

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED**

Semester - IV

**Subject: - Fishery Science
(With effect from July 2011)**

Theory Paper - VIII Fish Anatomy, Physiology & Fish microbiology

Periods: - 45

Marks:-50

Unit - I

Comparative study of –

- i) Teeth: - Types and function.
- ii) Gill Rakers: -structure,types and function.
- iii) Food: - Types of food, Feeding habits.
- iv) Alimentary canal :- alimentary canal of herbivorous and carnivorous fish

Unit - II

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

Unit - III

Endocrine Gland :-

- i) Pituitary gland: - Structure and functions 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-organisms in fresh water and marine water.
- ii) Fish spoilage
Causes of fish spoilage – Bacterial, enzymatic and chemical spoilage.
- iii) Changes during fish spoilage – Rigor mortis.
- iv) Chemical test for freshness.
- v) Organoleptic test for freshness.
- 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, Purse net, Drag net, Gill net, and Rampani net.
- vii) Material used in manufacture of nets:- a) Natural b) Synthetic
- viii) Preservation of the gear.

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) Mechanized boat :- a) Trawler b) vessels
 - c) Material used in boat in construction .
 - d) 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: -Washing, gutting, 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) Food poisoning and allergies from fish food.
 - c) Food poisoning from consumption poisonous fish.
 - d) Food poisoning of bacterial origin.
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**SWAMI RAMANAND TEERTH MARATHWADA
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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 multiphlis
- 12] Excursion tour, visit to coastal / fish farm and submission of excursion report.

**SWAMI RAMANAND TEERTH MARATHWADA
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Syllabus
Practical Paper – XI

- 1) **Dissection of Scoliodon.**
 - a) Digestive System.
 - b) Urinogenital System.
 - c) Ventral aorta.
 - d) Afferent and efferent branchial arteries.
 - e) Brain.
- 2) **Micro technique**

Block Preparation section cutting and staining of endocrine glands in any fresh water teleost

 - a) Pituitary
 - b) Ovary
 - c) Testes
 - d) Thyroid gland,
- 3) Isolation of micro-organism (Bacteria & fungi) from fish (Streak plate method).
- 4) Staining – monochrome staining and Grams staining.
- 5) Identification of fresh fishes and spoiled fishes.
- 6) Study of fishing lines. (any two).
- 7) Study of Fishing gears (any five).
- 8) Study of fishing craft (any five).
- 9) Fabrication of fishing boat model & submission (any one).
- 10) Preservation of locally available fishes by Ratnagiri method.
- 11) Preparation of fish Preservation (Washing, gutting, cleaning, and other stages & processing).
- 12) Preservation of locally available fishes by mechanical drying method.
- 13) Excursion tour: - Visit to fish processing industries and submission of report.

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Semester - IV

Practical Paper X

(Aquatic Ecology, Fish Pathology & Fish Biology)

Time: 3 hrs

Marks – 50

Batch No:

Date: / /20

- Q. 1) Identify Classify and comment on adaptive feature (any two). 06
- Q. 2) Identify and comments on (As per Instruction).
(1 Fresh water fish, 1 estuarine fish, 1sexual dimorphism in fish,
1fish parasite). 08
- Q. 3) Preparation of permanent slide of phytoplankton or Zooplankton
(Identify with comments). 05
- Q. 4) Estimate the amount of Present in given sample.
(Dissolved O₂/ CO₂/ chloride/ Nitrogen). 07
- Q. 5) Estimate the fish Fecundity of provided ovary 07

OR

- Estimate the length-weight relationship of available fishes
- Q. 6) Estimate the amount (Quantitatively) of Protein / fat /
Carbohydrate from of the fish provided. 07
- Q. 7) Submission of Permanent slides, Excursion report. 05
- Q. 8) Record book & viva-voce. 05

**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 topies 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.).

**SWAMI RAMANAND TEERTH MARATHWADA
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Fishery Science Practical Paper XIth

Time: 3 hrs

Marks – 50

Batch No:

Date: / /20

- 1] Dissect Scoliodon so as to expose system. 10
- 2] Dissect the fish Scoliodon so as to expose / dissect out its brain. 06
- 3] Preparation of Permanents slide of the provided ribbon of
Ovary / testes /pituitary gland. 08

OR

- Identification & staining or given microbial culture / material
Provided.
- 4] Identify and comments (as per Instruction).
(1 Fishing line, 1 Net, 1 craft). 12
- 5] Prepare the given fish sample for preservation & write the process of
preservation. 06
- 6] Submission of prepared fishing crafts & gear. 04
- 7] Record book & viva – voce.

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**SWAMI RAMANAND TEERH MARATWADA
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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 Reservoir.
 - a) Introduction to reservoirs
 - b) Classification of reservoirs
 - c) Eutrophication of reservoirs.
 - d) Physico-chemical characters of reservoirs waters.
 - e) Biotic Community: -Flora and fauna of reservoirs.

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 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, Stenohalane 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 (Disease causing organism, symptoms, preventives measures).

- 1) Fungal Diseases:-Gill rot, Branchiomycosis.
- 2) Bacterial Diseases:- Dropsy and fin rot
- 3) Protozoan Diseases:-White spot and costiasis.
- 4) Helminth diseases:-Gyrodactylosis and Dactylogyrosis.
- 5) Crustacean Diseases :-Learniasis and argulosis.

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Syllabus – (Effective from June, 2010)

B.Sc. IInd Year

Semester IIIrd

Subject: - Fishery Science

Theory Paper – VII Fish Biology

Periods – 45

Marks – 50

JULY-2010

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 (GSI).

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) Oviparity, viviparity & ovo – viviparity.

Unit – III

Growth studies

- 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.

Unit – IV

Nutritional value of Fish.

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