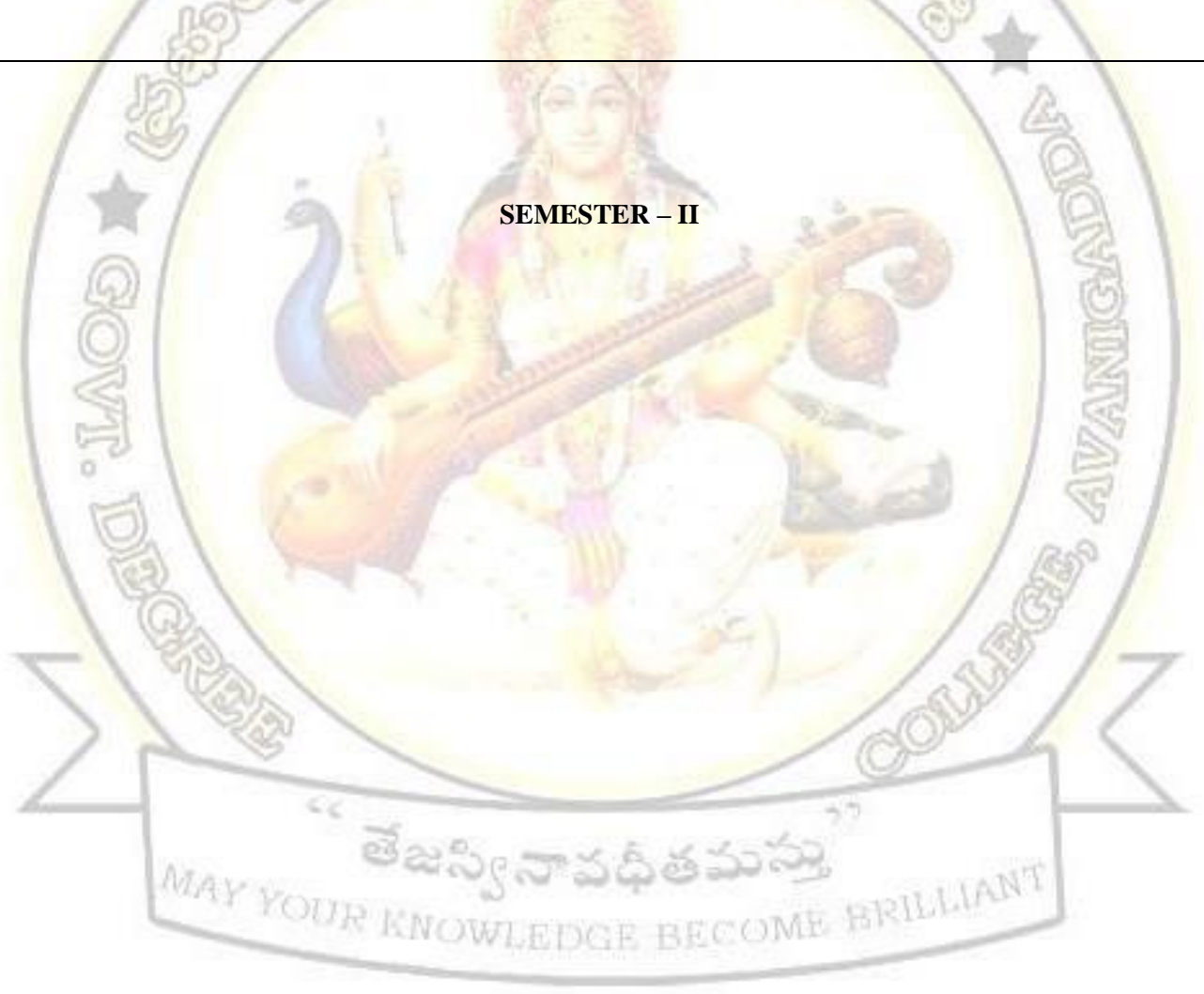


<b>SEMESTER-II</b>						
<b>GENERAL COMPONENTS</b>						
<b>No.</b>	<b>TITLE</b>	<b>Credits</b>	<b>Hours Week</b>	<b>Internal marks</b>	<b>External marks</b>	<b>Total</b>
<b>1</b>	<b>English (Communication &amp; soft skills)</b>	<b>3T</b>	<b>4T</b>	<b>25</b>	<b>75</b>	<b>100</b>
<b>2</b>	<b>LIFE SKILL- I</b>	<b>2T</b>	<b>2T</b>	<b>-</b>	<b>50</b>	<b>50</b>
	<b>SKILL DEVELOPMENT- I</b>	<b>2T</b>	<b>2T</b>	<b>-</b>	<b>50</b>	<b>50</b>
	<b>SKILL DEVELOPMENT- I</b>	<b>2T</b>	<b>2T</b>	<b>-</b>	<b>50</b>	<b>50</b>
<b>3</b>	<b>Chemistry</b>	<b>4T</b>	<b>4T</b>	<b>25</b>	<b>75</b>	<b>100</b>
	<b>Chemistry practical</b>	<b>1P</b>	<b>2P</b>	<b>25</b>	<b>25</b>	<b>50</b>
<b>4</b>	<b>Zoology</b>	<b>4T</b>	<b>4T</b>	<b>25</b>	<b>75</b>	<b>100</b>
	<b>Zoology practical</b>	<b>1P</b>	<b>2P</b>	<b>25</b>	<b>25</b>	<b>50</b>
<b>5</b>	<b>Capture Fishery</b>	<b>3T</b>	<b>4T</b>	<b>40</b>	<b>60</b>	<b>100</b>
	<b>Aqua practical</b>	<b>1P</b>	<b>2P</b>	<b>25</b>	<b>25</b>	<b>50</b>
<b>6</b>	<b>Fish Nutrition and Feed Technology</b>	<b>3T</b>	<b>4T</b>	<b>40</b>	<b>60</b>	<b>100</b>
	<b>Aqua practical</b>	<b>1P</b>	<b>2P</b>	<b>25</b>	<b>25</b>	<b>50</b>
<b>7</b>	<b>Fish Health Management</b>	<b>3T</b>	<b>4T</b>	<b>40</b>	<b>60</b>	<b>100</b>
	<b>Aqua practical:</b>	<b>1P</b>	<b>2P</b>	<b>25</b>	<b>25</b>	<b>50</b>
	<b>GRAND TOTAL</b>	<b>31</b>		<b>TOTAL</b>		<b>1000</b>

SEMESTER – II



**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**

**B.Voc.(Aquaculture)**

**SEMESTER – II**

**PAPER IV**

**CAPTURE FISHERY**

**HOURS : 60**

**Max.Marks: 75**

**Learning Objectives:**

To understand different riverine systems, their problems and Management present Improvement of fish stocks in these riverine systems.

To understand about the different types of Reservoir fisheries in India with special reference to status of Reservoir fisheries in Andhra Pradesh.

To understand about Estuarine fisheries, their origin and classification present in India with special reference to Andhra Pradesh

To understand the taxonomy, food, feeding habits, reproduction, craft and gears used in the fishery of Indian Oil Sardine, Mackerel, Ribbon fishes, Seer fishes and utilization

To understand the taxonomy, food, feeding habits, reproduction, craft and gears used in the fishery of Elasmobranchs, Bombay duck, Pomfrets, Prawns, Crabs, Molluscs and their population dynamics.

**Unit – 1**

Different riverine systems in India and their fishery – The Ganga river system, the East Coast river system, the West coast river system. Problems and management of riverine fisheries – problems, construction of dams, river pollution. Management – regulation of populations and exploitation. Improvement of fish stocks

**Unit – II**

Reservoir Fisheries – Types of Reservoirs Major, Medium and Minor. Different reservoirs of river systems in India with special reference to Govindsagar, Rihand and Nagarjunasagar. Transition from riverine to lacustrine ecology – Initial fertility, trophic depression, final fertility. Development and Management. Status of Reservoir Fisheries in Andhra Pradesh.

**Unit – III**

Estuarine fisheries – Definition of an estuary. Origin and classification. Different estuaries in India with special reference to Andhra Pradesh – their location and species composition with reference to Hooghly-Matlah estuary, Godavari estuary (Korangi), Krishna estuary, Penna estuary, Mahanadi estuary Chilka lake, Pulicat lake and Kerala backwaters

**Unit – IV**

Fishery of India: Oil Sardine, Mackerel, Ribbon fishes, Seer fishes – Taxonomy, General description, Food and feeding habits, reproduction, craft and gear, general trends in fishery and its utilization.

## Unit – V

### Fishery of India:

Fishery of Elasmobranchs, Bombay Duck, Pomfrets, Prawns, Crabs and Molluscs – Taxonomy, General description, Food and feeding habits, reproduction, craft and gear, general trends in fishery and its utilization. Overfishing. MSY, MEY, OSY.

### Reference Books :-

Bal, D.V. and Rao, V.K. 1990. *Marine Fisheries of India*. Tata Magraw Hill, New Delhi.

Jhingran, V.G. 1991. *Fish and Fisheries of India*. Hindustan Publishing Corporation, New Delhi.

Dixitulu, J.V.H. (Ed.) 1994. *Hand Book on Fisheries*. Global Fishing Chimes Pvt. Ltd., Visakhapatnam.

Iversen, E.S. 1996. *Living Marine Resources*. John Wiley & Sons, Inc., New York

Khan, I. 1999. *Marine Fishery Resources*. Rajat Publications, New Delhi.

Ayyappan, S., 2011. *Handbook of Fisheries and Aquaculture*, ICAR Publications, New Delhi.

Sugunan, V.V., 1995. *Reservoir fisheries of India*. FAO Fisheries Technical Paper. No. 345. Rome, FAO. 1995. 423 p.

Ahilan, B., 2013. *Text Book on Fresh water Aquaculture*, Daya publishing house.

Jayaram, K.C. 1999. *The Freshwater Fishes of the Indian Region*. Narendra Publication, New Delhi.

Silas, E.G. 1992. *Fresh Water Prawns*. Kerala Agricultural Univ., Kochi

Jhingram, V.G. *Fish and Fisheries of India*. Second edition 1983, Hindustan

Pub.Co. Picker, W.E. *Methods for assessment of Fish Production in Fresh Waters*. Blackwell Scient. Publ. 1970

Srivastava, U.K. et.al. *Freshwater aquaculture in India*, Oxford and IBH Publ. Co. New Delhi 1980.

C.B.L. Srivastava – *A text book of Fishery Science and Indian Fisheries*. KitabMahal Agencies, Patna.

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MAY YOUR KNOWLEDGE BECOME BRILLIANT

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER –II**  
**PAPER – IV**  
**CAPTURE FISHERY**

**Theory- Internal**

**Total Marks: 25**

- |                             |              |
|-----------------------------|--------------|
| 1 Internals (2) Best of Two | : 10 marks   |
| 2. Assignments (5)          | : 5x1=5marks |
| 3. Seminar                  | : 5 marks    |
| 4. Attendance               | :5 marks     |

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER –II**  
**PAPER – IV**  
**CAPTURE FISHERY**

**Time: 3 Hours**

**Total Marks: 75**

**Theory- External**

**Section –A**

- I. Short Answer questions 1 to 8 (Any 5 from given 10) **5x5=25**
- Section –B**
- II. Essay Questions 9 to 13 (With internal choice) **5x10=50**

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**Question Paper Blue Print**  
**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER –II**  
**PAPER – IV**  
**CAPTURE FISHERY**

	Section A (Short Questions)			Section B (Essay Questions)		
	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS
<b>UNIT -I</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-II</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-III</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-IV</b>	<b>01</b>	<b>5</b>	<b>5</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-V</b>	<b>01</b>	<b>5</b>	<b>5</b>	<b>02</b>	<b>10</b>	<b>20</b>

**BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS**

**Section-A**

**5 x 5 = 25**

**I Questions numbers 1 to 8, Out of 10 Questions 5 has to be answered.**

**Section-B**

**5 x 10 = 50**

**II Questions numbers 9 to 13, Internal Choice (either / or) and 5 Questions has to be answered.**

**Total**

**: 75 Marks**

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER –II**  
**PAPER – IV**  
**CAPTURE FISHERY**  
**THEORY MODEL PAPER**

**Time:3hrs**

**Max.Marks:75**

**Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x5=25**

1. The Ganaga river system
2. River Pollution
3. Check tray
4. Nagarjunasagar reservoir.
5. Types of resrvoirs
6. Chilaka lake
7. Godavari esturay
8. Seer fishes

**Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x10=50**

9. a. Describe different riverine systems and their fihery  
(or)  
b. Explain problems and management of riverine fishery
10. a. Explain about major Reservoirs  
(or)  
b. Describe status of Reservoir fisheries in Andhra Pradesh .
- 11 a. Define Estuarine and describe briefly different estuarines in india .  
(or)  
b. Describe briefly different estuaries in Andhra Pradesh
12. a. Describe about Indian oil sardine and Mackerels and their taxonomy.  
(or)  
c. Explain about general trend of seer fishes and ribbon fishes
13. a. Explain General description and taxonomy of Elasmobranchs and bombayduck  
(or)  
b. Describe food and feeding habits of pomfrets, prawns.

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc AQUACULTURE**  
**PRACTICAL SYLLABUS FOR SEMESTER-II**  
**CAPTURE FISHERY**

Periods: 24

Max. Marks: 50

.....  
**PRACTICAL SYLLABUS**

1. Identification of Freshwater fishes based on colour, Pigmentation, morphometric and meristic characters and other characters relevant to the group.
2. Identification of fry and fingerlings of Indian Major Carps.
3. Identification of Marine and Estuarine water fishes based on colour, Pigmentation, 4. morphometric and meristic characters and other characters relevant to the group.
5. Examination of Commercially Important Freshwater fishes and prawns, from the point of view of ecology and fishery.
6. Examination of Commercially Important Marine and Estuarine fishes and prawns, from the point of view of ecology and fishery.
7. Knowledge of common types of Freshwater craft and gear on models provided in the department.
8. Knowledge of common types of Marine and Estuarine craft and gear on models provided in the department





**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc. Aquaculture**  
**SEMESTER – I**  
**PAPER – IV**

**Practical's – External:**

**Time: 3 hrs.**

**Total Marks: 25**

- |                                   |                     |
|-----------------------------------|---------------------|
| 1. Identification of given sample | : 6 marks           |
| 2. Identification of given sample | : 6 marks           |
| 3. Identification (2)             | : 5 marks (2x2 1/2) |
| 4. Record                         | : 5 marks           |
| 5. Viva voce                      | : 3 marks           |

**Practical's – Internal :**

**Total Marks: 25**

- |                                   |           |
|-----------------------------------|-----------|
| 1. Assessment including viva voce | : 6 marks |
| 2. Record                         | : 6 marks |
| 3. Field note book                | : 5 marks |
| 4. Project                        | : 8 marks |

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER –II**  
**PAPER – IV**  
**CAPTURE FISHERY**

**Time : 2hrs**

**Max.Marks:25**

**PRACTICAL MODEL PAPER**

-----  
**Identification of fish based on colour, Pigmentation, morphometric and meristic characters.**

**10marks**

**Identify the following spotters (5x2)**

**10 marks**

**Record**

**05 marks**

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**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture Technology**  
**SEMESTER –II**  
**PAPER – V**  
**FISH NUTRITION & FEED TECHNOLOGY**

**HOURS : 60**

**Max.Marks: 75**

**Learning Objectives:**

- 1 To understand the different type feeds and feeding methods in fin and shell fish.**
- 2 To improve the knowledge in feed preparation and feed storage.**
- 3 To gain knowledge feed manufacture and storage.**
- 4 To understand the feed additives & non-nutrient ingredients in aquaculture.**
- 5 To know the different nutritional deficiency in cultivable fish and their prevention methods.**
- 6 To improve the technical knowledge feed quality and nutritional value analysis.**

**UNIT-I: NUTRITIONAL REQUIREMENTS OF CULTIVABLE FISH**

- 1-1 Requirements for energy, proteins, carbohydrates, lipids, fiber, micronutrients for different stages of cultivable fish and prawns**
- 1-2 Essential aminoacids and fatty acids, protein to energy ratio, nutrient interactions and protein sparing effect**
- 1-3 Dietary sources of energy, effect of ration on growth, determination of feeding rate, check tray**
- 1-4 Factors affecting energy partitioning and feeding**

**UNIT-II: FORMS OF FEEDS & FEEDING METHODS**

- 2-1 Fed conversion efficiency, feed conversion ratio and protein efficiency ratio**
- 2-2 Wet feeds, moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets, advantages of pelletization**
- 2-3 Manual feeding, demand feeders, automatic feeders, surface spraying, bag feeding & tray feeding**
- 2-4 Frequency of feeding**

**UNIT-III: FEED MANUFACTURE & STORAGE**

- 3-1. Feed ingredients and their selection, nutrient composition and nutrient availability of feed ingredients**
- 3-2. Feed formulation – extrusion processing and steam pelleting, grinding, mixing and drying, pelletization, and packing**
- 3-3. Water stability of feeds, farm made aqua feeds, micro-coated feeds, micro-encapsulated feeds and micro-bound diets**

**UNIT-IV: FEED ADDITIVES & NON-NUTRIENT INGREDIENTS**

- 4-1. Binders, anti-oxidants, probiotics**
- 4-2. Feed attractants and feed stimulants**
- 4-3. Enzymes, hormones, growth promoters and pigments**

**UNIT-V: NUTRITIONAL DEFICIENCY IN CULTIVABLE FISH**

- 5-1 Protein deficiency, vitamin and mineral deficiency symptoms**
- 5-2 Nutritional pathology and anti-nutrients**
- 5-3 Importance of natural and supplementary feeds, balanced diet**

**Reference Books:**

1. HALVER JE 1989. Fish nutrition. Academic press, San diego
2. Lovell rt 1998. Nutrition and feeding of fishes, Chapmann& Hall, NewYork
3. Sena de silva, trevor a anderson 1995. Fish nutrition in aquaculture. Chapmann&Hall,
4. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology and Management.
5. Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation,New Delhi

**GOVERNMENT DEGERRE COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture Technology**  
**SEMESTER –II**  
**PAPER – V**  
**FISH NUTRITION & FEED TECHNOLOGY**

	Section A (Short Questions)			Section B (Essay Questions)		
	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS
<b>UNIT -I</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-II</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-III</b>	<b>02</b>	<b>5</b>	<b>10</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-IV</b>	<b>01</b>	<b>5</b>	<b>5</b>	<b>02</b>	<b>10</b>	<b>20</b>
<b>UNIT-V</b>	<b>01</b>	<b>5</b>	<b>5</b>	<b>02</b>	<b>10</b>	<b>20</b>

**BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS**

**Section-A** **5 x 5 = 25**

**I Questions numbers 1 to 8, Out of 10 Questions 5 has to be answered.**

**Section-B** **5 x 10 = 50**

**II Questions numbers 9 to 13, Internal Choice (either / or) and 5 Questions has to be answered.**

**Total : 75 Mar**

**GOVERNMENT DEGERRE COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture Technology**  
**SEMESTER – II**  
**PAPER – V**  
**FISH NUTRITION & FEED TECHNOLOGY**

Time :3hrs

Max.Marks:75

**THEORY MODEL PAPER**

**I. Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x5=25**

- 1.Lipids
- 2.Check tray
- 3.Feed conversion efficiency
- 4.Bag feeding
- 5.Extrusion processing
- 6.Micro-coated feeds
- 7.Anti-oxidants
- 8.Aflatoxins

**II. Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x10=50**

- 9a. Explain essential amino acids required for cultivable fish  
(or)
- b. Describe various carbohydrates and micronutrients for different stages of cultivable fish
- 10a. Explain various feeds  
(or)
- b. Describe different feeding methods.
- 11 a. Explain nutrient composition and nutrient availability of feed ingredients..  
(or)
- b. Describe feed storage methods
12. a. Explain Probiotics role in fishes  
(or)
- d. Describe Enzymes and growth promoters
13. a. Explain Protein and Vitamin deficiency symptoms.  
(or)
- b. Describe natural and supplementary feed importance.

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**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc AQUACULTURE**  
**PRACTICAL SYLLABUS FOR SEMESTER-II**  
**FISH NUTRITION & FEED TECHNOLOGY**

Periods: 24

Max. Marks: 50

**PRACTICALS: SYLLABUS**

1. Estimation of protein content in aquaculture feeds
2. Estimation of carbohydrate content in aquaculture feeds
3. Estimation of lipid content in aquaculture feeds
4. Estimation of ash in aquaculture feed
5. Study of water stability of pellet feeds
6. Feed formulation and preparation in the lab
7. Study of binders used in aquaculture feeds
8. Study of feed packing materials
9. Study of physical and chemical change during storage
10. Study on physical characteristics of floating and sinking feeds
11. Visit to a aqua-feed production unit
12. Visit to a farm for studying feeding practices



**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc. Aquaculture**  
**SEMESTER – II**

**Practical's – External:**

**Time: 3 hrs.**

**Total Marks: 25**

- |                                   |                     |
|-----------------------------------|---------------------|
| 1. Identification of given sample | : 6 marks           |
| 2. Identification of given sample | : 6 marks           |
| 3. Identification (2)             | : 5 marks (2x2 1/2) |
| 4. Record                         | : 5 marks           |
| 5. Viva voce                      | : 3 marks           |

**Practical's – Internal :**

**Total Marks: 25**

- |                                   |           |
|-----------------------------------|-----------|
| 1. Assessment including viva voce | : 6 marks |
| 2. Record                         | : 6 marks |
| 3. Field note book                | : 5 marks |
| 4. Project                        | : 8 marks |

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc. Aquaculture Technology**  
**SEMESTER – II**  
**PAPER – V**  
**FISH NUTRITION & FEED TECHNOLOGY**

**Time : 2hrs**

**Max.Marks:25**

**PRACTICAL MODEL PAPER**

- |   |          |
|---|----------|
| I. Estimate Protein content in aquaculture feeds. Write procedure | 10marks  |
| II. Estimate the Ash content in aquaculture feed. Write procedure | 10marks  |
| III. Record   | 05 marks |

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**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**

**I B.Voc Aquaculture**

**SEMESTER – II**

**PAPER – VI**

**FISH HEALTH MANGEMENT**

**Learning Objectives:**

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1. To understand the definition of disease and to know the changes that occur at cellular level caused by it.
  2. To gain knowledge about the disease causing microbial organism in fin fishes, how to prevent its infection and the treatment to be followed for that disease.
  3. To gain knowledge about the disease causing microbial organism in shell fishes, how to prevent its infection and the treatment to be followed for that disease.
  4. To understand about the diseases that are caused due to nutritional deficiency
  5. To understand about the diagnosis tools that are followed in field of aquaculture and understand the importance of good feed management for health of the organism.
- 

**UNIT I: PATHOLOGY AND PARASITOLOGY**

- 1-1 Introduction to fish diseases –Definition and categories of diseases – Disease and environment
- 1-2 Disturbance in cell structure – changes in cell metabolism, progressive and retrogressive tissue changes, types of degeneration, infiltration, necrosis, cell death andcauses
- 1-3 Atrophy, hypertrophy, neoplasms, inflammation, healing andrepair

**UNIT II: DISEASES OF FIN FISH**

- 2-1 Fungal diseases (both of shell and finfish) – Saprolegniosis, brachiomycosis, ichthyophorus diseases – Lagenidium diseases – Fusarium disease, prevention and therapy
- 2-2 Viral diseases – Emerging viral diseases in fish, haemorrhagicsepticemia, spring viremia of carps, infectious hematopoietic necrosis in trout, infectious pancreatic necrosis in salmonids, swim-bladder inflammation in cyprinids, channel cat fish viral disease, prevention andtherapy
- 2-3 Baterial diseases – Emerging bacterial diseases, aeromonas, pseudomonas and vibrio infections, columnaris, furunculosis, epizootic ulcerative syndrome,infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease.

**UNIT III: DISEASES OF SHELL FISH**

- 3-1 Major shrimp viral diseases – Baculoviruspenaeii, MonodonBaculovirus, Baculoviralmidgut necrosis, Infectious hypodermal and haematopoieticnecrosis virus, Hepatopancreaticparvo like virus, Yellow head baculovirus, white spot baculovirus.
- 3-2 Bacterial diseases of shell fish – aeromonas, pseudomonas and vibrio infections, luminous bacterial disease, filamentous bacterial disease. Prevention andtherapy
- 3-3 Protozoan diseases- Ichthyophthiriasis, Costiasis, whirling diseases,

**trypanosomiasis. Prevention and therapy**

#### **UNIT IV: NUTRITIONAL DISEASES**

**4-1 Nutritional pathology – lipid liver degeneration, Vitamin and mineral deficiency diseases. Aflatoxin and dinoflagellates.**

**4-2 Antibiotic and chemotherapeutics. Nutritional cataract. Genetically and environmentally induced diseases.**

#### **UNIT V: FISH HEALTH MANAGEMENT**

**5-1 Diagnostic tools – immune detection- DNA/RNA techniques, General preventive methods and prophylaxis. Application and development of vaccines.**

**5-2 Quarantine – Significance, methods and regulations for transplants.**

**5-3 Production of disease-free seeds. Evaluation criteria of healthy seeds.**

**5-4 Good Feed management for healthy organisms, Zero water exchange, Probiotics in health management, Issues of biosecurity.**

#### **Reference Books:**

- 1. Shaperclaus W. 1991 Fish Diseases- Vol.I& II. Oxonian Press Pvt.ltd**
- 2. Roberts RJ 1989. Fish pathology. Bailliere Tindall, New York**
- 3. Lydia Brown 1993. Aquaculture for veterinarians- fish husbandry and medicine. Pergamon Press. Oxford**
- 4. Shankar KM & Mohan CV. 2002. Fish and Shellfish Health Management. UNESCO Publ. Sindermann CJ.1990**
- 5. Walker P & Subasinghe RP. (Eds.). 2005 Principal Diseases of Marine Fish and Shellfish. Vols. I, II. 2nd Ed. Academic Press**
- 6. Wedmeyer G, Meyer FP & Smith L. 1999. DNA Based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases. FAO Publ.**
- 7. Bullock G et.al., 1972 Bacterial diseases of fishes. TFH publications, New Jersey**
- 8. Post G 1987. Text book of Fish Health. TFH publications, New Jersey**
- 9. Johnson SK 1995. Handbook of shrimp diseases. Texas A & M University, Texas**

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**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER – II**  
**PAPER – VI**  
**FISH HEALTH MANAGEMENT**

	Section A (Short Questions)			Section B (Essay Questions)		
	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTTED FOR EACH QUESTION	TOTAL MARKS
UNIT –I	02	5	10	02	10	20
UNIT-II	02	5	10	02	10	20
UNIT-III	02	5	10	02	10	20
UNIT-IV	01	5	5	02	10	20
UNIT-V	01	5	5	02	10	20

**BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS**

**Section-A**

**5 x 5 = 25**

**I Questions numbers 1 to 18, Out of 10 Questions 5 has to be answered.**

**Section-B**

**5 x 10 = 50**

**II Questions numbers 9 to 13, Internal Choice (either / or) and 5 Questions has to be answered.**

**Total**

**: 75 Marks**

**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc Aquaculture**  
**SEMESTER – II**  
**PAPER – VI**  
**FISH HEALTH MANAGEMENT**

Time :3hrs

Max.Marks:75

**THEORY MODEL PAPER**

**I. Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x5=25**

1. Necrosis
2. Inflammation
3. Aeromonas in Fin fish
4. Fusarium in Fin fish
5. Costiasis in shell fish
6. Yellow head baculovirus in shell fish
7. Aflatoxin
8. Zero water exchange

**II. Answer any FIVE of the following**

**Draw labeled diagram wherever necessary**

**5x10=50**

9. a. Explain progressive and retrogressive tissue changes in fish.  
(or)  
b. Describe cell death and causes in fish

10. a. Explain any three fungal diseases in fin fish with preventive and therapeutic measures.  
(or)

b. Describe spring viremia of carps and infectious pancreatic necrosis in Salmonids.

11. a. Explain any three viral diseases in shell fish.

(or)

b. Explain preventive and therapeutic measures of protozoan diseases in shell fish.

12. a. Describe vitamin deficiency diseases in Fin fish.

(or)

b. Explain genetically induced diseases in Fin fish

13. a. Describe immune detection techniques used in shell fish

(or)

b. Write an account on Probiotics in health management of shell fish.

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**GOVERNMENT DEGERR COLLEGE ,AVANIGADDA**  
**I B.Voc AQUACULTURE**  
**PRACTICAL SYLLABUS FOR SEMESTER-II**  
**FISH HEALTH MANGEMENT**

Periods: 24

Max. Marks: 50

**PRACTICALS: SYLLABUS**

1. Enumeration of Bacteria by TPC Method
2. Enumeration of total Coliforms
3. Observation of gross pathology and external lesions of fish and prawn with reference to the common diseases in aquaculture
4. Examination of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves of fish
5. Examination of pathological changes in gut lumen, hepatopancreas, lymphoid organ, muscles and nerves of prawn and shrimp
6. Collection, processing and analysis of data for epidemiological investigations of viral diseases
7. Bacterial pathogens – isolation, culture and characterization
8. Identification of parasites in fishes: Protozoan, Helminths, Crustaceans
9. Antibigrams – preparation and evaluation
10. Molecular and immunological techniques; Biochemical tests; PCR; ELISA; Agglutination test; Challenge tests; Purification of virus for development of vaccines (Demonstration at institutes/labs)
11. Estimation of dose, calculation of concentration, methods of administration of various chemotherapeutics to fish and shellfish
12. Estimation of antibiotics used in aquaculture practices
13. Estimation of probiotics used in aquaculture
14. Field visit to farm for health monitoring and disease diagnosis

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA

**Practical's – External:**

Time: 3 hrs.

Total Marks: 25

- |                                   |                     |
|-----------------------------------|---------------------|
| 1. Identification of given sample | : 6 marks           |
| 2. Identification of given sample | : 6 marks           |
| 3. Identification (2)             | : 5 marks (2x2 1/2) |
| 4. Record                         | : 5 marks           |
| 5. Viva voce                      | : 3 marks           |

**Practical's – Internal :**

Total Marks: 25

- |                                   |           |           |           |
|-----------------------------------|-----------|-----------|-----------|
| 1. Assessment including viva voce | : 6 marks | 2. Record | : 6 marks |
| 3. Field note book                | : 5 marks |           |           |
| 4. Project                        | : 8 marks |           |           |

GOVERNMENT DEGERR COLLEGE ,AVANIGADDA  
B.Voc.

PAPER – V

Time: 2hrs

Max. Marks: 25

**PRACTICAL MODEL PAPER**

- |  |          |
|--|----------|
| I. Enumeration of Bacteria by TPC Method , write procedure | 10 marks |
| II. Identification of pathological diseases (5x5)          | 10 marks |
| Record   | 05 marks |

MAY YOUR KNOWLEDGE BECOME BRILLIANT

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Lecturer in Aquaculture  
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