



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./23)

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

Sumilashano
25/5/23
Deputy Registrar (Academic)

SS
01/05/23

CC
115

M
28/4/23

12

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

(5)



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. Hopher 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 CO₂
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

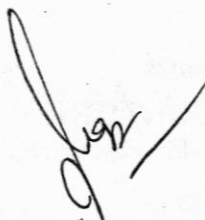
Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

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 CO₂
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

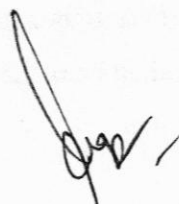
Section B: Eight long answer questions (Four to be attempted) representing whole of the syllabi i.e., two questions from each unit. Each question shall be of 12 marks. Candidates are required to attempt four questions in all, selecting one from each unit.

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 Gastroscopic 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. Hopher 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

