

B.Sc. Semester III

Course No. FI-301 (Theory)

Time Duration: 3 Hrs

Maximum Marks: 100

Internal: 20

External: 80

UNIVERSITY Of JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

1.	Course /Paper Title	:	Aquaculture
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External (Univ. Exam.)	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks		
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Univ. Exam.	:	3 Hrs.

OBJECTIVES

To meet the dietary requirement of ever increasing human population, the different alternative sources besides agriculture are being hunted upon and the aquaculture, the culture of edible aquatic organisms is the answer in the right direction. So the present course has been designed to acquaint the students with various aspects of aquaculture along with the culture of aquatic organisms. The culture and the ready availability of these organisms is apt to supplement the agriculture on one hand and provide protein with nutritious diet to the masses on the other hand.

SYLLABUS

UNIT I

- 1.1 Definition and History of aquaculture
- 1.2 Scope and importance of aquaculture
- 1.3 Present global and national scenario
- 1.4 Aquaculture vs Agriculture
- 1.5 Technological basis of aquaculture
- 1.6 Aquaculture practices
 - 1.6.1 (a) Warm water
 - (b) Coldwater
 - (c) Brackish water
 - 1.6.2 (a) Traditional

- (b) Extensive
- (c) Semi-intensive
- (d) Intensive
- (e) Super- intensive

1.7 Criteria for selection of candidate species for aquaculture

1.7.1 Some important culturable fish species

UNIT II

2.1 Criteria for site selection of fish farms

2.2 Water quality and its management

2.3 Soil characteristics and physico-chemical parameters

2.4 Preparation and management of ponds

2.4.1 Types of ponds

- (a) Nursery ponds
- (b) Rearing ponds
- (c) Grow out ponds

2.4.2 Pre-stocking management

- (a) Liming of ponds
- (b) Fertilization of ponds
- (c) Control of algal blooms
- (d) Weed control

2.5 Concept of different systems of aquaculture

2.5.1 Monoculture

2.5.2 Polyculture

2.5.3 Integrated culture

2.5.4 Pen, Cage and raft culture

UNIT –III

3.1 Concept of fish feed and its importance

3.2 Factors affecting feed design, production and feeding

3.3 Manufacture of aquaculture feeds

- 3.3.1 (a) Feed types
- (b) Selection of ingredients and additives
- (c) Formulation of feeds
- (d) Storage of feed

3.4 Feed techniques

- (a) Manual feeding
- (b) Mechanical feeding

UNIT –IV

4.1 Characteristics of brackishwater, its resources in India, culture practices in Bheris, Pokkali, Gazanis and Khazans

4.2 Important species of cultivable Penaeid prawns

4.2.1 Life history of typical Penaeid prawn

4.3 Breeding and culture of brackish water fin-fishes

- (a) Milk fish

- (b) Grey mullet
- (c) Pearl spot

4.4 Monoculture and polyculture of brackishwater fishes

UNIT –V

5.1 Culture of edible oyster, mussels, clams and sea cucumbers

5.2 Pearl Oyster culture

5.3 Culture of seaweeds

5.4 Fin fish culture in cages and pens

5.5 Transportation of finfish seed, Prawn seed and brooders

Note for the paper setters:

Section .A: 10 very short answer question are to be set. The maximum length of answer shall be 50 words.

All tie questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten long answer type questions, with two questions from each unit.

Candidate will have to attempt 5 questions selecting one question from each Unit Each question will, carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Jhingran, V.G. (1985) Fish and Fisheries of India
2. Rath, R.K. (2000) Freshwater Aquaculture
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. Pillay, T.V.R (1993) Aquaculture Principles and Practicies
6. Srivastava, C.B.L (2006) Atextbook of fishery science and Indian fisheries
7. Paulraj, R (1997) Aquaculture feed

B.Sc. Semester III

Course No. FI-301 (Theory)

Maximum Marks: 25

UNIVERSITY Of JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

1. Collection and analysis of soil and water samples for physico-chemical characteristics
2. Study of food cycle of pond
3. Collection and identification of fish food organisms
4. Study of different hatchery systems
5. Water quality monitoring in hatcheries
6. Preparation of nursery, rearing and stocking ponds
7. Identification of cultivable species of Oyster, Mussels, Clams and Weeds
8. Collection and identification of Brackish water fin fishes, Shell fishes and their Seeds
9. Fish feed formulation
10. Identification of seed cultivable fish species
11. Collection and identification of aquatic insects, weeds, predators and their control

B.Sc. Semester IV

Course No. FI-401 (Theory)

Time Duration: 3 Hrs

Maximum Marks: 100

Internal: 20

External: 80

UNIVERSITY Of JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

1.	Course /Paper Title	:	Fish Genetics, Endocrinology and Health Management
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External (Univ. Exam.)	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks	:	
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Univ. Exam.	:	3 Hrs.

OBJECTIVES

To produce quality seeds and the hybrid variety of fishes through implementation of modern bio-techniques, the course has been designed to expose the structure about the basic concepts of fish genetics and induced breeding. Also effort has been made to offer to the students an understanding and monopolizing of the prevailing fish diseases and their control measures so that healthy fish hatchery could be produces.

SYLLABUS

UNIT –I

- 1.1 Principles of genetics
- 1.2 Interactions of genes
- 1.3 Mutations
- 1.4 Sex determination system
- 1.5 Selective breeding, Hybridization, Transgenic fish and Indian fish hybrids.

UNIT –II

- 2.1 Endocrine glands in fish (Pituitary, Pineal, Thyroid, Gonads and Urophysis)

- 2.2 Role of Gonadotropins in fish breeding
- 2.3 Environmental factors influencing fish breeding
- 2.4 Trout culture
- 2.5 Carp culture
- 2.6 Bundh breeding
- 2.7 Riverine seed collection

UNIT –III

- 3.1 Induced breeding: Ovulating agents extracts used in induced breeding (Fish Pituitary glands, HCG, pheromones and new generation drugs)
- 3.2 Cryo-preservation of fish gametes
- 3.3 Production of mono-sex and sterile fish and their significance in aquaculture

UNIT –IV

- 4.1 Infectious disease: Bacterial, Viral, Fungal and Protozoan (Morphology, Biology, Life cycle and Epidemiology)
- 4.2 Epizootic Ulcerative Syndrome in fishes
- 4.3 Nutritional diseases
- 4.4 Inflammation in fishes
- 4.5 Host, pathogen and environment interaction.

UNIT –V

- 5.1 Principles of disease diagnosis
- 5.2 Disease development process and scientific health management in aquaculture
- 5.3 Tips for aquatic health management
- 5.4 Specific and Non- specific defense systems in fish
- 5.5 Fish immunization and Vaccination
- 5.6 Application of biotechnology in aquatic health management

Note for the paper setters:

Section .A: 10 very short answer question are to be set. The maximum length of answer shall be 50 words. All tie questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten long answer type questions, with two questions from each unit. Candidate will have to attempt 5 questions selecting one question from each Unit Each question will, carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Padhi , B.K and Mandal, R. K (2000) Applied Fish Genetics
2. Mohan, C.V and Shankar, K.M (2000) Recent advances in fish and shellfish health management
3. Jhingran, V.G. (1985) Fish and Fisheries of India
4. Rath, R.K. (2000) Freshwater Aquaculture
5. Ayyappan, S (2010) Handbook of Fisheries and Aquaculture
6. Pillay, T.V.R (1993) Aquaculture Principles and Practices
7. Chondar, S.L (1980) Induced carp breeding

B.Sc. Semester IV

Course No. FI-401 (Practical)

Maximum Marks: 25

UNIVERSITY OF JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

1. Histological studies of fish endocrine glands (Pituitary, Pineal, Thyroid, Gonads and Urophysis)
collection and preservation of pituitary glands
2. Maintenance of brood fish
3. Characteristics of gravid fishes and selection for induced breeding
4. Identification methods for common bacteria and fungal pathogens of fish
5. Examination and identification of common fish parasites.
6. Fish diseases diagnosis
7. Cryo-preservation of fish gametes
8. Live and post mortem examination
9. Determining health condition of fish and Prawn
10. Riverine fish seed collection

B.Sc. Semester V

Course No. FI-501 (Theory)

Time Duration: 3 Hrs

Maximum Marks: 100

Internal: 20

External: 80

UNIVERSITY Of JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

1.	Course /Paper Title	:	Aquaria- Construction and Management
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External (Univ. Exam.)	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks	:	
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Univ. Exam.	:	3 Hrs.

OBJECTIVES

To stand with the spirits of vocalization, raising and maintenance of aquaria becomes important parameters. This course hence has been designed to make students self sufficient through acquisition of knowledge on different kinds of aquaria their construction and maintenance. The students will also be exposed, through contents of this course, about feeding, breeding of aquarium fishes.

SYLLABUS

UNIT I

1.1 CONSTRUCTION OF AQUARIUM

1.1.1 Types of Aquarium tanks

1.1. 2 Aerators

1.1. 3 Types of filters

1.1. 4 Temperature control in aquarium (Thermostat)

1.2 SETTING OF AQUARIUM

1.2.1 Fabrication, setting up and maintenance of Aquarium

1.2.2 Water filtration system of Aquarium

1.2.3 Aquarium plants (Natural and Artificial), types and their propagation methods of natural plants

1.2.4 Selection of fish (qualitative fitness of fish for aquarium)

1.2.5 Aquarium accessories and decoratives

UNIT II: FOOD AND FEEDING

2.1 Kinds of feed

2.2 Identification and collection of live food from nature

2.3 Culture of fish food organisms

- 2.3.1 (a) Rotifers
- (b) Copepods
- (c) Cladocerans

2.4 Formulation of artificial feed

2.5 Feeding methods

UNIT III: ORNAMENTAL FISHES

3.1 World trade of ornamental fish and export potential.

3.2 Marine aquarium fishes their habitat and collection from nature

3.3 Freshwater aquarium fishes

3.4 Local aquarium fishes

3.5 Secondary sexual characters of aquarium fishes

3.6 Breeding seasons and spawning habits of aquarium fishes

3.7 Parental care

UNIT IV: BREEDING TECHNIQUES AND REARING OF AQUARIUM FISHES

4.1 Captive Breeding and rearing of ornamental fishes.

- 4.1.1 (a) Broodstock management.
- (b) Fertilization and development of eggs
- (c) Induced breeding in aquarium fishes

UNIT V: MAINTENANCE OF AQUARIUM

5.1 Cleaning of Aquarium

5.2 Maintenance of water quality

5.3 Major disease of ornamental fishes and their control

- 5.3.1 (a) Bacterial
- (b) Fungal
- (c) Protozoan, crustacean diseases

5.4 Transportation of live fishes

5.5 Use of sedatives in transportation

5.6 Use of pigments for colour enhancement

Note for the paper setters:

Section .A: 10 very short answer question are to be set. The maximum length of answer shall be 50 words. All tie questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten long answer type questions, with two questions from each unit. Candidate will have to attempt 5 questions selecting one question from each Unit Each question will, carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Jhingran, V.G. (1985) Fish and Fisheries of India
2. Zaidi, S.G.S (2002) Ornamental fish culture
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. Pillay, T.V.R (1993) Aquaculture Principles and Practicies
6. Srivastava, C.B.L (2006) Atextbook of fishery science and Indian fisheries

B.Sc. Semester V

Course No. FI-501 (Practical)

Maximum Marks: 25

UNIVERSITY OF JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

1. Identification of common ornamental fishes and plants.
2. Fabrication of all-glass aquarium.
3. Setting-up and maintenance.
4. Aquarium accessories and equipments.
5. Conditioning and packing of ornamental fishes.
6. Formulation of fish feed.
7. Identification of ornamental fish diseases and prophylactic measures.
8. Collection and preservation of local aquarium fishes
9. Collection of live food from nature
10. Collection of aquatic weeds from nature

B.Sc. Semester VI

Course No. FI-601 (Theory)

Time Duration: 3 Hrs

Maximum Marks: 100

Internal: 20

External: 80

UNIVERSITY OF JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

B.Sc. Semester VI

There shall be one written paper of 100 marks and one practical paper of 50 marks. Theory paper shall be of three hours duration and the practical paper shall be of four hours duration. 20% of the marks shall be reserved for internal assessment in theory paper and 50 % in the practical paper. Theory paper will be set for 80 marks and the practical paper for 25 marks. In case of the regular students internal assessment received from the college will be added to the marks obtained by them in the university examination and in case of private candidates marks obtained by them in the University examination shall be increased proportionately in accordance with the statues / regulation.

1.	Course /Paper Title	:	Fish Preservation, Marketing and Extension
2.	Total Contact Hours	:	90 hrs.
3.	Maximum Marks	:	100
	i) External (Univ. Exam.)	:	80
	ii) Internal Assessment	:	20
4.	Minimum Pass Marks	:	
	i) External	:	29
	ii) Internal	:	07
5.	Duration of Univ. Exam.	:	3 Hrs.

OBJECTIVES

Main objective of the course is the make the student's knowledgeable about the traditional as well as advanced methods of preservation and processing (including value addition). Besides attempt has also been made to introduce the students the concept of fishery economics, marketing and extension.

SYLLABUS

UNIT I: FISH PRESERVATION

1.1 Principles and Types of fish preservation

1.2 Methods of fish preservation

1.2.1 Traditional methods of preservation

- (a) Sun drying
- (b) Salting
- (c) Curing
- (d) Pickling

1.2.2 Advanced methods of preservation

- (a) Smoking
- (b) Canning

(c) Chilling

1.3 Postmortem changes in fish (Rigor mortis)

1.4 Spoilage of fish and reasons for spoilage

UNIT II: FISH PRODUCTS AND VALUE ADDITION

2.1 Fish products and byproducts

2.1.1 Fish pickles and sauce, Surimi, Fish cutlets, Fish balls, Fish noodles, Fish soup powder, Fish sausage, and Fish protein concentrate

2.2 Pharmaceutical products prepared from seaweeds

2.3 Sanitation in processing plants

UNIT III: FISHERIES ECONOMICS

3.1 Introduction to economics

3.2 Micro economics- Demand and Supply

3.3 Law of diminishing marginal utility

3.4 National Economy

3.5 Inflation

UNIT IV: FISHERIES MARKETING MANAGEMENT

4.1 Introduction to marketing management;

4.2 Market definition, classification, and market competition

4.3 Fish Marketing channels and supply chain

4.4 World trade organization (WTO)

4.5 Fish development and modern marketing

4.6 Scenario of fishery cooperatives

UNIT V: FISHERIES EXTENSION

5.1 Meaning of fisheries extension, objectives and principles

5.2 Extension education process and role of fisheries institutes for fisheries extension in India

5.3 Extension teaching methods and learning

5.4 Earlier attempts for transfer of technologies in fisheries

5.5 Use of Modern technologies in fisheries extension

Note for the paper setters:

Section .A: 10 very short answer question are to be set. The maximum length of answer shall be 50 words. All tie questions are compulsory. Each question will carry 2 marks, total weightage being 20 marks

Section B: This section will comprise of ten long answer type questions, with two questions from each unit. Candidate will have to attempt 5 questions selecting one question from each Unit Each question will, carry 12 marks and the total weightage being 60 marks.

Books Recommended

1. Gopakumar, K (2002) A textbook of fish processing technology
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. Pillay, T.V.R (1993) Aquaculture Principles and Practicies
6. Srivastava, C.B.L (2006) Atextbook of fishery science and Indian fisheries

B.Sc. Semester VI

Course No. FI-601 (Practical)

Maximum Marks: 100

UNIVERSITY Of JAMMU

Syllabi and Course of Study in Industrial Fish and Fisheries for the Examination to be held in the Years 2015, 2016 and 2017.

1. Traditional method of fish preservation (Sun drying)
2. Advanced method of fish preservation (Smoking)
3. Preparation of fish products (Fish pickles, Fish sauce, Surimi, Fish cutlets, Fish balls, Fish noodles and Fish soup powder)
4. Postmortem changes in fish
5. Visit to KVKs to study the activities and extension approaches of the KVKs
6. Visit to the State Department of Fisheries
7. Collection of socio-economic data of the fishing village
8. Practical exercise on preparation of charts, posters and flash cards
9. Field study on participation of women in fisheries
10. Prepare a questionnaire for study of fish catch composition