

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED**

SYLLABUS (EFFECTIVE FROM JUNE 2009)

B.SC. 1st year (1ST SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER I : TAXONOMY AND GENERAL TOPICS

MAX MARKS : 60

PERIODS : 45

UNIT I

- 1) Introduction, definition, scope and importance of fishery science.
- 2) Classification of fishes (Berg, 1940) up to class level.
- 3) External characters of teleost and Elasmobranchii.
- 4) Difference between teleost and Elasmobranchii fishes.
- 5) Body forms in fishes.
- 6) Different types of fins and their functions.

UNIT II

- 1) Fish identification techniques.
 - a. Study of morphometric characters in fishes.
 - b. Study of meristic characters in fishes
- 2) Locomotion in fishes : Types of locomotion, special mode of locomotion, locomotion due to the movement of appendages.
- 3) Migration in fishes – general account of migration, types of migration, advantages of migration, factors influencing migration.
- 4) Structure and functions of skin in fishes.
- 5) Study of different types of scales.

UNIT III

- 1) Colouration in fishes – Source of colour, colour changes in fishes, regulation of colour changes, significance of colour changes.

- 2) Air bladder, location of air bladder, different types of air bladder, their structure and functions.
- 3) Weberian ossicle in fishes – structure and functions.
- 4) Parental care in fishes

UNIT IV

- 1) Light producing organs in fishes – occurrence, nature of light producing organs, location, structure of light producing organs, significance of luminescence in fishes.
- 2) Electric organs in fishes – Occurrence, location of electric organs, general structure of electric organ, electric organ in torpedo, electrophorus electricus, functions of electric organ.
- 3) Sound producing organs in fishes.
- 4) Poison glands in fishes – Introduction, difference between poisonous and venomous fishes, division of poisonous fishes.
- 5) Lateral line canal – Structure of lateral line canal
- 6) Structure and functions of neuromast organs.

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SYLLABUS (EFFECTIVE FROM JUNE 2009)

B.SC. 1st year (1ST SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER II : TYPE STUDY WALLAGO ATTU (FRESH WATER SHARK)

MAX MARKS : 60

PERIODS : 45

UNIT I

- 1) Introduction and classification
 - a. Distinguishing characters of cypriniformes.
 - b. Distinguishing characters of family cyprinide.
 - c. General characters of the family siluridae.
- 2) External characters of wallago attu
- 3) Skin – structure and functions.
- 4) Endoskeleton
 - a. Axial skeleton – typical trunk vertebra, caudal vertebra, ribs
 - b. Appendicular skeleton – pectoral girdle and fin, pelvic girdle and fin.
- 5) Air bladder of wallago attu – structure and functions.
- 6) Weberian ossicles – structure and functions.

UNIT – II

- 1) Coelom and alimentary canal.
- 2) Associated glands of digestive system.
 - a. Liver
 - b. Pancreas
 - c. Gall bladder
- 3) Physiology of digestion
- 4) Respiratory organs
 - a. Structure of gills
 - b. Physiology of respiration

UNIT III

- 1) Cardiovascular system
 - a. Structure of heart
 - b. Arterial system – Ventral aorta and afferent branchial arteries, dorsal aorta and its branches.
 - c. Venous system
 - i. Anterior cardinal system
 - ii. Posterior cardinal system
 - iii. Hepatic portal system
 - d. Composition of blood
- 2) Nervous system
 - a. Structure of brain
 - b. Cranial nervous system
 - c. Spinal nerves

UNIT IV

A)

- 1) Lateral line canals – Structure and functions.
- 2) Pit organs – Structure and functions.
- 3) Internal ear (membranous labyrinth) – Structure and functions.
- 4) Olfactory organs – Structure and functions.
- 5) Photoreceptor organs (eye)

B)

- 1) Male urinogenital system of *wallogo attu*
- 2) Female urinogenital system of *wallogo attu*
- 3) Spawning habits and structure of eggs.

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SYLLABUS (EFFECTIVE FROM JUNE 2009)

B.SC. 1st year (IInd SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER III : AQUACULTURE

MAX MARKS : 60

PERIODS : 45

UNIT I

- 1) Importance, objective and scope of aquaculture.
- 2) Comparison between agriculture, aquaculture and capture fishery.
- 3) Introduction to types of aquaculture.
 - a. Culture bases on types of water
Fresh water aquaculture, brackish water aquaculture, mariculture.
 - b. Culture based on economic or commercial consideration.
Extensive culture, intensive culture & semi-intensive culture
 - c. Culture based on the types of designs of culture
Pond culture, culture in manmade reservoirs, fish culture in paddy fields, culture in bheries, culture in tanks, raceway culture, cage culture and pen culture.
 - d. Culture based on number
Monoculture and poly culture
 - e. Culture based on climatic condition
Cold water fish culture and warm water fish culture

UNIT II

Intensive fish farming

A) Selection of site -

- 1) Topography
- 2) soil type
- 3) water supply

B) Construction of fish farm

- a) Layout, design and construction of different types of pond
 - i. Hatching pits
 - ii. Nursery pond
 - iii. Rearing pond

- iv. Stocking pond
- b) Physical chemical and biological factors affecting fish culture.
- c) Objectives of fish culture
- d) Qualities of culturable species of fishes
- e) Types of cultivable fishes, qualities of major carps
- f) Breeding habits of cultivable fishes with special reference to Indian major carps

UNIT III

Management of fish pond in fish culture

- 1) Pre stocking management
 - a. Drying the pond
 - b. Eradication of aquatic weeds
 - c. Eradication of predatory fishes, weed fishes, aquatic insects.
 - d. Liming the pond
 - e. Pond fertilization
 - f. Stocking of fish seed
 - g. Supplementary feeding
 - h. Harvesting the fish

UNIT IV

- 1) Composite fish farming**
 - a. Principle of composite fish farming
 - b. Objectives of composite fish culture
 - c. Composite fish culture in India
 - d. Stocking density
- 2) Integrated fish farming**
 - a. Duck cum fish farming
 - b. Poultry cum fish farming
 - c. Pig cum fish farming
 - d. Cattle cum fish farming
 - e. Paddy cum fish farming

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SYLLABUS (EFFECTIVE FROM JUNE 2009)

B.SC. 1st year (IInd SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER IV: FISH SEED PRODUCTION TECHNOLOGY

MAX MARKS : 60

PERIODS : 45

UNIT I

- 1) Breeding techniques
 - A) Bundh breeding
 - a. Types of bundhs – a) wet bundhs b) dry bundhs c) modern bundhs
 - B) Artificial fertilization by stripping
 - C) Induced breeding by hypophysation
 - i) Definition
 - ii) Hormones responsible for induced breeding
 - iii) Dissection and removal of gland
 - iv) Preservation and storage of pituitary gland
 - v) Preparation of gland suspension for injection and dosage.
 - vi) Collection, rearing and selection of brooders
 - vii) Synthetic hormones used in induced breeding.

UNIT II

- 1) Fish seed trade and transport
 - a. Classification of fish seed and identification techniques
 - b. Different units of fish seed counting
 - c. Fish seed trade in India
 - d. Fish seed transportation system
 - i. Open transportation system
 - ii. Close transportation system
 - e. Causes of mortality in transportation
 - f. Use of chemicals in live-fish transportation
 - g. Anesthetic drugs use in transport
 - h. Antiseptic and antibiotics used in transportation
 - i. Technique of fish seed release.

UNIT III

Hatcheries and management (Principle, structure and management)

- i) Hatching happa
- ii) Glass jar hatchery
- iii) Bin hatchery
- iv) CIFE D 80 model (Dwivedi – 80)
- v) CIFE D 81 model (Dwivedi 81)
- vi) Chinese hatchery

PART IV

- 1) The ganga river system
- 2) Bramputra river system
- 3) Riverine spawn resources investigation technique
 - a. Selection of spawn collection site
 - b. Gears used for collection of spawn and their diversities
 - c. Methods of collection of spawn
- 4) Behaviour of spawn in relation to hydrobiological characters
- 5) Present status and future prospectes of fresh water fish seed in India

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SYLLABUS (EFFECTIVE FROM JUNE 2009)

B.SC. 1st year (IInd SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER Vth : PRACTICAL

DATE :

CENTRE :

MAX MARKS : 60

TIME : 3HRS

BATCH NO. :

- Q.1. Dissect..... to expose.....
(wallago/locally available fish, major dissection) (12)
- Q.2. Dissect To expose / dissect out
(wallago/locally available fish , minor dissection) (08)
- OR
- Preparation of pituitary gland extract
- Q.3. Identify, classify and describe the following one specimen from each (10)
- a) Major carp
 - b) Exotic carp
 - c) Modification in fish (02)
 - d) Fish seed
- Q.4. Identify, classify and describe the following : (One specimen from each) (10)
- a) Aquatic weed
 - b) Predatory fish
 - c) Predatory insect
 - d) Fertilizers
 - e) Artificial food
- Q.5. a. Define and measure morphometric characters from the given teleost. (05)
- | | | |
|----|----|----|
| 1) | 2) | 3) |
| 4) | 5) | |
- b. Count any five meristic characters from the given teleost. (05)
- Q.6. Record book, submission of permanent slide excursion report (10)

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B.SC. 1st year (IInd SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER Vth : PRACTICAL SYLLABUS

DATE :

MAX MARKS : 60

CENTRE :

TIME : 3HRS

- 1) Identify, classify and describe following fishes :
 - i. Indian major carps
 - a) *catla catla* b) *cirrhina mrigala* c) *labeo rohita*
 - ii. Exotic carps
 - a) *cyprinus carpio* b) *ctinopharyngodon idella*
 - c) *hypothalmyethys molitrix*
 - iii. Adaptation in fishes
 - a) *Tropedo* b) *trygon* c) *tilapia* d) *pterois*
- 2) Permanent mounting of fish scales and submission of prepared slides
 - a) Placoid b) cycloid c) ctenoid
- 3) Fish identification techniques (any locally available fish)
 - a) Study of any five morphometric characters
 - b) Study of any five meristic characters
- 4) Dissection of *wallago attu* / any locally available teleost.
Dissection – digestive system, urinogenital system (male & female), ventral aorta and afferant branchial arteries, brain, weberian ossicle, air bladder
- 5) Preparation of pituitary gland extract and injection techniques, dosage of synthetic hormones to fishes for induced breeding.
- 6) Identification of spawn, fry and fingerlings of Indian major carps.
- 7) Skeleton study
 - a) Trunk vertebra b) caudal vertebra c) pectoral girdle d) pelvic girdle
- 8) Identify and describe predatory fishes (any three).
- 9) Identify and describe predatory insects (any three).
- 10) Preparation of layout plan of fish farm and their submission.
- 11) Visit to fish farm/ hatchery / fish market and submission of report.

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B.SC. Ist year (I & IInd SEMESTER)
SUBJECT – FISHERY SCIENCE**

LIST OF REFERENCE BOOK

- 1) General and applied ichthyology – S.K. Gupta, P.G. Gupta, S. Chand Publishing company, New Delhi.
- 2) An introduction to fishes – S.S. Khanna, Central Book Depo, Allahabad.
- 3) A text book of fish, fisheries and technology – K. P. Biswas, Narendra publishing house, New Delhi.
- 4) A manual of aquaculture – Santhanam, Narendra publishing house, N. Delhi.
- 5) Fish and fisheries – Pandey, Shukla, rastogi publication, merrut.
- 6) Inland fisheries (ecology and management) – R.L. welcome. Discovery publishing house, N. Dehli.
- 7) Aquaculture and aquarium keeping – S.P. Chavan, M.S. Kadam, Niture S.D. Educational publishers and distributors, Aurangabad (M.S.).
- 8) A text book of fishery science and Indian fisheries – C.B.L. Shrivastava. Kitab mahal Allahabad.
- 9) A manual of fishery science – A.D. Mohekar, K.R. Reddy, M.G. Babre. Manjusha publication, Naldurg (M.S.)
- 10) Applied fishery science – vol. I, II S.M. Shafi. Atlantic publishers and distributors, N. Delhi
- 11) An introduction to Indian fisheries – Mrs. Uma Sharma, S.P. Grover. Bisensingh, Mahendrapalsing, Connot place, Deharadunn.
- 12) An introduction to fishes – H.S.L. Bhamrah and K. Juneja. Anmol publication, N. Delhi
- 13) Fish and fisheries of India – V.G. Jhingran. Hindustan publishing corpo. N. Delhi
- 14) Wallago attu (Fresh water shark of India) – B.M. Sinha. Hindustan publishing corp. N. Delhi.
- 15) Fish culture in India – Alikunhi
- 16) Aquaculture – Bardarch Ryther, M.C. Larney