

**RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)
LATUR.**

**Course Structure
B.Sc. S.Y. (Semester IV)
W.e.f. 2020-21
Subject: FISHERY SCIENCE
SECF-II PRACTICAL**

Marks: 50

Lect.: 45

Credits: 2

1. Collection and preservation of fish pituitary gland and preparation of pituitary extract for hypophysation
2. Calculation of fecundity of fishes
3. Brood stock maintenance and selection of brooders for injection
4. Double-walled hapa and glass jar hatchery
5. Chinese type of carp hatchery
6. Preparation and management of fish nursery
7. Maturity stages of carps
8. Indian major carp egg and embryonic development
9. Common carp egg and embryonic development
10. Identification of eggs, spawn, fry and fingerlings of different species
11. Fish seed and broodfish transportation
12. Use of anaesthetics, disinfectants and antibiotics in fish breeding
13. Water quality monitoring in fish hatcheries and nurseries
14. Breeding and larval rearing of major carps

Unit IV

1. Breeding of common carp (*Cyprinus carpio*)
2. Breeding of mahseers
3. Breeding of trouts
4. Breeding of tilapia
5. Breeding of catfishes
6. Breeding of grey-mullet, *Mugil cephalus*
7. Breeding of milk fish, *Chanos chanos*
8. Breeding of Asian sea bass, *Lates calcarifer*
9. Breeding of groupers
10. Breeding of indigenous carps /Multiple breeding of carps

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SECF-II

Marks: 50

Lect.: 45

Credits: 2

Finfish Breeding and Hatchery Management

Unit I

1. Freshwater and marine fish seed resources and natural breeding of finfishes.
2. Riverine fish seed collection
3. Sexual maturity, breeding season and development of gonads
4. Methods of breeding carps in bundhs

UNIT II

1. Induced breeding of warm water finfishes and environmental factors affecting spawning
2. Fish pituitary gland
3. Synthetic hormones for induced breeding of fishes
4. Fish brood stock management and transportation of broodfish
5. Induced breeding of Indian major carps
6. Induced breeding of exotic carps (silver carp and grass carp)
7. Major carp egg and embryonic developmental stages
8. Causes of mortality of fish eggs and spawn and their treatment

Unit III

1. Different types of fish hatcheries – traditional double-walled hapa
2. Different types of fish hatcheries – Chinese type of carp hatchery
3. Different types of fish hatcheries – glass jar hatchery
4. Spawn rearing techniques – nursery pond
5. Spawn rearing techniques – rearing pond
6. Packing and transportation of fish seed and use of anaesthetics and disinfectants in fish breeding and transport.

1. MOISTURE
2. CRUDE LIPIDS
3. CRUDE FIBRE
4. ASH
5. NITROGEN-FREE EXTRACT (NFE)

11. Collection and submission of locally available feed ingredients.
12. Submission of prepared fish feed.

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Course Structure

B.Sc. S.Y. (Semester IV)

Subject: FISHERY SCIENCE

Lab course

PRACTICAL

Course Code: CCFP-6

Marks: 50

Lect.: 45

Credits: 2

Objectives

- The course deals with different aspects of fish nutrition and feed technology.
- Enable students to understand The importance of carbohydrate in aqua feed and the relationship of dietary Carbohydrate for protein sparing.
- Enable students to understand different milling machines their operation handling and use.
- Enable students to understand Packing and storage of feed stuffs
- Enable students to understand Estimation of carbohydrate/ vitamin from feed ingredients and feed.

Course outcome:

- At the end of this course, students should be able to
- Students enable to understand formulation and manufacturing of various forms of feeds and their description and use have been presented
- Students enable to understand Different feed additives like binders, antioxidants, enzymes, pigments, growth promoters and feed stimulants have been dealt.
- Students enable to Formulate fish feed for Herbivorous/Carnivorous fishes.
- Students enable to analyze proximate compounds of feed stuff.
- Students enable to identify locally available feed ingredients
- Students enable to formulate different fish diets.

1. Study of different milling machines (Any 2)
2. Study of locally available feed ingredients (Any 5)
3. Packing and storage of feed stuffs
4. Study of insects & microorganism affecting the feeds storage
5. Formulation of fish feed for Herbivorous/Carnivorous fishes
6. Estimation of crude protein from feed ingredients and feed.(Standard MAFF (1982) method for determining proteins in feedstuffs and feed ingredients.
7. Estimation of lipid from feed ingredients and feed.
8. Estimation of carbohydrate from feed ingredients and feed.
9. Estimation of vitamin from feed ingredients and feed.
10. 3. PROXIMATE ANALYSES

7. Maintenance of an aquarium.
 8. Cultivation of some common live food
 9. Aquarium fish diseases
 1. Columnaris
 2. Gill Disease
 3. Ick
 4. Dropsy
 5. Fin-rot
 6. Fungal Infections
 7. Hole in the Head
 8. Pop-Eye
 9. Cloudy Eye
 10. Fish Lice
 11. Nematode Worms
 12. Water Quality Induced Diseases
- Treating Fish

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**Course Structure
B.Sc. S.Y. (Semester IV)
Subject: FISHERY SCIENCE
PRACTICAL CCFP-5**

Marks: 50

Lect.: 45

Credits: 2

Objectives

- Enable students to understand Identify classify and describe an aquarium fishes & hybrid aquarium fishes.
- To give students knowledge about various foods and its Types
- To teach techniques of construction of glass aquarium and its maintenance
- To give students knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation.
- Enable students to understand Aquarium fish diseases

1. Course outcome:

- Student enables Identify and describe the aquarium accessories with their use and maintains
- Student enables to set aquarium
- Student enables to manage the home as well as commercial aquariums
- Students will learn Maintenance of an aquarium, Decorations of aquarium
- Students will learn Breeding of Aquarium Fishes
- Students will learn Cultivation of some common live food
- Students will be self sustainable after graduation in the field of Aquarium keeping.

1. Identify and describe the aquarium accessories with their use and maintains. (any five).

1. Identify classify and describe an aquarium fishes (any five).
2. Identify and describe hybrid aquarium fishes.
3. Identify and describe food and its Types
4. Identify and describe an aquarium plants (any five).
5. Preparation of an aquarium tank of suitable size
6. Setting of aquarium.

10. Shimeno Sadao, 1982. Studies on Carbohydrate Metabolism in Fish. Amerind Publishing Company, New Delhi.
11. Cowey, C.B. et al. (Eds.) 1985. Nutrition and Feeding in Fishes. Academic Press, London
12. Sena S. De Silva and Trevor Anderson. Fish Nutrition in Aquaculture. Chapman and Hall, Publ.

d) Diluents for premixes

VI) Fish Feed Formulation

- a) Introduction
- b) Balancing crude protein level
- c) Steps in feed formulation
- d) Best-buy techniques

Unit IV

VII) Material Flow in Feed Manufacturing

- a) Introduction
- b) Receiving
- c) Processing
- d) Packaging
- e) Storage and distribution

VIII) Feed Milling Processes

- a) Introduction
- b) Grinding
- c) Mixing
- d) Pelletting

Reference Book

1. Verreth, J. Fish Larval Nutrition. Chapman and Hall, Publ.
2. Stephen Goddard, 1996. Feed Management in Intensive Aquaculture.
3. Farm-made Aquafeeds. FAO Fisheries Technical Paper 343.
4. Devadasan, K. (Ed.)1994. Nutrients and Bioactive substances in Aquatic Organisms.
5. Kalver John, E. 1972. Fish Nutrition. Academic Press, London.
6. Halver John E. and Tiews Klaus, 1979 Finfish Nutrition and Fish Feed Technology.
Heenemann, Berlin.
7. Hopher Balfour 1988. Nutrition of Pond Fishes. Cambridge University Press.
8. Tyler Peter and Calow Peter, 1985. Fish Energetics. Croom Helin, London.
9. Winberg, 1960. Rate of Metabolism and Food Requirements in Fishes. Fisheries Research Board of Canada.