

**SWAMI RAMANAND TEERH MARATWADA
UNIVERSITY, NANDED**

Syllabus – (Effective from *June, 2014*)

B.Sc. IInd Year

Semester IIIrd

Subject: - Fishery Science

Theory Paper – VI Ecology & Fish Pathology

Periods – 45

Marks – 50

Unit – I

Fresh water Ecology

- 1) Definitions and objectives of ecology.
- 2) River Ecology
 - a) Physico-chemical characters of river waters.
 - b) Biotic factors- Producers, Consumers and Decomposers
 - c) Zonation of river- Rhithron and Potamon
 - d) Flora and fauna of river
- 3) Reservoir Ecology
 - 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, Stenohalanine Organism & migrants.

Unit III

Water pollution & their control.

- 1) Introduction and definition.
- 2) Different types of pollutants.
- 3) Sewage and its treatments
- 4) Effect of pollutants on fishes.
- 5) Pollution control and legislation.

Unit IV

Fish Pathology (Disease causing organism, symptoms, preventive 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.

**SWAMI RAMANAND TEERH MARATWADA
UNIVERSITY, NANDED**

Syllabus – (Effective from June, 2014)

B.Sc. IInd Year

Semester IIIrd

Subject: - Fishery Science

Theory Paper – VII Fish Biology

Periods – 45

Marks – 50

Unit – I

Developmental Biology.

- 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 – II

Reproductive Biology

- 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) Assessment of fecundity in fishes.
 - i) Volumetric ii) Gravimetric iii) Von Bayrs method
- f) Study of Gonado Somatic Index (GSI)

Unit – III

Growth studies

- a) Introduction to growth
- b) Linear growth characteristics
- c) Estimation of length (Linear growth)
- d) Length weight relationship
- e) Ponderal index
- f) 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 and Economical importance.

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

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED**
Syllabus – (Effective from June, 2014)
B.Sc. IInd Year
Semester - IV
Subject: - Fishery Science
**Theory Paper - VIII Fish Anatomy, Physiology & Fish
microbiology**

Periods: - 45

Marks:-50

Unit - I

Comparative study

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

Unit – II

Comparative study

- 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 Glands

- 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.

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED**

Syllabus – (Effective from June, 2014)

B.Sc. IInd Year

Semester - IV

Theory Paper IXth

Fish Technology & Processing

Periods: - 45

Marks: - 50

Unit - I

Methods of Fishing and Fishing gear

- i) History of fishing
- ii) Methods of fishing
 - a) Traditional method:- Catching by hand ,fishing by hunting ,fishing by plant poisons .
 - b) Conventional methods:-
 - iii) Nets:- Mode f netting a) Active netting :- Dip Net, Cast net, Purse net, Drag net, Gill net, Rampani net and bag net. Trawls Hooks and lines, Fishing baited springs, fish screens.
 - b) Passive netting:- Gill net, drift net, Trammel net, fixed bag net fixed traps
 - iv) Material used in manufacture of nets:- a) Natural b) Synthetic
 - v) Preservation of the gear.

Unit - II

Unconventional fishing and Fishing Crafts

- A) Unconventional fishing:-
 - i) Electric fishing:- mode of site of electric fishing,
 - ii) Light fishing

iii) Fish finding:-a) Hydro acoustic devices b) Fishing operations by Echo sounders

B) Fishing crafts:-

i)Inland fishing crafts;

ii)Sea fishing crafts;

iii)Mechanized crafts.

iv) Material used in boat in constructions .

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

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.

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED
Syllabus B. Sc. IInd Year
(Effective from June, 2014)
(Semester IIIrd & IVth)
Subject: - Fishery Science
Practical Paper Xth**

- 1] Water analysis –
 - a) Dissolved oxygen b) Free CO₂ c) Chlorides
 - d) Carbonates and Bicarbonate e) PH
- 2] Collection, identification of planktons and its submission of prepared slides.
 - 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 periodicity by ova diameters measurement in any locally available fish.
- 8] Length- weight 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) Ichthyophtheris multiplis
- 12] Excursion tour, visit to coastal / fish farm and submission of excursion report.

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED
Syllabus B. Sc. IInd Year
(Effective from June, 2014)
(Semester IIIrd & IVth)
Subject: - Fishery Science
Practical Paper – XIth**

- 1) **Dissection of any available local fish.**
 - 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 following tissues

a) Pituitary	b) Ovary
c) Testes	d) Intestine
- 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.

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED**

B. Sc. IInd Year

Semester –III& IV

Practical Paper Xth

(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 from given sample.
(Dissolved O₂/Free CO₂/ chlorides). 07

Q. 5) Estimate the Fecundity of provided ovary 07

OR

Estimate length-weight relationship of fishes.

Q. 6) Quantitative estimation of Protein / fat / Carbohydrates from given tissue 07

Q. 7) Submission of Permanent slides, Excursion report. 05

Q. 8) Record book & viva-voce. 05

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED**

B. Sc. IInd Year

Semester –III& IV

Fishery Science Practical Paper XIth

Time: 3 hrs

Marks – 50

Batch No:

Date: / /20

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

OR

Identification & staining of given microbial culture / material .

- | | |
|--|----|
| 4] Identify and comments (as per Instruction).
(1 Fishing line, 1 Net, 1 craft). | 12 |
| 5] Prepare the given fishes for preservation & write the process of
preservation. | 06 |
| 6] Submission of prepared models of fishing crafts & gear. | 04 |
| 7] Record book & viva – voce. | 04 |

**SWAMI RAMANAND TEERTH MARATHWADA
UNIVERSITY, NANDED
B. Sc. IInd Year
Semester –III& IV
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 – IAAB Publication Hyderabad.
- 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. Biswas, Narendra Publishing science
- 14] Manual in fishery science By. K.R. Reday & M.G. Babre.
- 15] General Topices 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
UNIVERSITY, NANDED
MEMBER OF BOARD OF STUDIES IN
FISHERY SCIENCE**

1.DR.N.G.POPATWAR.	CHAIRMAN
2.DR.J.M.GAIKWAD .	MEMBER
3.DR.S.S.KORDE.	MEMBER
4.DR.S.D.AHIRRAO.	MEMBER
5.DR.M.G.BABRE.	MEMBER
6.DR.C.J.HIWARE.	MEMBER
7.DR.M.SHARMA.	MEMBER
8.DR.A.N.KULKARNI	INVITEE MEMBER
9.DR.S.U.KADAM	INVITEE MEMBER
