

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE: VIJAYAWADA

(An autonomous college in the jurisdiction of Krishna University)

SEMESTER- V

PAPER- VI

Title of the paper: SUSTAINABLE AQUACULTURE MANAGEMENT

(No of Hours: 45

Credits: 03

Wef: 2022-2023

Course Code: ZOOSE T01

COURSE OUTCOMES:

Students at the successful completion of the course will be able to:

CO 1	Evaluate the present status of aquaculture at the Global level and National level
CO 2	Classify different types of ponds used in aquaculture
CO 3	Demonstrate induced breeding of carps
CO 4	Acquire critical knowledge on commercial importance of shrimps
CO 5	Identify fin and shell fish diseases

SYLLABUS

UNIT-I 10 hours

- 1.1. Present status of Aquaculture – Global and National scenario. **1 hour**
- 1.2. Major cultivable species for aquaculture: freshwater, brackish water and marine **3 hours**
- 1.3. Criteria for selection of species for culture. **2 hours**
- 1.4. Culture practices and culture systems Traditional, extensive, modified extensive, semi-intensive and intensive, ponds, race ways, cages and pens. **4 hours**

UNIT-II 8 hours

- 2.1 Functional classification of ponds – nursery, rearing, stocking and quarantine ponds. **4 hours**
- 2.2 Physio-chemical conditions of soil and water optimal for culture (Temperature, depth, turbidity, PH, BOD, CO₂, N,P,K and C:N ratio) **4 hours**

UNIT-III 9 hours

3.1. Induced breeding in carps (*Catla* and *Labeo*) and shrimp (*Peneaus vannamei* and *P.monodon*).

4 hours

3.2. Culture of Indian major carps – Pre Stocking management. **3 hours**

3.3. Culture of Indian major carps - post-stocking management **2 hours**

UNIT-IV 7 hours

4.1 Commercial importance of shrimp & prawn. **1 hour**

4.2 *Macrobrachium rosenbergii*- biology, seed production. **2 hours**

4.3 Culture of *P. vannamei* – hatchery technology and culture practices. **3 hours**

4.4 Mixed culture of fish and prawns **1 hour**

UNIT-V 11 hours

5.1 Viral diseases of Fin Fish & shell fish. **3 hours**

5.2 Fungal diseases of Fin & Shell fish. **2 hours**

5.3 Bacterial diseases of Finfish & Shell fish **3 hours**

5.4. Protozoan and metazoan diseases of fin fish and shell fish. **3 hours**

REFERENCES:

1. S. Armugam, A text book Aquaculture: ISBN: 978-93-82459-99-6.
2. Kumar D. 1996. *Aquaculture Extension Services Review: India*. FAO Fisheries Circular No.906, Rome.
3. Lavens P & Sorgeloos P. 1996. *Manual on the Production and Use of Live Food for Aquaculture*. FAO Fisheries Tech. Paper 361, FAO.

WEB RESOURCES:

<https://www.youtube.com/watch?v=rv8fzewn2gu>

<https://www.youtube.com/watch?v=w9oy1loucvw>

CO –CURRICULAR ACTIVITIES:

1. Preparation of Model/Charts of Cultivable species of fin fish shell fish
2. Preparation of Model/Chart of Ideal fish Pond- with the standards prescribed.

3. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village)
4. Preparation of Model – charts of Fin /Shell fish Diseases with eco-friendly material.
5. Assignments, Group discussion, Seminar, Quiz, Collection of Material, Video preparation etc., Invited lecture

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V SEMESTER END EXAMINATIONS

III B.SC., ZOOLOGY PAPER – VI

SUSTAINABLE AQUACULTURE MANAGEMENT

MODEL PAPER

Time: 3 Hours

Max. Marks: 75

SECTION –A

Answer any **FIVE** of the following

5x5=25 Marks

Draw neat labeled diagrams wherever necessary.

1. Explain Semi-intensive culture. CO1, L2.
2. Describe Major cultivable species for aquaculture. CO1, L1.
3. Give a short note on Pond preparation. CO2, L2.
4. Illustrate Post stocking management. CO2, L4.
5. Explain Seed production. CO3, L2.
6. Describe Culture practices. CO4, L1.
7. Give a short note on viral diseases of Fin Fish. CO4, L2.
8. Describe Bacterial diseases of shell fish. CO5, L1.

SECTION – B

Answer the following

5X10=50 Marks

Draw neat labeled diagrams wherever necessary.

- 9 (a). Give a detailed on cultivable fishes of brackish water. CO1, L2

Or

- (b) Describe the Processes extensive and intensive cultures. CO1, L1

- 10 (a). Explain the Functional classification of ponds. CO2, L2

Or

- (b). Illustrate pond preparation. CO2, L4

11 (a). Explain Induced breeding in carps. CO3, L2

Or

(b). Describe post stocking management of Indian major carps.CO3, L1

12 (a). Give a detailed note on Commercial importance of prawn. CO4.L2

Or

(b). describe the process of Hatchery technology. CO4, L1

13 (a). Explain fungal diseases of shell fish. CO5, L2

Or

(b). Illustrate protozoan diseases of fin fish. CO5, L4

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PRACTICAL- V (At the end of V Semester)

Title: **SUSTAINABLE AQUACULTURE MANAGEMENT**

No of Hours: 45

Credits: 02

WEF: 2022-2023

Course Code: ZOOSE P01

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1. Identify the characters of Fresh water cultivable species
2. Estimate physio chemical characteristics of water used for aquaculture
3. Examine the diseases of fin and shell fish
4. Suggest measures to prevent diseases in aquaculture
- 5.

Practical Syllabus:

1. Fresh water Cultivable species any (Fin & Shell Fish Specimens – Observation of morphological characters by observation and drawings)-5
2. Brackish water cultivable species (Fin & Shell fish- Specimens- Observation of Morphological Character by observing drawing) -5
3. Hands on training on the use of kits for determination of water quality in aquaculture (DO, Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/ Standard procedure can be demonstrated for the same)
4. Demonstration of Hypophysation(Procedure of hypophysation to be demonstrated in the practical lab with any edible fish as model)
5. Viral diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of viral pathogens in fin/ shell fish – one edible specimen can be used for observation of same in the laboratory)
6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)
7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/ Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory)

References

Websites of Interest

1. http://www.fao.org/fishery/docs/CDrom/FAO_Training/FAO_Training/General/x6708e/x6708e06.htm
2. http://aquaticcommons.org/1666/1/Better-Practice3_opt.pdf
3. <https://www.notesonzoology.com/india/fishery/fish-diseases-symptoms-and-control-fishery/871>

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V SEMESTER PRACTICAL END EXAMINATIONS

SUSTAINABLE AQUACULTURE MANAGEMENT

SEE MODEL PAPER

Time: 3hrs.

Max. Marks 40M

- | | |
|----|-----|
| 1. | 10M |
| 2. | 10M |
| 3. | 10M |
| 4. | 05M |
| 5. | 05M |

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SEMESTER- V

PAPER- VII

Title of the paper: POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

No of Hours: 45

Credits: 03

Wef: 2022-2023

Course Code: ZOOSE T02

COURSE OUTCOMES:

Students at the successful completion of the course will be able to:

CO 1	Identify the types of preservation methods employed in aquaculture
CO 2	Choose the suitable processing methods in aquaculture
CO 3	Maintain the standard quality control protocols laid down in aqua industry
CO 4	Identify the best Seafood quality assurance system

SYLLABUS

UNIT – I 10 hours

1.0. Handling and Principles of fish Preservation

1.1. Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), microbial spoilage in fish and their prevention, process value calculation
5 hours

1.2. Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives and exposure to low radiation of gamma rays
5 hours

UNIT – II 10 hours

2.0. Methods of fish Preservation

2.1. Traditional methods - sun drying, salt curing, pickling and smoking. **4 hours**

2.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD). **6 hours**

UNIT – III 10 hours

3.0. Processing and preservation of fish and their by-products

3.1. Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure. **7 hours**

3.2. Fish by-products – fish glue, isinglass, chitosan. **3 hours**

UNIT – IV 6 hours

4.0. Sanitation and Quality control

4.1. Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants. **3 hours**

4.2. Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing. **3 hours**

UNIT – V 9 hours

5.0. Quality Assurance, Management and Certification

5.1. Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety traceability. **6 hours**

5.2. National and International standards – ISO 9000: 2000 Series of Quality Assurance System, Codex Alimentarius, detection of antibiotics and heavy metals in fishery

products.

3 hours

REFERENCES:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, NewDelhi.
2. Lakshmi Prasad's, Fish Processing Technology 2012, Arjun Publishing House
3. Dr Sunitha Rai, Fish Processing Technology, 2015, Random Publications

WEB RESOURCES:

1. <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743>
2. https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=03

CO –CURRICULAR ACTIVITIES:

1. Observation of fish/shrimp processing plants – visit web sites of processing companies and record the details of that Unit
2. Interaction with local fishermen to know the method of preservation and details with the available traditional technology
3. Collection of web resources on the Quality assurance, quality control measures in Aqua Industries- cross checking the standards during the visit to any processing units.
4. Assignments, Seminar, Group discussion. Quiz, Collection of Material, Invited lecture, Video preparation etc.,

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V SEMESTER END EXAMINATIONS

III B.SC., ZOOLOGY PAPER – VII

POST HARVEST TECHNOLOGY OF FISH AND FISHERIES

MODEL PAPER

Time: 3 Hours

Max. Marks: 75

SECTION –A

Answer any **FIVE** of the following

5x5=25 Marks

Draw neat labeled diagrams wherever necessary.

1. Explain Rigor Mortis. CO1, L2.
2. Describe lowering of temperature. CO1, L1.
3. Give a short note on pickling and smoking. CO2, L2.
4. Illustrate Accelerated freeze drying. CO2, L4.
5. Explain any two fish byproducts. CO3, L2.
6. Describe personal hygiene in processing plant. CO3, L1.
7. Give a short note on pre-processing control. CO4, L2.
8. Describe HACCP. CO5, L1.

SECTION – B

Answer the following

5X10=50 Marks

Draw neat labeled diagrams wherever necessary.

9. (a). Give a detailed account on handling of fresh fish and storage fish. CO1, L2

Or

- (b) Describe the processes principles of preservation. CO1, L1

10. (a). Explain Traditional methods of fish drying. CO2, L2

Or

(b). Illustrate advanced methods of fish drying. CO2, L4

11. (a). Explain any four fish products. CO3, L2

Or

(b). Describe any four fish by products. CO3, L1

12. (a). Give a detailed note on sanitation in processing plant. CO4.L2

Or

(b). Describe the process of quality control in processing plants. CO4, L1

13. (a). Explain GMP's and GLP's. CO5, L2

Or

(b). Illustrate National and International standards for quality control. CO5, L4

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PRACTICAL- VI (At the end of V Semester)

Title: **POST HARVEST TECHNOLOGY OF FISH AND FISHERIES**

No of Hours: 45

Credits: 02

WEF: 2022-2023

Course Code: ZOOSE P02

Learning Outcomes:

On successful completion of this practical course, student shall be able to:

- Identify the quality of aqua processed products.
- Determine the quality of fishery by products by observation.
- Analyze the protocols of aqua processing methods.

Practical Syllabus:

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish
3. Examination of salt, protein, moisture in dried / cured products
4. Examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards – preparation of Hazard analysis worksheet
7. Corrective action procedures in processing of fish- flow chart- work sheet preparation.

References:

1. Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.
2. Bond, et al. 1971. *Fish Inspection and Quality Control*. Fishing News Books, England.

Websites of Interest:

https://www.youtube.com/watch?v=xyf_g7fku-4

https://www.youtube.com/watch?v=bvtqb_ccmy4

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V SEMESTER PRACTICAL END EXAMINATIONS

POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

SEE MODEL PAPER

Time: 3hrs.

Max. Marks 40M

1. Identify fishery products from given fish, write the procedure and tabulate the results. 10M
2. Estimate the protein content from given dried fish tissue. 10M
3. Project Report 10M
4. Viva voce 05M
5. Practical record & field note book 05M