

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED.

Syllabus (Effective from June, 2009)

B.Sc. II<sup>nd</sup> Year

Subject : Fishery Science

**Theory Paper IV : Ecology & Fish Biology**

**Periods - 80**

**Marks – 100**

**Unit I :**

- 1) Definition and objectives of ecology.
- 2) Ecology of River: -
  - a. Physical and chemical characters of river water, zonation of river water.
  - b. Flora and fauna of river water.
- 3) Ecology of reservoir: -
  - a. Introduction to reservoir, classification of reservoirs, morphometric characters, physico-chemical characters of reservoir water, Biotic community : Plankton, micro vegetation, Benthos and ecthyofauna.
- 4) Marine Ecology: -  
Physico chemical characters of sea water, horizontal and vertical zonation of sea water, flora and fauna, food web and food chain.

**Unit II :**

- 1) Adaptation in deep sea fishes.
- 2) Water pollution :- Introduction and definition, different types of pollutants, sewage and domestic refuse, dilution and treatment of sewage, pollution control and legislation, effects of pollutants on fishes.
- 3) Fish migration :- Migratory species, types and method of migration, periodicity of migration, distance, speed, duration and degree of return, patterns of migration, factors affecting and controlling migration, advantages of migration.
- 4) Study of hill stream fishes :- Conditions in the hill streams, modifications and adaptations in the fishes, origin of hill stream fish.
- 5) Study of Planktons :- Introduction, definition and classification, methods of collection from fresh and marine water, qualitative and quantitative analysis of plankton.

**Unit III :**

**Study of maturity and spawning in fishes.**

- a) Sexual dimorphism in fishes.
- b) Seasonal changes in testes and ovary. (morphological and histological)
- c) Study of oogenesis and spermatogenesis.
- d) Determination spawning periodicity by ovadiameter measurement.
- e) Study of Gonadosomatic index (GSI)
- f) Length, weight relationship.

- g) Ponderal index.
- h) Assesment of fecundity in fish by
  - (i) Volumetric
  - (ii) Gravimetric
  - (iii) Von Bayer's method.

**Unit IV :**

**Fish embryology and development.**

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

**List of References :**

- 1) Reservoir of fisheris of India – V. V. Sugunan
- 2) The ecology of fisheries – G. V. Nikolvsky
- 3) Methodology for water analysis – Indian Association of Aquatic biology.
- 4) Limnolog by welch.
- 5) Concept of Ecology – N. Arumugum
- 6) An introduction to fishes by S. S. Khanna  
– Central Book Dept. Allahabad.
- 7) A textbook of fishery science and Indian fisheries by C.B.L. Shrivastava  
– Kitab Mahal 22 A.S.N. marg, Allahabad.
- 8) An introduction to Indian Fisheries by Mrs. V. Shrama and S. P. Grover –  
Bishen Singh Mahendra pal Singh 23 – A cannaugut place, Dehra-Dun (India)
- 9) Indian fishes vol. I and II by P. K. Tsawars and Arun J. Jhingran; -  
Oxford and I B H publishing co. povt., Ltd. New Delhi, Bombay.
- 10) Fish and fisheries of India by V. G. Jhingran  
– Hindustan Publishing co-operation Delhi (India).
- 11) Lcthylogy – Laglar
- 12) A. History of fishes by J. R. Norman.  
– London Ernest Benn Limited.
- 13) A textbook of fish, fisheries and technology 2<sup>nd</sup> edition Dr. K. P. Biswas  
– Narendra Publishing House Delhi.
- 14) Fresh water fish culture. By K. P. Rath.
- 15) Manual in fishery science. By K. R. Reddy and M. G. Babre.
- 16) General topics in fishery science. By K. R. Reddy and M. G. Babre.

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**Theory Paper V : Fish Microbiology, technology and Processing**

**Periods - 80**

**Marks – 100**

**Unit I :**

**Introductory microbiological tools and techniques.**

- I)
- 1) Hot air oven
  - 2) Autoclave
  - 3) Incubator
  - 4) Centrifuge machine
  - 5) Colorometer
  - 6) pH meter
  - 7) Colony counter
  - 8) Compound microscope
  - 9) Deep field microscop
  - 10) Electron microscope

II) **Fish Microbiology**

- a) Fish Spoilage :- Causes of fish spoilage, post mortam changes, Rigor mortis, Rancidity, Autospoilage, Spoilage in fresh water fish and marine fish.
- b) Normal microflora of fish.
- c) Sources of contamination of fish.
- d) Isolation and cultivation of microbes of spoiled fish.
- e) Fish food born diseases and food incubation.

**Unit II :**

**Fishing gear materials and accesorise.**

- 1) Nating :- Natural fibres, synthetic fibres, properties of fibres.
- 2) Construction of nelting.

- 3) Care and maintenance of fishing gear
- 4) Fabrication of fishing gear : -
  - a) Net braiding
  - b) Shaping webbing
  - c) Tailoring and webbing
  - d) Knots, bends and hitches
  - e) Mendings.
- 5) Fish catching methods.  
Factors determine the selection of fishing gears and methods.
- 6) Evolution of fish gear.
- 7) Classification of fishing gear and fishing catching methods.
- 8) Fishing gear operation.
  - a) Trawls : Operation of trawls
  - b) Nets : Types of nets
  - c) Lines : classification of lines.

### **Unit III :**

#### Fishing Crafts

- 1) Boat building material.
  - a) Selection of wood / timber
  - b) Seasoning
  - c) Storage
- 2) Types of vessels
  - A) Fishing vessels
    - (i) Wooden fishing vessels
    - (ii) Steel fishing vessels
    - (iii) Aluminium boat
    - (iv) Ferro cement fishing vessels
    - (v) GRP fishing vessels
  - B) Non fishing vessels :
    - (i) Mothership
    - (ii) Fish carrier
    - (iii) Fishery protection vessels.
    - (iv) Fishery training vessels.

#### **Unit IV :**

##### **Fish Processing & Preservation**

- 1) Introduction
- 2) Principle of preservation :- Cleaning, lowering the temperature, rising the temperature, dehydration, use of salt, use of preservation, electrocuting by 'ion wind'
- 3) Methods of preservation :-
  - a) Chiling with ice
  - b) Freezing and refrigeration
  - c) Storing in cold storage
  - d) Deep freezing and freez deying
  - e) Canning
  - f) Sun drying
  - g) Mechanical drying
  - h) Dry salting
  - i) Brining
  - j) Smoking and pickling.

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Subject : Fishery Science

**Practical Paper No. VI (New)**  
**(Aquatic Ecology and Fish Biology)**

**Marks – 100**

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- 1) Plankton study – Collection, identification and submission of five permanent slides of fresh water phytoplankton and zooplankton each.
  - 2) Plankton study – Collection, identification and submission of three permanent slides of marine phytoplankton and zooplankton each.
  - 3) Identification and classification, distinguishing characters and adaptive features of following fishes.
    - a. Trygon
    - b. Torpedo
    - c. Zygena
    - d. Pristis
    - e. Exocoetus
    - f. Echenius
    - g. Hippocampus
    - h. Diodon
    - i. Ostraceon
    - j. Pterios
    - k. Signathus
  - 4) Identification, classification and distinguishing features of trully migratory fishes.
    - a. *Anguilla anguilla* (eel)
    - b. Hilsa ilisha
    - c. Petromyzon
    - d. Salmon
    - e. Tunnas
    - f. Herring clupea.

- 5) Identification and sexual dimorphism in fishes. (any five)
- 6) Study of different maturity stages of gonads.  
(Staining, mounting and submission of permanent slides of ovary and testis each three)
- 7) Study of ponderal index of locally available fishes.
- 8) Assessment of fecundity of any available fish. (any three)
- 9) Determination of gonadosomatic index of (GSI) of available fish.
- 10) Study of length weight relationship.
- 11) Ova-diameter measurement of available fishes.
- 12) Excursion Tour – visit to coastal sites and submission of excursion report.

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B.Sc. II<sup>nd</sup> Year

Subject : Fishery Science

**Practical Paper No. VII (New)**

**(Fish Microbiology and Processing Technology)**

**Marks – 100**

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- 1) Study of Basic Microbiological Tools (structure and use)
  - a. Hot air oven
  - b. Autoclave
  - c. Incubator
  - d. Centrifuse machine
  - e. Colorimeter
  - f. PH meter
  - g. Colony counter
  - h. Compound microscope
- 2) Isolation of microorganisms (Bacteria and fungi) from fish (Streak plate method)
- 3) Staining - monocrome staining and gram staining.
- 4) Identification of fresh fishes and spoiled fishes.
- 5) Study of fishing gears (any five)
- 6) Study of fishing craft (any five)
- 7) Fabrication of fishing net model and submission (any one)
- 8) Fabrication of fishing boat model and submission (any one)
- 9) Preservation of locally available fishes by “Ratnagiri” method.
- 10) Preparation of fish for preservation.  
(Washing, gutting, cleaning and other stages and processing.)
- 11) Preservation of locally available fishes by mechanical drying method.
- 13) Excursion tour – visit to fish processing industries and submission of report.