B. Sc. Part II Fisheries  
[Introduced from June 2014 onwards]

Semester III

Paper I - (Fishery Biology I)

A) Lectures / contact hours per unit -   11  
B) Contact hours per practical –     04

UNIT-I

1. An introduction to Fisheries:  
1.1 History in brief.  
1.2 Inland, marine, capture and culture fisheries.  
1.3 A broad outline of fishery activity:  
   i. Fishing.  
   ii. Processing  
   iii. Marketing  
1.4 Importance of fisheries.  

2. Taxonomy of Shell-fish:  
2.1 Classification and General characters of Crustacea and Mollusca.

3. Taxonomy of Fin-fish:  
3.1 General outline of the classification.  
3.2 Chondrichthyes, Osteichthyes and Dipnoi.

UNIT-II

4. External Morphology of:  
4.1 Bivalve- Unio.  
4.2 Typical cartilaginous fishes - Scoliodon  
4.3 Typical bony fish- Labeo  
4.4 Typical lung fish - Protopterus.

5. Internal Anatomy of Fin fish : Scoliodon  
With reference to –  
5.1 Digestive system  
5.2 Circulatory system  
5.3 Excretory and reproductive system  
5.4 Brain  

UNIT – III

6. Internal Anatomy of Fin fish : Labeo  
With reference to –  
6.1 Digestive system  
6.2 Circulatory system  
6.3 Excretory and reproductive system  
6.4 Brain

7. Economic importance of the following:  
Sponges, Prawn, Unio, Oyster, Scoliodon, Harpodon, Pomphret, Sardine, Labeo and Catla

UNIT – IV

8. Study of the following general topics :  
8.1 Study of fins: Evolution of paired and unpaired fins in fishes  
8.2 Swim bladder.  
8.3 Migration in fishes.  
8.4 Locomotion in fishes : Carangiform, Anguilliform and Ostraciform  
8.5 Lung Fishes.

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Total periods   45

N.B. -Figures to the right indicate the number of lectures.
Semester III

Paper – II (Fish Physiology – I)

UNIT – I
1. Nutrition: 06
   1.1 Food and Feeding.
   1.2 Physiology of digestion.
   1.3 Assimilation.
2. Respiration: 07
   2.1 Types of gills.
   2.2 Mechanism of respiration.
   2.3 Accessory respiratory organs- Anabas, Clarias and Saccobranchus.

UNIT- II
3. Circulation: 06
   3.1 Composition and functions of blood
   3.2 Structure of heart in Scoliodon and Labeo
   3.3 Mechanism of circulation in Scoliodon and Labeo
4. Excretion: 06
   4.1 Osmoregulation in freshwater, marine and diadromous fishes.
   4.2 Structure and function of kidney.
   4.3 Excretory function of gills.

UNIT- III
5. Reproduction: 10
   5.1 Modes of Reproduction: Oviparity, Viviparity, Ovo- viviparity and Hermaphroditism.
   5.2 Maturity stages in gonads:
      i) Resting phase (immature)
      ii) Early maturing phase.
      iii) Advanced maturing phase.
      iv) Matured phase.
      v) Spawning phase.
      vi) Spent phase.

UNIT- IV
6. Sense organs: 10
   6.1 Olfactory Organs:
   6.2 Taste buds.
   6.3 Eye.
   6.4 Membranous labyrinth.
   6.5 Lateral line system.
   6.6 Ampullae of Lorenzini.
   6.7 Weberian ossicles.

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Total periods -45

N.B- Figures to the right indicate number of lectures.
Fisheries Semester IV
Paper III - Inland Fisheries

UNIT- I
1. Freshwater Habitat :
   1.1 Introduction.
   1.2 Characters and classification of:
       Ponds, Lakes, Streams, Rivers and Reservoirs.
2. Freshwater Ecosystems in Ponds, Rivers and Reservoirs.
   With respect to:
       2.1 Food chain.
       2.2 Food web.
       2.3 Primary productivity.

UNIT- II
3. Inland Capture Fisheries:
   3.1 Riverine capture fisheries.
   3.2 Reservoir capture fisheries.
   3.3 Lacustrine capture fisheries.

UNIT- III
4. Fishing Crafts and Gears:
   4.1 Fishing Crafts:
       Rafts, Catamaron, Canoes, Machwa, Trawler.
   4.2 Fishing Gears:
       Hooks and Lines, Cast net, Gill net, Trap net,
       Rampani net and Trawl net.

UNIT- IV
4.3 Maintenance of Fishing Crafts and Gears.
5. Water Pollution:
   5.1 Types of water pollutants.
   5.2 Effects of pollutants on fishes.
   5.3 Preventive measures.

Total periods 45

N.B- Figures to the right indicate number of lectures
Semester IV

Paper IV (Aquaculture)

UNIT- I

1. Introduction to Aquaculture: 05
   1.1 Basic Aquaculture- Definition and scope.
   1.2 History of Aquaculture- Origin and growth.
   1.3 Present national and global scenario.
   1.4 Comparison of aquaculture and agriculture.

2. Types of aquaculture: 07
   2.1 Semi Intensive, Intensive and Extensive aquaculture.
   2.2 Pond culture.
   2.3 Pen and cage culture.
   2.4 Running water culture.

UNIT- II

3. Criteria for selection of aquaculture species. 03
4. Major species for freshwater aquaculture. 03
5. Prerequisites of site selection: 04
   5.1 Topography
   5.2 Soil type.
   5.3 Water supply.

UNIT- III

6. Layout of Fish farm: 04
   6.1 Types of ponds.
   6.2 Construction of pond.

7. Physico-chemical conditions of fish pond: 07
   7.1 Physical conditions: Depth, Temperature, Turbidity, Light.
   7.2 Chemical conditions: Oxygen, Carbon dioxide, pH, Organic and inorganic contents.

UNIT– IV

8. Freshwater Plankton: 06
   8.1 Definition and classification
   8.2 Morphological study of:
      a) Phyto-plankton
      b) Zoo-plankton
   8.3 Importance of plankton

9. Aquarium Fishery: 06
   9.1 Setting of an aquarium.
   9.2 Common aquarium fishes:
      a) Angel fish.
      b) Gold fish.
      c) Guppy fish.
      d) Gourami.
      e) Swordtail Fish.
      f) Molly.

N.B- Figures to the right indicate number of lectures.

Total periods -45
**List of Recommended Books:**

1) Fish and Fisheries of India : V. G. Jhingran. Hindustan Publication Corp. (India), Delhi.


4) Textbook of Fish Culture : Breeding and Cultivation of Fish. Mare. Huet.

5) Freshwater Fish Pond Culture and Management. M. Chakrav.


8) A Handbook of Fish Farming : S. C. Agarwal, Narendra Publication House, Delhi.


11) Methods of Physical and Chemical Analysis of Water : Gotterman et.al.


18) Ecology - P.D. Sharma.
Practical course in Fisheries for B.Sc. II (Annual)

UNIT -I

1. Taxonomy of fin fishes;
   Classification of the following fishes up to families:
   Scoliodon, Pristis, Torpedo, Chimaera, Polypterus, Acipenser, Amia, Lepidosteus,
   Harpodon, Eel, Labeo, Clarias, Exocoetus, Hippocampus, Ophiocephalus, Anabas,
   Pleuronectus, Echeneis, Tetradon and Antennarius.

2. Taxonomy of shell fishes:
   i. Crustacea: Prawn, lobster and crab.
   ii. Mollusca: Unio, Pearl oyster and Sepia.

UNIT-II


4. Dissection of Catla, Mrigal or Cyprinus:
   4.1 Digestive system.
   4.2 Heart and major blood vessels. (Demonstration)
   4.3 Brain.
   4.4 Weberian ossicles.
   4.5 Mountings: Cycloid scale and swim bladder.

5. Demonstration of accessory respiratory organs in:
   5.1 Anabas.
   5.2 Clarias.
   5.3 Saccobranchus.

UNIT-III

6. Study of Fin:
   6.1 Paired fins: Pectoral and pelvic fins.
   6.2 Unpaired fins: Dorsal, ventral and different types of caudal fins.

7. Mounting of the following scales:
   Placoid, Cycloid and Ctenoid scales.

8. Study of different types of swim bladders.

UNIT –IV

9. Economic importance of the following:
   Sponges, Prawn, Oyster, Bivalve, Scoliodon, Pomphret, Harpadon, Sardine, Labeo.

10. Estimation of total glycogen, protein and lipid in fish organs.
    [Note: Sketches, Specimen/photographs may be used]
B.Sc. Part II Fisheries

Practical II

UNIT-I
1. Estimation of the following chemical factors from water sample.
   1.1 Dissolved oxygen.
   1.2 Free carbon dioxide.
   1.3 Alkalinity
   1.4 Hardness

2. Determination of primary productivity

UNIT-II
3. Study of Crafts and Gears:
   3.2 Gears - i. Cast net. ii. Gill net. iii. Rampani net.
       iv. Trawl net.

UNIT-III
4. Study of planktons:
   4.1 Quantitative estimation of plankton.
   4.2 Qualitative estimation of zoo-plankton.

5. Study of life cycle in Labeo- Egg and sperms, fertilized egg, hatchling, fry, fingerling and adults.

UNIT-IV
6. Aquarium fishery:
   6.1 Demonstration of tank fabrication.
   6.2 Setting of an aquarium.

7. Visit to fish seed production center/local fish market and submission of the report.
**Distribution of Marks for Theory Examination for Fisheries Paper I, II, III and IV**
Common Nature of Question paper as per Science Faculty.

**Distribution of Marks for Practical Examination (from 2013 onwards)**

**Practical – I**
1. Dissection – Major 12
2. Demonstration – Minor 06
3. Temporary Mounting 07
4. Estimation of glycogen / protein / lipid 10
5. Identification 10
6. Journal 05
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Total marks 50

N.B. Figures to the right indicate full marks.

**Practical – II**
1. Estimation of dissolved O2/ Free CO2. 10
2. Estimation of Alkalinity/Primary Productivity/Hardness 10
3. Mounting / Quantitative estimation of Planktonic Forms 05
4. Identification 10
5. Tour Report 10
6. Journal 05
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Total marks 50

N.B. Figures to the right indicate full marks.

**B.Sc. II : Fisheries Equivalence to Old Syllabus**