

**Rajarshi Shahu Mahavidyalaya, Latur**  
**(Autonomous)**

**Fishery Science**



**Certificate Course**  
**In**  
**Ornamental Fish Breeding**

<b>Sr. No.</b>	<b>Heading</b>	<b>Particulars</b>
<b>1</b>	<b>Title of the Course</b>	Certificate Course in Ornamental Fish Breeding
<b>2</b>	<b>Eligibility for Admission</b>	Candidate who passed 10+2 examination with at least 55% marks in aggregate in Science
<b>3</b>	<b>Passing Marks</b>	The candidate must obtain 35% of the total marks in theory and practical separately to pass the course.
<b>4</b>	<b>No.ofYears/Semesters</b>	Six month (one Terms)
<b>5</b>	<b>Level</b>	Certificate
<b>6</b>	<b>Pattern</b>	Semester
<b>7</b>	<b>To be implemented from the Academic Year</b>	From Academic Year 2017-18

Date:

Signature:

Name of BOS Chairperson : Prof. Dr.V.S. Shembekar, Department of Zoology and Fishery Science



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## **PREAMBLE**

India has the potential to earn about US \$ 5 billion as foreign exchange by way of export of ornamental fishes. India's domestic trade in this area is growing at the rate of 20% annually and demand at domestic level is higher than supply. The Government of India has also identified this sector as one of the thrust area for development and providing employment to the rural poor as well as unemployed youth. In addition to that, earning potential of this sector has hardly been understood and the same is not being exploited due to lack of skilled human resources who can be selfemployed as well as can play a key role for disseminating the technology of ornamental fishery as an earning tool to different places of the country

India's share in global ornamental fish trade is negligible and at present the ornamental fish export from India is dominated by the wild caught species. Ornamental fish culture in India involves breeding of exotic species and this activity is a small segment of the Fisheries Sector. India is endowed with a suitable climate, water resources and large manpower base. The potential manpower can be easily trained into ornamental fish breeding technology and fast growing domestic market.

Moreover, the unit value of ornamental fish is higher than the food fish. Hence this sector offers good opportunity for rural and urban households to augment income and link them to the International trade. Almost all of the tank bred ornamental fish in India comes from the small-scale or back yard type of breeding units. But due to the lack of adequate infrastructure and key inputs like appropriate feed, quality brood stock etc these breeding units are not in a position to produce varieties which are in demand in the international market. Organized trade in ornamental fish depends on assured and adequate supply of demand, which is possible only by mass breeding.

In this context, the certificate course in 'ornamental fish breeding and aquarium keeping' will start soon in this department

### **Objectives of the Certificate Course:**

1. To impart hands on training on feed and feeding technology
2. To impart hands on training on setting up of aquaria and maintenance
3. To generate export oriented employment in rural and urban households through ornamental fish production.
4. To impart hands on training on culture, breeding of commercially important ornamental fishes
5. To mass-produce a large number of varieties of ornamental fish species to create a large supply of ornamental fish and increase the overall exports.
6. To promote employment and entrepreneurship in the ornamental fish sector by graduates in fisheries, aquaculture and biological sciences.

### **Course outcome:**

- Student enables to set aquarium
- Student enables to manage the home as well as commercial aquariums
- Students will learn to handle different aquarium equipments
- Students will learn Decorations of aquarium
- Students will learn Breeding of Aquarium Fishes.
- students knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after completing certificate course.

**ORDINANCES FOR CERTIFICATE COURSE**  
**IN**  
**ORNAMENTAL FISH BREEDING**

The Certificate Course in **Ornamental fish breeding, started** with keeping view of “Career Oriented certificate course” will be covered under following ordinances.

1. **Number of Students per batch are 20.**
2. The admission/examination shall be opened to any candidate who has passed 10+2 examination with at least 45% marks in aggregate in science.
3. The candidate after passing examination will be awarded a separate “Certificate in **Ornamental Fish breeding.**”
4. The supplementary examination shall be held in semester end or as fixed by the Academic Council.
5. The candidate who doesn't pass in the supplementary examination will be given another chance to appear in above said course along with forthcoming examination.
6. The candidate, who is unable to pass the course in three given chances, will not be allowed to continue the above said course.
7. Every candidate will be required to attend minimum of 75% lectures/periods delivered to that class.
8. The candidate must obtain 35% of the total marks in theory and practical separately to pass the course.
9. The candidate must have obtained in House Examination at least 25% marks in the subject.
10. Candidates will be offered English as the medium of Instructions/ Examination.

**FEESTRUCTURE:**

2000.00 (Amount in `Rupees)

**Revenue Expected= 2500 × 20 = RS 50,000/**

**Expenses (approximately)**

<b>Sr .No</b>	<b>PARTICULARS</b>	<b>Amount</b>
<b>I</b>	<b>Chemicals</b>	<b>5000</b>
<b>II</b>	<b>Live material (fishes, plankton live feed)</b>	<b>10.000</b>
<b>III</b>	<b>Aquarium accessories</b>	<b>5000</b>
<b>IV</b>	<b>Hardware: aerators ,tubing,glass,adhesive</b>	<b>10.000</b>
<b>V</b>	<b>Remuneration to lecture</b>	<b>10.000</b>

**SYLLABUS OF THE CERTIFICATE COURSE****TITLE OF THE CERTIFICATE COURSE: ORNAMENTAL FISH BREEDING**

<b>Course</b>	<b>Unit</b>	<b>Topic</b>	<b>Credit</b>	<b>L/Week</b>
<b>Term-I</b>	<b>I</b>	<b>Introduction to Aquaculture and Ornamental Fishes Trading</b>	<b>II</b>	<b>04</b>
		<b>Introduction to Ornamental fishes</b>		
	<b>II</b>	<b>Engineering Aspect and construction of aquarium(I)</b>	<b>II</b>	
		<b>Fish Breeding and rearing in Live Bearers</b>		
	<b>III</b>	<b>Fish Breeding and rearing in Egg layers</b>	<b>II</b>	<b>04</b>
		<b>Ornamental fish farming-Management Aspects</b>		
	<b>IV</b>	<b>Introduction to Aquarium plants and its propagation techniques</b>	<b>II</b>	
		<b>Engineering Aspect and construction of aquarium(II)</b>		
			<b>Practical</b>	<b>04</b>
			<b>Total</b>	<b>12</b>



# **CERTIFICATE COURSE IN ORNAMENTAL FISH REARING**

## **Theory Syllabus of Certificate Course**

### **Program of the Course:**

Course will be of 12 Credits, each credit will have 15 hours (45min.)

1. The candidate required to attend 75% lectures/periods.
2. The candidate must obtained 35% of the total marks in theory and practical/project work separate to pass the course.
3. Candidate will be offered English as a medium of instructions/examination.
4. All 12<sup>th</sup> examination passed and first year appearing under graduate students are eligible for this course.

### **UNIT-I Introduction to Aquaculture and Ornamental Fishes Trading (12 L)**

#### **Term- (UNIT-I to UNIT-IV)**

#### **UNIT –I (12 HRS)**

##### **1. Introduction to Aquaculture and Ornamental Fishes Trading**

1.1: Basics of aquaculture-definition and scope. History of aquaculture: Present global and national scenario.

1.2: World trade of ornamental fish and export potential.

Different varieties of exotic and indigenous fishes.

1.3 : Ornamental fisheries-e new dimensions in aquaculture entrepreneurship

##### **2. Introduction to Ornamental fishes (15 )**

2.1: Introduction to aquarium and aquarium accessories.

2.2 : Basic knowledge on profile of ornamental fishes in world

#### **UNIT- II (12 HRS)**

##### **3. Engineering Aspect and construction of aquarium (I) (15L)**

3.1: Design and construction of public fresh water and marine aquaria and oceanarium.

3.2: Aerators, filters and lighting.

3.3: Biofilters in aquarium.

#### **4. Introduction to Aquarium plants and its propagation techniques**

- 4.1: Introduction to Aquarium plants and their export potential.
- 4.2: Profiles of some selected aquarium plants. Morphology, multiplication of aquarium plants – different methods. Indigenous ornamental plants of Western Ghats.
- 4.3: Aquarium plant propagation.
- 4.4: Management of ornamental aquatic plants and its trading.

### **UNIT-III**

**(11 HRS)**

#### **5. Fish Breeding and rearing in Live Bearers**

- 5.1: Breeding of ornamental fish with reference to live bearer species.
- 5.2: Breeding of Guppies, Mollies, Sword tail fish and Platy fish
- 5.3: Introduction hatchery management system for live bearers
- 5.4: Nursery management of live bearers • Rearing of live bearers

#### **6. Fish Breeding and rearing in Egg layers**

- 6.1: Breeding of ornamental fish with reference to selected egg layer species.
- 6.2: Introduction to Breeding of Angel fish, Zebra fish and Neon tetra
- 6.3: Introduction hatchery management system for egg layers
- 6.4: Nursery management of egg layers Special emphasis on Breeding of Gold fish

### **UNIT-IV**

**(10 HRS)**

#### **7. Ornamental fish farming-Management Aspects**

- 7.1: Ornamental Fish-diseases and their management
- 7.1: Live Food culture for tropical ornamental fish
- 7.1: Feeding for breeding and maintenance of ornamental fish.
- 7.1: Health management in Ornamental Fish Farming.

## **8. Engineering Aspect and construction of aquarium (II)**

8.1: Construction, settings and maintenance of aquarium

8.2: Construction of ornamental fish unit

8.3: Engineering aspect in Ornamental Fish Farming

### **PRACTICAL**

1. Identify classify and describe an aquarium fishes (any five).
2. Study of breeding in live bearer
3. Identify and describe the aquarium accessories with their use and maintains.
4. Identify and describe hybrid aquarium fishes.
5. Identify and describe food and its Types
6. Identify and describe an aquarium plants (any five).
7. Preparation of an aquarium tank of suitable size
8. Setting of aquarium.
9. Maintenance of an aquarium.
10. Cultivation of some common live food
11. Aquarium fish diseases

**MODE OF ASSESSMENT:**

**Term End Theory Assessment –100%**

**50 marks**

1. Duration - These examinations shall be of three hours duration.
2. Theory question paper pattern:-
  - a) There shall be **5** questions each of **10** marks.
  - b) All questions are descriptive
  - c) There will be one question on each unit.
  - d) All questions shall be compulsory with internal choice
  - e) Questions may be sub divided into sub questions a, b, c & d only, each carrying **5** marks  
**OR** a, b, c, d, e, f and g only each carrying two marks.

**Practical Examination Pattern: There will not be any external examination/ evaluation for practical.**

**Term end practical examination:-**

<b>Sr. No.</b>	<b>Particulars</b>	<b>Marks</b>
<b>1</b>	<b>Laboratory work</b>	<b>40</b>
<b>2</b>	<b>Journal</b>	<b>05</b>
<b>3</b>	<b>Viva voce</b>	<b>05</b>

**In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department; failing which the student will not be allowed to appear for the practical examination.**

**N.B:**

1. Apart from the institutional Animal Ethics Committee (IAEC) and any other Committee appointed by a Competent Authority/Body from time to time, every college should constitute the following Committees:

II. A Dissection Monitoring Committee (DMC)

**Composition of DMC** shall be as

follows:

- a. Head of the Concerned Department (Convener/Chairperson)
- b. Two Senior Faculty Members of the concerned Department
- c. One Faculty of related department from the same College
- d. One or two members of related department from neighbouring colleges.

## ANNEXURE -I

### **Suggested Field Visits**

Field visits are to be organized to facilitate students to have firsthand experience and exposure to technology / production / functioning of an organization / unit or witness a relevant activity.

Each student must make at least 02 (Two) such visits to the units/markets/public aquarium out of 2 to 3 such visits organized by the college.

i) Visit to one of the units with one or multiple activities such as .

- Ornamental fish farm / Nursery/ Hatchery.

ii) Visit any production units such as

- Ornamental fish Food industry
- Ornamental articles.

iii) **Govt. Offices** such as

- Fishery Department.
- MPEDA, Mumbai
- NFDB, Hyderabad
- CIFI, Mumbai

iv) Visit to National Laboratories, National Research Labs & Training Institutes such as NIO, Goa; CIFE, Mumbai; Fishery College, Ratnagiri; (Field visit is desirable to know the organization; however guest lecturers could also be helpful in understanding functioning).

## ANNEXURE –II

### **Suggested Topics for Entrepreneurial Skill Development**

1. Setting and Maintenance of fresh water aquarium.
2. Setting and Maintenance of marine aquarium.
3. Breeding of various aquarium fishes.
4. Preparation of aquarium fish feed.
5. Breeding of aquarium fishes.
6. Rearing of aquarium fishes.
7. Propagation of aquatic plants.

## ANNEXURE -III

### **Suggested Topics for Individual Project**

1. Feasibility report of the maintenance of aquarium fishes in high profile residences.
2. Probability report of maintenance of a culture of Chaetoceros & Artemia by the fish farmers.
4. Project report for the establishment of small / medium / large ornamental fish farming unit
5. Feasibility report of various packaging materials in freezing / canning industry.
6. Feasibility report for establishing an aquarium shop.
7. Feasibility report for establishing a fish feed industry.
8. Setting up of marine aquarium with various accessories and its costing.
9. Finding herbal medicines for ornamental fish diseases
- 10 Propagation of aquarium plants and tissue culturing methods



### **Books and References Recommended**

1. Hawlins, A.D. (Ed). Aquarium Systems. Academic Press.
2. Hunnam, P. Ward Lock, Living Aquarium.
3. Ratjak, K. and Zukal, R., Aquarium Fishes and Plants.
4. Spotte and John Wiley, S., Seawater Aquariums.
5. Straughan, R.P.L. and Thomas Yoseloff. Salt water Aquarium in the Home.
6. Dick Mills, 1987. Illustrated Guide to Aquarium Fishes. Published by Galley and Price, an imprint of W.H. Smith and Sons Limited, England.
7. Stephen Spotte. Marine Aquarium Keeping. A Wiley-Interscience Publication.
8. Dick Mills and Gwynne Vevere. Tropical Aquarium Fishes. Published by Salamander Books Limited. London.
9. Carcacson, R.H. A field guide to the Coral Reef Fishes of the Indian and West Pacific Oceans.
10. Vincent B. Hargreaves. The Tropical Marine Aquarium. Mc-Graw-Hill Book Company. New York.
11. Guy N. Smith. Profitable Fish Keeping.
12. Maurice Melzak. Marine Aquarium Manual. B.T. Balsford Ltd., London.
13. Ornamental aquarium fishes of India- 1999- K.L.Tekrival and A.A. Rao.- TFH United Kingdom.
14. Marine Ornamental species (collection, culture and conservation) – J.C.Cato and C.L.Brown. – Blackwell Science





