UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(23/April/Adp./03)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the Syllabi and Courses of Studies in the subject of **Industrial Fish and Fisheries** of **Semester IIIrd and IVth** for **Four Year Under Graduate Programme (FYUGP)** under the **Choice Based Credit System** as per **NEP-2020 (as given in the annexure)** for the examinations to be held in the years as per the details given below:

Subject	Semester	For the examinations to be held in the year
Industrial Fish and Fisheries		
	Semester-III	December 2023, 2024 and 2025
	Semester-IV	May 2024, 2025 and 2026

The Syllabi of the courses is also available on the University website: www.jammuuniversity.ac.in.

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/23/ 1153-1168
Dated: 03/5/23

Copy for information and necessary action to:

1. Dean Faculty of Life-Science
2. HOD/Convener, Board of Studies **Industrial Fish and Fisheries**
3. All members of the Board of Studies
4. C.A. to the Controller of Examinations
5. Director, Computer Centre, University of Jammu
6. Deputy Registrar/Asst. Registrar (Conf. /Exams. UG/ Exam Non. Prof.)
7. Incharge University Website for necessary action please

Sunitesha 2/5/23
Deputy Registrar (Academic)

01/05/23 1/5 28/4/23

UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2023, 2024 & 2025

INDUSTRIAL FISH & FISHERIES COURSE

UG SEMESTER III

UNDER NEP-2020

UNIVERSITY OF JAMMU

Syllabi of Industrial Fish & Fisheries for FYUP under CBCS as per NEP-2020

SEMESTER- III
(Examination to be held in 2023, 2024, 2025)

Major Course

Course code: UMJIFT-301
Credits: 04 {03 (Theory) + 01 (Practical)}

Course Title: Fish Nutrition and Feeding Technology
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Major Course

Course code: UMJIFT-302
Credits: 04 {03 (Theory) + 01 (Practical)}

Course Title: Freshwater Aquaculture
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Minor Course

Course code: UMIIFT-303
Credits: 04 {03 (Theory) + 01 (Practical)}

Course Title: Freshwater Aquaculture Practices
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Multidisciplinary Course

Course code: UMDIFT-304
Credits: 03

Course Title: Basics of Aquaculture
Total no. of lectures: Theory : 45 hours

Maximum Marks : 75
Theory : 75

Skill Enhancement Course

Course code: USEIFT-305
Credits: 02

Course Title: Fish Feed Technology
Total no. of lectures: Theory/Practical : 45 hours
(15 hours)/(30 hours)

Maximum Marks : 50
Theory/ Practical : 50

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2023, 2024 & 2025
(MAJOR COURSE)
UG SEMESTER-III
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-301
MAJOR CORE COURSE TITLE	:	FISH NUTRITION AND FEEDING TECHNOLOGY
CREDITS	:	04 {03 (Theory) +.01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an opportunity for students to understand the basic principles of fish nutrition as this aspect of aquaculture has gained an importance in recent years. Feed employed in the culture of fish and shellfish is becoming a limiting factor in terms of economics as well as availability of quality ingredients and Nutrition and feed not only play a crucial role in enhancing the growth of fish, but also in breeding and health management so it is aimed to create awareness among students on feed additives in aquafeed.

UNIT I: FISH FOOD AND FEEDING (13 Hrs.)

1.1 Types of fish food and natural feeding habits of fishes

1.2 Nutritional requirements of fin fishes

- 1.2.1 Proteins- Source and importance in fish feed
- 1.2.2 Carbohydrates- Source and importance in fish feed
- 1.2.3 Vitamins- Source and importance in fish feed
- 1.2.4 Lipids- Source and importance in fish feed

1.3 Nutritional requirements of shell fishes- *Palaemon* and *Unio*

1.4 Live food organisms- Culture and importance

- 1.4.1 Rotifers
- 1.4.2 *Artemia*

UNIT 2: ANATOMY AND PHYSIOLOGY OF DIGESTION (13 Hrs.)

2.1 Anatomy of digestive system of *Cyprinus carpio*

2.2 Physiology of digestion in *Cyprinus carpio*

2.3 Anatomy of digestive system of *Palaemon*

2.4 Physiology of digestion in *Palaemon*

UNIT 3: FEED FORMULATION TECHNOLOGY (10 Hrs.)

3.1 Feed formulation- Methods (Pearson's square method) and Steps of feed formulation

3.2 Feed additives

- 3.2.1 Binders
- 3.2.1 Attractants
- 3.2.1 Probiotics
- 3.2.1 Antioxidants

3.3 Factors affecting feeding in fishes- intrinsic and extrinsic

3.4 Locally available feed ingredients for making Aquafeed

UNIT 4: FEED STORAGE AND FEEDING TECHNOLOGY (10 Hrs.)

4.1 Feed mills- Components and their management

4.2 Feed storage units and Quality control

4.3 Feeding methods- Manual, Mechanical and Demand feeder

4.4 Nutritional diseases in fishes

Practicum (30 Hrs.)

1. Museum survey of morphology of Locally available food fishes and shell fishes
2. Protein estimation test
3. Feed Formulation
4. Feed preparation using locally available feed ingredients
5. Gastrosomatic indices of fishes
6. Dissection/ Anatomical study of Digestive system of Locally available Prawn
7. Dissection/ Anatomical study of Digestive system of cultured fishes
8. Visit to nearby Fish feed manufacturing plant

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B){Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. De Silva SS & Anderson TA. 1995. *Fish Nutrition in Aquaculture*.
3. New MB. 1987. Feed and Feeding of Fish and Shrimp. A Manual on the Preparation and Preservation of Compound Feeds for Shrimp and Fish in Aquaculture. ADCP/REP/87/26 FAO
4. Nelson DL & Cox MM. 2005. Lehninger Principles of Biochemistry. WH Freeman.
5. Halver JE & Tiews KT. 1979. Finfish Nutrition and Fishfeed Technology. Vols. I, II. Heenemann.
6. Hepher B. 1988. Nutrition of Pond Fishes. Cambridge University Press.
7. Houlihan D, Boujard T & Jobling M. 2001. Food Intake in Fish. Blackwell.
8. Lovell RT. 1998. Nutrition and Feeding of Fishes. Kluwer.

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2023, 2024 & 2025
(MAJOR COURSE)
UG SEMESTER-III
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	**UMJIFT-302**
MAJOR CORE COURSE TITLE	:	**FRESHWATER AQUACULTURE**
CREDITS	:	**04 {03 (Theory) + 01 (Practical)}**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**
MAXIMUM MARKS PRACTICALS	:	**25**
i) Continuous assessment	:	**10**
ii) Final examination	:	**15**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

Aquaculture as a specialization is taught by all the Institutes offering Fisheries as a subject, in view of its importance in terms of contribution to fish production and employment generation. After studying this course students will be able to know the culturing aspects of aquatic organisms and will be able to start their own entrepreneurship

UNIT I: BASICS OF AQUACULTURE (13 Hrs.)

1.1 Definition, history and scope of aquaculture
1.2 Status and importance of aquaculture
1.3 Types of Aquaculture
  1.3.1 Extensive
  1.3.2 Semi-intensive
  1.3.2 Intensive aquaculture
1.4 Aquaculture practices
  1.4.1 Integrated fish farming
  1.4.2 Composite fish culture

UNIT 2: WARM WATER AQUACULTURE (13 Hrs.)

2.1 Criteria of selection of suitable site for fish farms
2.2 Morphological characteristics of cultivable fish species- Indian major carps and exotic carps
2.3 Different types of ponds (Nursery, Rearing and Stocking ponds)
2.4 Management of ponds
  2.4.1 Control of aquatic insects
  2.4.2 Control of aquatic weeds
  2.4.3 Fertilization and Liming of ponds

UNIT 3: COLD WATER AQUACULTURE (10 Hrs.)

3.1 Present status and global scenario of coldwater fish culture
3.2 Trout culture

3.3 Mahseer culture

3.4 Cold water fish conservation strategies

UNIT 4: AQUACULTURE PRACTICES (10 Hrs.)

4.1 Induced breeding

4.2 Design and working of Circular Hatchery

4.3 Feed formulation and Feeding methods- Manual, Mechanical and Demand feeder

4.4 Cultural practices of fresh water prawn (*Macrobrancium rosenbergii*)

Practicum (30 Hrs.)

1. Analysis of following parameters of water sample
   (a) Dissolved oxygen
   (b) pH
   (c) Free CO_2
2. Preparation of culture ponds
3. Morphological study of important culturable Freshwater finfishes
4. Morphological study of important culturable Freshwater shellfish species
5. Formulation of fish feed using locally available ingredients
6. Visit to different aquaculture systems
   (a) Carp fish farm
   (b) Trout fish farm
   (c) Mahseer farm
7. Design and working of Hatcheries
8. Visit to different hatcheries to observe breeding and hatching technology

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B){Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. Bardach JE, Rhyther JH & Mc. Larney WO. 1972. *Aquaculture Farming and Husbandry of Freshwater and Marine Organisms*. John Wiley & Sons.
3. Jhingran, V.G. (1985) Fish and Fisheries of India
4. Rath, R.K. (2000) Freshwater Aquaculture
5. Gupta, S.K and Gupta, P.C (2008) General and applied ichthyology (Fish and Fisheries)
6. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
7. Pillay, T.V.R (1993) Aquaculture Principles and Practicies
8. Srivastava, C.B.L (2006) Atextbook of fishery science and Indian fisheries
9. Paulraj, R (1997) Aquaculture feed

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2023, 2024 & 2025
(MINOR COURSE)
UG SEMESTER-III
UNDER NEP-2020

MINOR CORE COURSE NO.	:	**UMIIFT-303**
MINOR CORE COURSE TITLE	:	**FRESHWATER AQUACULTURE PRACTICES**
CREDITS	:	**04 {03 (Theory) + 01 (Practical)}**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**
MAXIMUM MARKS PRACTICALS	:	**25**
i) Continuous assessment	:	**10**
ii) Final examination	:	**15**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

Aquaculture as a specialization is taught by all the Institutes offering Fisheries as a subject, in view of its importance in terms of contribution to fish production and employment generation. After studying this course students will be able to know the culturing aspects of aquatic organisms and will be able to start their own entrepreneurship

UNIT I: BASICS OF AQUACULTURE (13 Hrs.)

1.5 Definition, history and scope of aquaculture
1.6 Status and importance of aquaculture
1.7 Types of Aquaculture
- 1.3.1 Extensive
- 1.3.2 Semi-intensive
- 1.3.2 Intensive aquaculture

1.8 Aquaculture practices
- 1.4.1 Integrated fish farming
- 1.4.2 Composite fish culture

UNIT 2: WARM WATER AQUACULTURE (13 Hrs.)

2.1 Criteria of selection of suitable site for fish farms
2.2 Morphological characteristics of cultivable fish species- Indian major carps and exotic carps
2.3 Different types of ponds (Nursery, Rearing and Stocking ponds)
2.4 Management of ponds
- 2.4.1 Control of aquatic insects
- 2.4.2 Control of aquatic weeds
- 2.4.3 Fertilization and Liming of ponds

UNIT 3: COLD WATER AQUACULTURE (10 Hrs.)

3.1 Present status and global scenario of coldwater fish culture
3.2 Trout culture

3.3 Mahseer culture

3.4 Cold water fish conservation strategies

UNIT 4: AQUACULTURE PRACTICES (10 Hrs.)

4.1 Induced breeding

4.2 Design and working of Circular Hatchery

4.3 Feed formulation and Feeding methods- Manual, Mechanical and Demand feeder

4.4 Cultural practices of fresh water prawn (*Macrobrancium rosenbergii*)

Practicum **(30 Hrs.)**

1. Analysis of following parameters of water sample
   (a) Dissolved oxygen
   (b) pH
   (c) Free CO_2
2. Preparation of culture ponds
3. Morphological study of important culturable Freshwater finfishes
4. Morphological study of important culturable Freshwater shellfish species
5. Formulation of fish feed using locally available ingredients
6. Visit to different aquaculture systems
   (a) Carp fish farm
   (b) Trout fish farm
   (c) Mahseer farm
7. Design and working of Hatcheries
8. Visit to different hatcheries to observe breeding and hatching technology

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr.	15
External Theory End Semester	100%	3 Hours	60
Internal Practical	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B){Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. Bardach JE, Rhyther JH & Mc. Larney WO. 1972. *Aquaculture Farming and Husbandry of Freshwater and Marine Organisms*. John Wiley & Sons.
3. Jhingran, V.G. (1985) Fish and Fisheries of India
4. Rath, R.K. (2000) Freshwater Aquaculture
5. Gupta, S.K and Gupta, P.C (2008) General and applied ichthyology (Fish and Fisheries)
6. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
7. Pillay, T.V.R (1993) Aquaculture Principles and Practicies
8. Srivastava, C.B.L (2006) Atextbook of fishery science and Indian fisheries
9. Paulraj, R (1997) Aquaculture feed

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2023, 2024 & 2025
(MULTIDISCIPLINARY COURSE)
UG SEMESTER-III
UNDER NEP-2020

MULTIDISCIPLINARY CORE COURSE NO.	:	**UMDIFT-304**
MULTIDISCIPLINARY CORE COURSE TITLE	:	**BASICS OF AQUACULTURE**
CREDITS	:	**03**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to inculcate importance of ornamental fish farming in relation with entrepreneurship development among students along with the knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation. To teach techniques of construction of glass aquarium and its maintenance and also about fish food production and health related problems with ornamental fish.

UNIT 1 – BASIC KNOWLEDGE ABOUT FISHES (13 Hrs.)

1.1 An introduction to fisheries sciences

1.2 General characteristics of fishes

1.3 Nutritional value of fish

1.4 History of fish farming

UNIT 2 – BASICS OF FISH CULTURE (13 Hrs.)

2.1 Site selection for a fish farm

2.2 Types of fish ponds- Nursery, Rearing and Stocking pond

2.3 Criteria of selection of farmed species

2.4 Types of fish culture- Composite fish culture & Integrated fish farming

UNIT 3- MANAGEMENT OF FISH CULTURE (10 Hrs.)

3.1 Pre-stocking and Post stocking management of fish farms

3.2 Types of fish feed and nutritional requirements of fishes

3.3 Fish harvesting

3.4 Transportation of fishes

UNIT 4: CONSTRUCTION AND MAINTENANCE OF AQUARIUM (10 Hrs.)

1.1 Aquarium- Definition, Types and importance

1.2 Design, Construction and Setting of Home aquarium

1.3 Aquarium accessories

1.3.1 Basic accessories- Aerators, Filters, Thermostat and Lightening equipments

1.3.2 Ornamental accessories- Gravels, Pebbles, Toys, Artificial plants, etc.

1.4 Maintenance of Aquarium

1.5 Important ornamental fishes

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	**50%**	**1 Hr. and 30 Min.**	**15**
External Theory End Semester	**100%**	**3 Hours**	**60**

External End Semester Theory Examination will have two sections (A & B){Total marks 60}

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment {Total marks 15}

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. De Silva SS & Anderson TA. 1995. *Fish Nutrition in Aquaculture*.
3. Zaidi, S.G.S (2002) Ornamental fish culture
4. Mahapatra, B.K., Dutta S., Pailan, G.H.(2015) Ornamental Fish Breeding, Culture and Trade
5. Ahilan, B., Felix, N., Santham, R., (2008) A text book of Aquariculture
6. Dholakia A.D. (2010)Ornamental Fish culture and Aquarium Management
7. Axelrod HR & Vorderwinkler W. 1978. *Encyclopaedia of Tropical Fishes*. TFH Publ.
8. Axelrod HR & Sweenen ME. 1992. *The Fascination of Breeding Aquarium Fishes*. TFH Publ.
9. ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR. 23
10. Mills D. 1981. *Aquarium Fishes*. Kingfisher Books.

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2023, 2024 & 2025
(SKILL ENHANCEMENT COURSE)
UG SEMESTER-III
UNDER NEP-2020

SKILL ENHANCEMENT CORE COURSE NO.	:	**USEIFT-305**
SKILL ENHANCEMENT CORE COURSE TITLE	:	**FISH FEED TECHNOLOGY**
CREDITS	:	**02**
MAXIMUM MARKS	:	**50**
I) External (University Exam)	:	**40**
II) Internal Assessment	:	**10**
DURATION OF UNIVERSITY EXAM	:	**02 Hours and 30 Minutes**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course provides an opportunity for students to understand the basic principles of fish nutrition as this aspect of aquaculture has gained an importance in recent years. Feed employed in the culture of fish and shellfish is becoming a limiting factor in terms of economics as well as availability of quality ingredients and Nutrition and feed not only play a crucial role in enhancing the growth of fish, but also in breeding and health management so it is aimed to create awareness among students on feed additives in aquafeed.

UNIT I: FISH FOOD AND FEEDING (8 Hrs.)

1.1 Types of fish food and natural feeding habits of fishes

1.2 Nutritional requirements of fishes- Sources and Importances

1.3 Nutritional requirements of shell fishes- *Palaemon* and *Unio*

1.4 Live food organisms- Culture and importance

1.4.1 Rotifers

1.4.2 *Artemia*

UNIT 2: FEED FORMULATION (7 Hrs.)

2.1 Feed formulation- Methods (Pearson's square method) and Steps of feed formulation

2.2 Feed mills- Components and their management

2.3 Feed storage units and Quality control

2.4 Feeding methods- Manual, Mechanical and Demand feeder

UNIT 3: PRACTICAL FEED TECHNOLOGY (30 Hrs.)

3.1 Museum survey of morphology of Locally available food fishes

3.2 Protein estimation test

3.3 Feed Formulation

3.4 Feed preparation using locally available feed ingredients

3.5 Gastrosomatic indices of fishes

3.6 Demand Feeder- construction and working
3.7 Visit to nearby Fish feed manufacturing units

NOTE FOR PAPER SETTERS:

Total Marks of the USEZOT-305 is 50 of which 20% marks shall be reserved for internal assessment (10 marks). Remaining 80% of the marks (40 marks) shall be reserved for external examination to be conducted by the University/Colleges.

Internal Assessment Test (10 Marks)
Internal Assessment Paper of 10 Marks shall consist of Theory Question/s of 5 Marks from Unit I/II and 5 Marks of Practical Exercise from Unit III.

External End Semester University / College Examination
External Theory Exam shall be of 40 Marks and consist of 2 sections:

Section A: Four (4) short answer questions representing all Units/Syllabi i.e., atleast one question from each Unit. Each question shall be of 2.5 marks (All Compulsory)

Section B: Six (6) long answer questions representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 10 marks (Three to be attempted selecting one from each unit).

SUGGESTED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. De Silva SS & Anderson TA. 1995. *Fish Nutrition in Aquaculture*.
3. New MB. 1987. Feed and Feeding of Fish and Shrimp. A Manual on the Preparation and Preservation of Compound Feeds for Shrimp and Fish in Aquaculture. ADCP/REP/87/26 FAO
4. Nelson DL & Cox MM. 2005. Lehninger Principles of Biochemistry. WH Freeman.
5. Halver JE & Tiews KT. 1979. Finfish Nutrition and Fishfeed Technology. Vols. I, II. Heenemann.
6. Hepher B. 1988. Nutrition of Pond Fishes. Cambridge University Press.
7. Houlihan D, Boujard T & Jobling M. 2001. Food Intake in Fish. Blackwell.
8. Lovell RT. 1998. Nutrition and Feeding of Fishes. Kluwer.

UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2024, 2025 & 2026

INDUSTRIAL FISH & FISHERIES COURSE

UG SEMESTER IV

UNDER NEP-2020

University of Jammu

Syllabi of Industrial Fish and Fisheries for FYUP under CBCS as per NEP-2020

SEMESTER-IV

(Examination to be held in 2024, 2025, 2026)

Major Course

Course Code: **UMJIFT-401**
Credits: 04 {03(Theory) + 01(Practical)}

Course Title: **ORNAMENTAL FISHERIES**
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Major Course

Course Code: **UMJIFT-402**
Credits: 04 {03(Theory) + 01(Practical)}

Course Title: **FRESHWATER FISHERIES**
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Major Course

Course Code: **UMJIFT-403**
Credits: 04 {03(Theory) + 01(Practical)}

Course Title: **MARINE WATER FISHERIES**
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Major Course

Course Code: **UMJIFT-404**
Credits: 04 {03(Theory) + 01(Practical)}

Course Title: **BRACKISH WATER FISHERIES**
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

Minor Course

Course Code: **UMIIFT-405**
Credits: 04 {03(Theory) + 01(Practical)}

Course Title: **ORNAMENTAL FISH KEEPING**
Total no. of lectures: Theory : 45 hours
Practical : 30 hours

Maximum Marks : 100
Theory : 75
Practical/Tutorial : 25

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026

(MAJOR COURSE)

UG SEMESTER-IV

UNDER NEP-2020

MAJOR CORE COURSE NO.	:	**UMJIFT-401**
MAJOR CORE COURSE TITLE	:	**ORNAMENTAL FISHERIES**
CREDITS	:	**04 {03 (Theory) + 01 (Practical)}**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**
MAXIMUM MARKS PRACTICALS	:	**25**
i) Continuous assessment	:	**10**
ii) Final examination	:	**15**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to inculcate importance of ornamental fish farming in relation with entrepreneurship development among students along with the knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation. To teach techniques of construction of glass aquarium and its maintenance and also about fish food production and health related problems with ornamental fish.

UNIT I: AQUARIUM CONSTRUCTION AND MAINTENANCE (13 Hrs.)

1.1 Aquarium- Definition, Types and importance

1.2 Design, Construction and Setting of Aquaria

1.3 Aquarium accessories

1.3.1 Basic accessories- Aerators, Filters and Thermostat

1.3.2 Ornamental accessories- Gravels, Pebbles, Toys, Artificial plants, etc.

1.4 Aquarium maintenance

UNIT 2: ORNAMENTAL FISH AND FISHERIES (13 Hrs.)

2.1 World status and scope of ornamental fisheries

2.2 Important Freshwater ornamental finfishes- their taxonomy and biology

2.3 Important Marine water ornamental finfishes- Their taxonomy and biology

2.4 Other ornamental organisms (Sea anemone, lobsters, and star fish)- their taxonomy and biology

UNIT 3: IMPORTANT ASPECTS OF ORNAMENTAL FISHERIES (10 Hrs.)

3.1 Criteria of selection of ornamental fishes for aquarium

3.2 Construction and maintenance of Commercial ornamental Fish farm

3.3 Breeding of Ornamental fishes

3.4 Transportation of Ornamental Fishes

UNIT 4: FEEDING AND HEALTH MANAGEMENT (10 Hrs.)

4.1 Nutritional requirements of Ornamental Fishes

4.2 Types of Feed and Artificial Feed formulation of Ornamental Fishes

4.3 Common ornamental fish diseases and their management

- 4.4.1 Argulosis
- 4.4.2 White spot
- 4.4.3 Fin rot
- 4.4.4 Mouth fungus

Practicum **(30 Hrs.)**

1. Morphological Study of ornamental fishes
2. Construction of aquarium
3. Setting up of aquarium
4. Design and working Aquarium accessories and equipments
   (a) Aerator
   (b) Filter
   (c) Heater and thermostat
   (d) Hand net
5. Feed Formulation
6. Analysis of following parameters of water sample
   (a) Dissolved oxygen
   (b) pH
   (c) Free CO_2
7. Identification of causative agents of Common ornamental fish diseases through charts
8. Visit to Aquarium cum Awareness centre, Bagh-e-Bahu Jammu and nearby Aquarium shops

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit.Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one longanswer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Pandey, K. and Shukla, J. P. (2005). Fish and Fisheries (4th edition) Rastogi Publications.
2. De Silva SS & Anderson TA. 1995. *Fish Nutrition in Aquaculture*.
3. Zaidi, S.G.S (2002) Ornamental fish culture
4. Mahapatra, B.K., Dutta S., Pailan, G.H.(2015) Ornamental Fish Breeding, Culture and Trade
5. Ahilan, B., Felix, N., Santham, R., (2008) A text book of Aquariculture
6. Dholakia A.D. (2010)Ornamental Fish culture and Aquarium Management
7. Axelrod HR & Vorderwinkler W. 1978. *Encyclopaedia of Tropical Fishes*. TFH Publ.
8. Axelrod HR & Sweenen ME. 1992. *The Fascination of Breeding Aquarium Fishes*. TFH Publ.
9. ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR. 23
10. Mills D. 1981. *Aquarium Fishes*. Kingfisher Books.
11. Saxena A. (Ed.). 2003. *Aquarium Management*. Daya Publ.
12. Spotte S. 1979. *Fish and Invertebrate Culture*. John Wiley & Sons.

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(MAJOR COURSE)
UG SEMESTER-IV
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	UMJIFT-402
MAJOR CORE COURSE TITLE	:	FRESHWATER FISHERIES
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to inculcate importance of freshwater fisheries resources of India and to impart knowledge on the role and relevance of freshwater fisheries along with information on management of freshwater fisheries with basic practical skills in fisheries data collection and field work in freshwater fisheries.

UNIT I: INLAND AND RIVERINE FISHERIES RESOURCES (12 Hrs.)

1.1 Indian Inland fisheries resources and status

1.2 Riverine fisheries resources of India

1.3 Ecology of rivers

1.4 Important riverine fishes of India- Their taxonomy and biology

UNIT 2: COLDWATER FISHERIES (12 Hrs.)

2.1 Characteristic features of Hill streams

2.2 Characteristic features of Hill stream fishes

2.3 Important coldwater finfishes, their biology and culture

- 2.3.1 Trout fisheries
- 2.3.2 Tor fisheries

UNIT 3: WARM WATER FISHERIES (12 Hrs.)

3.1 Characteristic features of warm water

3.2 Warm water fishes- Their taxonomy, biology and culture

- 3.1.1 Carp fishes- Indian major carps and exotic carps
- 3.1.2 Catfishes

3.3 Fresh water Prawn culture

UNIT 4: LACUSTRINE FISHERIES (10 Hrs.)

4.1 Ecology of lakes

4.2 Lacustrine fisheries in India

4.3 Important gears used in Freshwaters

4.4 Cage fish culture

Practicum (30 Hrs.)

1. Morphological Study of Fresh water carps- Indian major carps and Exotic carps
2. Morphological Study of cold water fishes- Trouts and Tors
3. Morphological Study of Fresh water cat fishes
4. Morphological Study of Fresh water prawn
5. Construction and working of Gillnet, Cast net and Hook & line
6. Location of five major river systems on maps
7. Design and working of cage
8. Visit to nearby Carp farm
9. Visit to nearby cold water fishing units

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B) (Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one longanswer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Blaber, J.M. 1997. Fish and Fisheries in Tropical Estuaries. Chapman & Hall.
2. Cowx, I.G. 1996. Stock assessment in Inland Fisheries. Fishing News Books, Oxford, 513pp.
3. FAO 1999. Fish and Fisheries at Higher Altitudes: Asia FAO Fisheries Technical paper No. 385.
4. FAO (2012). The State of World Fisheries and Aquaculture. FAO Fisheries and Aquaculture Department, FAO, Rome (http://www.fao.org/docrep/016/i2727e/i2727e00.htm)
5. Gulland, J.A. 1983. Fish Stock Assessment. A Manual of Basic Methods. Vol. 1. John Wiley & Sons, NY, 223 pp.
6. ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.
7. Jhingran, V.G. 1991. Fish and Fisheries of India. Hindustan Publishing Co., Delhi, 727 pp.
8. Jhingran, V.G. and K.L. Sehgal. 1978. Cold Water Fisheries of India. J.Inland. Fish. Soc. India. Sp. Publ.
9. Khanna, D.R., R. Rajani, G. Matta. 2011. Ecology of Fish Pond. Daya Publishing House, New delhi, 173pp.
10. Sakhare, V.B. 2012. Inland fisheries. Daya publishing house, Delhi, 326pp.
11. Sansbury, J.C. 1986. Commercial Fishing Methods. An Introduction to Vessels and Gears. 2 nd ed. Fishing News Books Ltd., England, 207 pp.
12. Sharma A.P. 2012. Management issues in Inland Fisheries and Aquaculture. Narendra Publishing House, Delhi, 243pp. 17. Stickney, R.R. 2000.
13. Srivastava, C.B.L. 2001. A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal, Delhi. 20. Sugunan, V.V. 1995. Riverine Fisheries of India. FAO Publication, 423 pp.
14. Sugunan V.V. 1997. Reservoir Fisheries of India. Daya Publ. House. 22. Templeton. R. 1995. Freshwater Fisheries Management. Fishing News Books, Oxford, 241 pp. 42 23.
15. Welcomme, R.L. 2007. Inland Fisheries. Ecology and Management. Discovery Publ. House., New Delhi, 358 pp.

UNIVERSITY OF JAMMU
SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES
For the Examination to be held in Year 2024, 2025 & 2026
(MAJOR COURSE)
UG SEMESTER-IV
UNDER NEP-2020

MAJOR CORE COURSE NO.	:	**UMJIFT-403**
MAJOR CORE COURSE TITLE	:	**MARINE WATER FISHERIES**
CREDITS	:	**04 {03 (Theory) + 01 (Practical)}**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**
MAXIMUM MARKS PRACTICALS	:	**25**
i) Continuous assessment	:	**10**
ii) Final examination	:	**15**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

To know the present level of marine resources and to impart knowledge on conservation measures of marine fisheries resources as well as to impart knowledge to students about learning the recent methodologies of sustainable exploitation of marine water resources.

UNIT I: MARINE FISHERIES RESOURCES (13 Hrs.)

1.1 Overview of Marine fisheries resources of India

1.2 Status of Marine capture fisheries of India

1.3 Zonation of Sea

1.4 Ecology of Sea

UNIT 2: PELAGIC & DEMERSAL FISHERIES (12 Hrs.)

2.1 Important Pelagic fisheries of India – Sardines, Mackerels, Bombay duck, Mullets, etc.

2.2 Features and trends of conservation of pelagic fisheries

2.3 Important Demersal fisheries of India – Sharks, Perches, Tuna, Threadfins, etc.

2.4 Features and trends of conservation of demersal fisheries

UNIT 3: MARICULTURE (12 Hrs.)

3.1 Molluscan fisheries

3.2 Seaweed culture

3.3 Crustacean culture

UNIT 4: MARINE FISHERIES TECHNOLOGY (10 Hrs.)

4.1 Important gears and crafts used in marine waters

4.2 Remote sensing and Fish finding equipments in Sea

4.3 Concept of EEZ and Overfishing

4.4 Marine pollution- sources and impacts

Practicum **(30 Hrs.)**

1. Morphological Study of Marine water fishes
2. Morphological Study Marine molluscs
3. Morphological Study Marine crustaceans
4. Construction and working of Marine water gears
5. Location of Indian marine waters on map
6. Design and working of Remote sensing equipments
7. Design and working of Fish finding equipments- Sonar, Radar, Ecosounder

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit.Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one longanswer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Bal DV & Rao KV. 1990. *Marine Fishes of India.* 1st Revised Ed. Tata McGraw Hill. 265
2. Chandra P. 2007. *Fishery Conservation, Management and Development.* SBS Publ.

3. Dholakia AD. 2004. *Fisheries and Aquatic Resources of India*. Daya Publ. House.
4. FAO. Technical Papers on Marine Fisheries.
5. Kurian CV & Sebastian VO. 1986. *Prawns and Prawn Fisheries of India*. Hindustan Publ. Corp.
6. Peter BM & Joseph JC. Jr. 2000. *Fishes- An Introduction to Ichthyology*. 4th Ed. Prentice Hall.
7. Samuel CT. 1968. *Marine Fisheries in India*. Narendra Publ. House.
8. Shanbhogue SL. 2000. *Marine Fisheries of India*. ICAR.
9. Yadav BN. 1997. *Fish and Fisheries*. 2nd Ed. Daya Publ. House.
10. Srivastava, C.B.L. 2001. A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal, Delhi.

UNIVERSITY OF JAMMU

SYLLABI AND COURSE OF STUDY IN INDUSTRIAL FISH & FISHERIES

For the Examination to be held in Year 2024, 2025 & 2026

(MAJOR COURSE)

UG SEMESTER-IV

UNDER NEP-2020

MAJOR CORE COURSE NO.	:	**UMJIFT-404**
MAJOR CORE COURSE TITLE	:	**BRACKISH WATER FISHERIES**
CREDITS	:	**04 {03 (Theory) + 01 (Practical)}**
MAXIMUM MARKS	:	**75**
I) External (University Exam)	:	**60**
II) Internal Assessment	:	**15**
DURATION OF UNIVERSITY EXAM	:	**03 Hours**
MAXIMUM MARKS PRACTICALS	:	**25**
i) Continuous assessment	:	**10**
ii) Final examination	:	**15**

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

The course helps to gain students in-depth knowledge on the categorization, utilization, conservation and management of brackishwater fisheries resources.

UNIT I: BRACKISHWATER FISHERIES RESOURCES (12 Hrs.)

1.1 Overview of Brackish water fisheries resources of India

1.2 Status of Brackish water capture fisheries of India

1.3 Ecology of brackish water

1.4 Problems and conservation of brackish water fisheries

UNIT 2: ESTUARINE FISHERIES (13 Hrs.)

2.1 Estuaries- Definition and types

2.2 Important estuarine waters and their fisheries in India

- 2.2.1 The Hooghly- Matlah estuary
- 2.2.2 The Mahanadi estuary

2.3 Important brackish water lakes

- 2.3.1 Chilka lake
- 2.3.2 Pulicat lake

2.4 Important brackishwater fishes- their taxonomy and biology

- 2.4.1 Hilsa fishery
- 2.4.2 Mullet fishery

UNIT 3: BARCKISHWATER CULTURE PRACTICES (10 Hrs.)

3.1 Culture of *Penaeus mondon*

3.2 Culture of *Litopenaeus vannamei* 3.3. Crab fisheries

3.4 Tilapia culture

UNIT 4: GEARS AND CRAFT TECHNOLOGY; MIGRATION (10 Hrs.)

4.1 Important gears used in brackish waters

4.2 Important crafts used in brackish waters

4.3 Pen culture and concept of bheris

4.4 Migration of fishes

Practicum **(30 Hrs.)**

1. Morphological Study of brackish water fishes
2. Morphological Study brackish water crustaceans
3. Construction and working of brackish water gears
4. Construction and working of brackish water crafts
5. Design and working of cages
6. Design and working of Pens
7. Diagrammatic representation of formation of estuaries
8. Location of brackishwater estuaries on maps

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one long answer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

1. Chandra P. 2007. *Fishery Conservation, Management and Development*. SBS Publ.
2. Jhingran, V.G. (1985) Fish and Fisheries of India
3. Gupta, S.K and Gupta, P.C (2008) General and applied ichthyology (Fish and Fisheries)
4. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
5. Talwar, P.K. Inland Fisheries of India
6. Dholakia AD. 2004. *Fisheries and Aquatic Resources of India*. Daya Publ. House.
7. Kurian CV & Sebastian VO. 1986. *Prawns and Prawn Fisheries of India*. Hindustan Publ. Corp.
8. Peter BM & Joseph JC. Jr. 2000. *Fishes- An Introduction to Ichthyology*. 4th Ed. Prentice Hall.
9. Samuel CT. 1968. *Marine Fisheries in India*. Narendra Publ. House.
10. Shanbhogue SL. 2000. *Marine Fisheries of India*. ICAR.
11. Yadav BN. 1997. *Fish and Fisheries*. 2nd Ed. Daya Publ. House.
12. Srivastava, C.B.L. 2001. A Text Book of Fishery Science and Indian Fisheries. Kitab Mahal, Delhi.

For the Examination to be held in Year 2024, 2025 & 2026

(MINOR COURSE)

UG SEMESTER-IV

UNDER NEP-2020

MINOR CORE COURSE NO.	:	UMIIFT-405
MINOR CORE COURSE TITLE	:	ORNAMENTAL FISH KEEPING
CREDITS	:	04 {03 (Theory) + 01 (Practical)}
MAXIMUM MARKS	:	75
I) External (University Exam)	:	60
II) Internal Assessment	:	15
DURATION OF UNIVERSITY EXAM	:	03 Hours
MAXIMUM MARKS PRACTICALS	:	25
i) Continuous assessment	:	10
ii) Final examination	:	15

OBJECTIVES AND EXPECTED LEARNING OUTCOMES

This course intends to inculcate importance of ornamental fish farming in relation with entrepreneurship development among students along with the knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation. To teach techniques of construction of glass aquarium and its maintenance and also about fish food production and health related problems with ornamental fish.

UNIT I: AQUARIUM CONSTRUCTION AND MAINTENANCE (13 Hrs.)

1.1 Aquarium- Definition, Types and importance

1.2 Design, Construction and Setting of Aquaria

1.3 Aquarium accessories

1.3.1 Basic accessories- Aerators, Filters and Thermostat

1.3.2 Ornamental accessories- Gravels, Pebbles, Toys, Artificial plants, etc.

1.4 Aquarium maintenance

UNIT 2: ORNAMENTAL FISH AND FISHERIES (13 Hrs.)

2.1 World status and scope of ornamental fisheries

2.2 Important Freshwater ornamental finfishes- their taxonomy and biology

2.3 Important Marine water ornamental finfishes- Their taxonomy and biology

2.4 Other ornamental organisms (Sea anemone, lobsters, and star fish)- their taxonomy and biology

UNIT 3: IMPORTANT ASPECTS OF ORNAMENTAL FISHERIES (10 Hrs.)

3.1 Criteria of selection of ornamental fishes for aquarium

3.2 Construction and maintenance of Commercial ornamental Fish farm

3.3 Breeding of Ornamental fishes

3.4 Transportation of Ornamental Fishes

UNIT 4: FEEDING AND HEALTH MANAGEMENT (10 Hrs.)

4.1 Nutritional requirements of Ornamental Fishes

4.2 Types of Feed and Artificial Feed formulation of Ornamental Fishes

4.3 Common ornamental fish diseases and their management

- 4.4.1 Argulosis
- 4.4.2 White spot
- 4.4.3 Fin rot
- 4.4.4 Mouth fungus

Practicum **(30 Hrs.)**

1. Morphological Study of ornamental fishes
2. Construction of aquarium
3. Setting up of aquarium
4. Design and working Aquarium accessories and equipments
   (a) Aerator
   (b) Filter
   (c) Heater and thermostat
   (d) Hand net
5. Feed Formulation
6. Analysis of following parameters of water sample
   (a) Dissolved oxygen
   (b) pH
   (c) Free CO_2
7. Identification of causative agents of Common ornamental fish diseases through charts
8. Visit to Aquarium cum Awareness centre, Bagh-e-Bahu Jammu and nearby Aquarium shops

NOTE FOR PAPER SETTING

Examination Theory/Practical	Syllabus to be covered in Examination	Time allotted for Exam	% weightage (Marks)
Internal Theory Assessment	50%	1 Hr. and 30 Min.	15
External Theory End Semester	100%	3 Hours	60
Continuous assessment	-	-	10 (Based on Daily Performance only)
Final Practical examination	-	-	15

External End Semester Theory Examination will have two sections (A & B)(Total Marks 60)

Section A: Four short answer questions representing all units/syllabi i.e., one question from each unit. Each question shall be of 3 marks.

Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e. two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

Internal Assessment (Total Marks 15)

Fifteen (15) marks for theory paper in a subject reserved for internal assessment shall have one longanswer type question of 7 marks and four short answer type questions of 2 marks each.

RECOMMENDED READINGS

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3. Zaidi, S.G.S (2002) Ornamental fish culture
4. Mahapatra, B.K., Dutta S., Pailan, G.H.(2015) Ornamental Fish Breeding, Culture and Trade
5. Ahilan, B., Felix, N., Santham, R., (2008) A text book of Aquariculture
6. Dholakia A.D. (2010)Ornamental Fish culture and Aquarium Management
7. Axelrod HR & Vorderwinkler W. 1978. *Encyclopaedia of Tropical Fishes*. TFH Publ.
8. Axelrod HR & Sweenen ME. 1992. *The Fascination of Breeding Aquarium Fishes*. TFH Publ.
9. ICAR. 2006. *Handbook of Fisheries and Aquaculture*. ICAR. 23
10. Mills D. 1981. *Aquarium Fishes*. Kingfisher Books.
11. Saxena A. (Ed.). 2003. *Aquarium Management*. Daya Publ.
12. Spotte S. 1979. *Fish and Invertebrate Culture*. John Wiley & Sons.