

**SWAMI RAMANAND TEERH MARATWADA
UNIVERSITY, NANDED**

Syllabus – (Effective from June, 2010)

B.Sc. IInd Year

Semester IIIrd

Subject :- Fishery Science

Theory Paper – VI Ecology & Fish Pathology

Periods – 45

Marks – 50

Unit – I

- 1) Definition and objectives of ecology.
- 2) Ecology of River.
 - a) Physico-chemical & Biological Characters of river water
 - b) Zonation of river water
 - c) Flora and fauna of river water
- 3) Ecology of Reservoir.
 - a) Introduction to reservoirs
 - b) Classification of reservoirs
 - c) Morphometric characters of reservoirs
 - d) Physico-chemical characters of reservoirs waters.
 - e) biotic Community :- Plankton, Microvegetation, Benthos
ecthyofauna.

Unit – II

Marine Ecology

- a) Physico-chemical characters of Sea water.
 - b) Horizontal & Vertical zonation of Sea water.
 - c) Flora & Fauna.
 - d) Food Web & food chain.
- Ecology of estuarine

Ecology of Estuaries

Types of estuaries :-

- 1) Types of estuaries :-
 - a) Salt wedge estuaries
 - b) Partially mixed estuaries
 - c) Fjords estuaries
 - d) Bar – built estuaries
- 2) Physico – chemical characteristic of estuaries.
- 3) Biota of estuaries :- Oligohaline organism, true estuarine organism, Stenohaline marine Organism & migrants.

Unit III

Water pollution & their control.

- 1) Introduction and definition.
- 2) Different types of pollutants.
- 3) Sewage and domestic refuse.
- 4) Pollution and treatment of sewage.
- 5) Pollution control and legislation.
- 6) Effect of pollutants on fishes.

Unit IV

Fish Pathology (Discusses, causing organism, symptoms, preventives measures).

- 1) Fungal Diseases
- 2) Bacterial Diseases
- 3) Protozoan Diseases
- 4) Helminthes diseases
- 5) Crustacean Diseases

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Semester IIIrd

Subject :- Fishery Science

Theory Paper – VII Fish Biology

Periods – 45

Marks – 50

Unit – I

Study of maturity and spawning in fishes

- a) Sexual dimorphism in Fishes.
- b) Seasonal changes in Testes (Morphological Histological).
- c) Seasonal change in ovary (Morphological Histological).
- d) Study of oogenesis and spermatogenesis in fishes.
- e) Determination of spawning periodicity by ova diameter measurement.
- f) Study of Gonado somatic index.

Unit – II

Fish Embryology and Development.

- a) Types of eggs.
- b) Cleavage and formation of blastula.
- c) Fate map of blastula.
- d) Gastrulation.
- e) Hatching and post embryonic development.
- f) Larval development stages.
- g) Oviparity, viviparity & ovo – viviparity.

Unit – III

- a) Length weight relationship
- b) Ponderal index
- c) Assessment of fecundity in fishes.
 - i) Volumetric ii) Gravimetric iii) Von Bayrs method
- d) Age and growth studies in fishes
 - i) Different method of age and growth determination :- Tagging, Marking, Scale method, otolith, radio carbon uptake method, RNA – DNA ratio method.
 - ii) Factors affecting growth rate in fishes.
 - iii) Significance of age and growth studies.

Unit – IV

Nutritional value of Fish.

- a) Bio-chemical composition of raw fish value
- b) Medicinal value of fishes.
- c) Calorific value in fishes.
- d) Economic importance of fishes.
- e) By products.

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Semester - IV

Subject: - Fishery Science

Theory Paper - VIII Fish Anatomy, Physiology & Fish microbiology

Periods: - 45

Marks:-50

Unit - I

Comparative study of –

- i) Teeth: - Structure, types, modification & function.
- ii) Gill Rakers: - Structure, types, modification & function.
- iii) Food: - Types of food, Feeding habits.
- iv) Alimentary canal modification of alimentary canal.
- v) Respiratory System.

Unit - II

- i) Structure and working of heart in elasmobranches and teleost.
- ii) Excretory System: - Kidney – structure types & functions.
- iii) Reproductive System.
- iv) Structure & function of air bladder.
- v) Osmoregulation in fishes, Osmoregulation in fresh water, marine & diadromous fishes.
Control of Osmoregulation in fresh water & marine fishes.

Unit - III

Endocrine Gland :-

- i) Pituitary gland: - Structure and Histophysiology of pituitary gland.
- ii) Thyroid gland: - Structure and Functions.
- iii) Adrenal gland: - Structure and Functions.
- iv) Gonads: - Structure and Functions.
- v) Thymus gland: - Structure and Functions.

Unit - IV

Microbiology

- i) General account of harmful and useful micro-organism in fresh water and marine water.
- ii) Fish spoilage
Causes of fish spoilage –
 - a) Bacteria and fish spoilage.
 - b) Enzymes and fish spoilage.
 - c) Chemical spoilage.
- iii) Changes during fish spoilage – Rigor mortis.
- iv) Measurement of spoilage.
- v) Chemical test for freshness.
- vi) Proper handling of fish.
- vii) Sources of contamination of fish.

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**Semester - IV
Theory Paper IX
Fish Technology & Processing**

Periods: - 45

Marks: - 50

Unit - I

Methods of Fishing and Fishing gear

- i) Introduction
- ii) Fishing without gear
- iii) Wounding gear
- iv) Line fishing
- v) Fishing baited springs, fish screens, fish traps.
- vi) Indigenous fishing gear of India: - Dip Net, Cast net, Triangular net, Purse net, Drag net, Gill net, Bag net, Rampani net.
- vii) Manufacture of nets.
- viii) Preservation of the gear.
- ix) Recent development in fishing gears of India.

Unit - II

Fishing Crafts

- 1) Indigenous fishing crafts-
 - a) Sea fishing crafts :-
 - i) Catamaran
 - ii) Masula boat
 - iii) Dug out canoes
 - iv) Out trigger canoes
 - v) Plank built canoes
 - b) Built up boats.
 - c) Mechanization of Indian fishing craft.
 - d) Selection of boat construction material.
 - e) Electronics in fishing industry :-
 - i) Echo sounder
 - ii) Sonar
 - iii) Net sonde
 - iv) Electro fishing

Unit - III

Fish Preservation

- i) Introduction
- ii) Principles of preservation: - Cleaning, lowering the temperature, rising the temperature, dehydration, use of salt, use of preservatives.
- iii) Methods of Preservation:-
 - a) Chilling with ice & salt.
 - b) Freezing & refrigeration.
 - c) Storing in cold storage.
 - d) Deep freezing & freeze drying.
 - e) Canning
 - f) Sun drying
 - g) Mechanical drying
 - h) Dry salting
 - i) Brining
 - j) Smoking
 - k) Pickling

Unit - IV

- i) Special Problems in fish preservation.
 - a) Denaturation due to freezing of fish.
 - b) Problems arising out of industrial processes in fish preservation industries.
 - c) Food poisoning from fish food. Intoxication & Allergies from fish.
 - d) Histamine poisoning from badly preserved fish.
 - e) Food poisoning from eating poisonous fish species.
 - f) Food poisoning of bacterial origin.

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**Syllabus B. Sc. IInd Year
(Semester IIIrd & IVth)**

**Subject: - Fishery Science
Practical Paper Xth**

- 1] Water analysis –
 - a) Dissolved oxygen
 - b) Dissolved CO₂
 - c) Chlorides
 - d) Carbonates
 - e) Ph- by Ph - meter
 - f) Sulphar
 - g) Nitrogen
- 2] Collection, identification of planktons and submission of planktons, slide
 - a) Fresh water phytoplankton & Zooplankton.
 - b) Marine Phytoplankton & Zooplankton.
- 3] Identification, classification & diagnostic characters.
 - i) Marine Water Fishes with adaptive characters (any 08)
 - ii) Fresh Water Fishes (any 08)
 - iii) Estuarine Fishes (any 05)
- 4] Identification & sexual dimorphisms in fishes. (any five)
- 5] Study of maturity stages in teleost locally available fish.
 - a) Morphological & Histological.
- 6] Assessment of fecundity from any two locally available fish.
- 7] Assessment of spawning season by ova diameters measurement in any locally available fish.
- 8] Length weigh relationship study in any two locally available fish.
- 9] Quantitative estimation of Protein/fat/carbohydrate from fish tissue (dry or wet).
- 10] Determination of fish age by scale method.
- 11] Identification of Fish Parasite
 - a) Argulus
 - b) Dactylogyrus
 - c) gyrodactylus
 - d) Ichthyoptheris multiplhis
- 12] Excursion tour, visit to coastal / fish farm and submission of excursion report.

**SWAMI RAMANAND TEERTH MARATHWADA
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**Paper VI & VII
List of Reference Books**

For Fishery Science Paper – VI, VII, VIII, & IX

- 1] Reservoir of fisheries of India – V.V. Sugunan.
- 2] The ecology of Fisheries – G.V. Nikolovsky.
- 3] Methodology for water analysis – Indian Association of Aquatic biology.
- 4] Limnology by wilch.
- 5] Concept of ecology – N. Arumugum.
- 6] An Introduction to fishes by S.S. Khana.
- 7] A text book fishery science and Indian fisheries by C B L Shvivastava. Kitab Mahal 22. AS.N Marg Allahabad.
- 8] An Introduction to Indian fisheries by Mrs. V. Sharma & S.P. Grover. Bishen Singh, Mahendrapal Singh 23 – A cannaugut place, Dhrreradun India.
- 9] Fish & Fisheries of India by V.G. Jhingran.
- 10] Ichthyology - Laglar
- 11] A History of fishes by J.R. Norman.
- 12] Fish & Fisheries – Pandey & Shukla Rastogi Publication Shivaji, Road, Meerut.
- 13] A text book fish & fisheries and technology and edition Dr. K.P. Bistwas, Narendra Publishing science
- 14] Manual in fishery science By. K.R. Reday & M.G. Babre.
- 15] General topics in Fishery Science, By. K.R. Reday & M.G. Babre.
- 16] An Introduction to Fishes. By Gurudarshan Singh & Bhaskar.
- 17] Aquaculture and Aquarium keeping By Chavan S.P., M.S. Kadam, & S.D. Niture (Educational Books and Publishers Aurangabad M.S.).

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Semester - IV

Practical Paper X

(Aquatic Ecology, Fish Pathology & Fish Biology)

Time: 3 hrs

Marks – 100

Batch No:

Date: / /20

- Q. 1) Identify Classify and comment on adaptive feature (any two). 10
- Q. 2) Identify and comments on (As Per Instruction).
(2 Fresh water fish, 1 estuarine fish, sexual dimorphism in fish, 1 fish
parasite). 20
- Q. 3) Preparation of permanent slide of phytoplankton & Zooplankton
(Identify with comments). 10
- Q. 4) Estimate the amount of present in given sample.
(Dissolved O₂/ CO₂/ chloride/ Nitrogen). 15
- Q. 5) Estimate the fish Fecundity of provided ovary 15

OR

- Estimate the length-weight relationship of available fishes
- Q. 6) Estimate the amount (Quantitatively) of Protein / fat / Carbohydrate
from of the fish provided. 15
- Q. 7) Submission of Permanent slides, Excursion report. 05
- Q. 8) Record book & viva-voce. 10

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Fishery Science Practical Paper XIth

Time: 3 hrs

Marks – 100

Batch No:

Date: / /20

- 1] Dissect Scoliodon so as to expose system. 20
- 2] Dissect the fish Scoliodon so as to expose / dissect out its brain. 10
- 3] Preparation of Permanents slide of the provided ribbon of ovary / testes
/pituitary gland. 15

OR

Identification & staining or given microbial culture / material provided.

- 4] Identify and comments (as per Instruction).
(1 Fishing line, 2 Net, 2 craft). 25
- 5] Prepare the given fish sample for preservation & write the process of
preservation. 10
- 6] Submission of prepared fishing crafts & gear. 10
- 7] Record book & viva – voce. 10