	
➤ Theories of organic evolution in brief; Preformation theory, Bear's Law, Biogenetic law, catastrophism, Lamarckism, Darwinism and Germplasm theory.	
2. Origin of Life :-	<b>03</b>
➤ Definition, Abiogenesis, Biogenesis.	
➤ Chemical evolution of life.	
3. Evidences of Organic Evolution :-	<b>04</b>
➤ Anatomical evidences.	
➤ Embryological evidences.	
4. Darwinism :-	<b>05</b>
➤ Introduction :- Natural selection theory,	
➤ Artificial selection theory and sexual selection theory.	
5. Elemental forces of evolution :-	<b>07</b>
➤ Mutation: - Concept and role in evolution.	
➤ Recombination: - Concept and role in evolution.	
➤ Natural selection: - Concept and role in evolution.	
➤ Isolation: - Concept and role in evolution.	
➤ Genetic Drift. : - Concept and role in evolution.	
6. Basic patterns of evolution :-	<b>09</b>
➤ Sequential and divergent evolution.	
➤ Microevolution: - Concept, silent features and mechanism with example.	
➤ Macro evolution: - Concept, silent features and mechanism with example.	
➤ Mega evolution: - Concept, silent features and mechanism with example.	
7. Species and speciation:-	<b>07</b>
➤ Species: - Morphological concept, Genetical concept, biological concept of species	
➤ Speciation: - Definition, concept, mechanism of speciation.	
➤ Allopatric, Sympatric and Parapatric spèciation.	
8. Fossils :-	<b>04</b>
➤ Definition , fossil formation	
➤ Types of fossils.	
<b>Total Periods</b>	<b>45</b>

**B.Sc. VI Semester**

**Course Code - ZOL- 602  
PAPER XXII- A**



**FISHARY SCIENCE – II  
(Elective Paper)**

---

**FISH CULTURE AND FISH TECHNOLOGY**

**A. fish culture**

- |    |                                                                                |    |
|----|--------------------------------------------------------------------------------|----|
| 1. | Introduction                                                                   | 15 |
|    | a) Types of freshwater ponds-perennial and seasonal.                           |    |
|    | b) Different types of ponds-nursary, rearing and stoking ponds.                |    |
|    | c) Design, contruction and maintenance of nursery, rearing and stocking ponds. |    |
|    | d) Productivity of ponds                                                       |    |
|    | e) principles of fish collection                                               |    |
|    | f) Fish culture methods                                                        |    |
|    | g) Culture – cat fisheries                                                     |    |
|    | h) Sewage fed fisheries                                                        |    |
| 2. | Fish crop production (fish diseases)                                           | 06 |
|    | Protozoan, fungal, bacterial, viral worms diseases                             |    |
| 3. | Breeding of fishes                                                             | 08 |
|    | a) Natural spawning of carps                                                   |    |
|    | c) Artificial breeding by hypophysation                                        |    |
|    | d) Common carp breeding                                                        |    |

**B. fish technology**

- |    |                                  |    |
|----|----------------------------------|----|
| 4. | Fish preservation and processing | 08 |
|    | a) Fish processing methods       |    |
|    | b) Fish –spoilage                |    |
|    | c) Value added products          |    |
|    | d) Sanitation and HACCP          |    |
| 5. | Crafts and gears                 | 08 |
|    | a) Different types of gears      |    |
|    | b) Different types of crafts     |    |
|    | c) Preservation of gears         |    |

**Total Periods 45**

**B.Sc. VI Semester**

**Course Code – ZOL - 603**

**PAPER XXIII**

**XXIV**

**EVOLUTION (PRACTICAL)**

---

- |                                                                                                         |    |
|---------------------------------------------------------------------------------------------------------|----|
| 1. Embryological evidences of evolution with the help of slide/chart/pictures.                          | 02 |
| 2. Adaptive modification in feet of birds and mouth parts of insects                                    | 02 |
| 3. Study of successive stages of evolution with the help of models/charts                               | 02 |
| ➤ Horse                                                                                                 |    |
| ➤ Human                                                                                                 |    |
| 4. Discussion on patterns of speciation with the help of charts /pictures.                              | 02 |
| ➤ Allopatric speciation                                                                                 |    |
| ➤ Sympatric speciation.                                                                                 |    |
| 5. Study the homologous and analogous organs.                                                           | 04 |
| 6. Study of natural selection using <i>E.coli</i> bacteria against antibiotics (Tetramycin/ Penicillin) | 01 |
| 7. Study of geographical era.                                                                           | 02 |

**Total Practical periods 15**



**B.Sc. VI Semester Course**

**Code - ZOL- 604  
PAPER XXIV - A**

*XXIV - A*

**FISHARY SCIENCE - II (PRACTICAL)  
(Elective Paper)**

---

1.	Primary productivity of ponds (plankton studies).	02
2.	identification, classification and culturable significance of following. Catla, rohu, mrigal, catfishes, exotic canoj	03
3.	Collection and identification of fish parasites and worms.	04
4.	Removal of fish pituitary gland and preparation of pituitary extract	02
5.	Identification of crafts and gears. <u>Gill net</u> , Rampanni, Satpalti, Machwa, Catamaran.	02
6.	A visit to fish farm and fish processing centre is compulsory.	02
<b>Total Practical Periods</b>		<b>15</b>