

**Adusumilli Gopalakrishnaiah & Sugarcane Growers
Siddhartha Degree College of Arts & Science**

Vuyyuru – 521165, Krishna District, Andhra Pradesh

(An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam)

Accredited by NAAC with “A” Grade

ISO 9001:2015 Certified Institution

2022-2023

EVEN SEMESTER



DEPARTMENT OF ZOOLOGY

MINUTES OF BOARD OF STUDIES

B.Sc. AQUACULTURE

25-03-2023

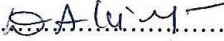
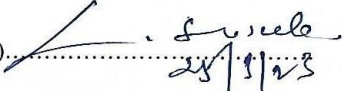
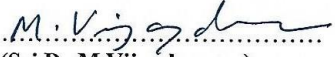

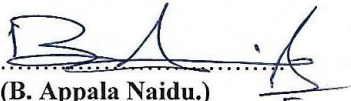
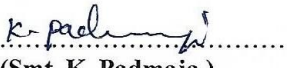
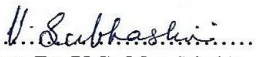



Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 10:00 am on 25-03-2023 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

Presiding

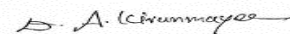
Members Present:

- 1)  Chair person Head, Department of Zoology,
(Smt. D.A.Kiranmayee.) A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2)  University Nominee Bio Sciences & Bio technology
(Smt. Dr.L.Suseela.) Krishna University
Machilipatnam.
- 3)  Academic Council Head, Department of Zoology,
(Sri Dr.M.Vijay kumar.) Nominee SRR & CVR Govt. Degree College,
Vijayawada.
- 4)  Academic Council Head, Department of Zoology,
(Sri Ch. Venkateswaralu.) Nomine P.B. Siddhartha College,
Vijayawada.
- 5)  Industrialist Principle Scientific Officer,
(B. Appala Naidu.) RGCA
Manikonda.
- 6)  Member Lecturer in Zoology,
(Smt. K. Padmaja.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 7)  Member Lecturer in Zoology,
(Smt. Dr.V.Subhashini.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 8)  Student Represent P.hd –Research Scholar,
(Ch.Chiranjeevi.) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

AQUACULTURE

Agenda for B.O.S Meeting.

1. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of I B.Sc
(A.B.C) for the academic year 2022-2023.
2. To recommend the syllabi (Theory & Practical), Model question paper for IV Semester of II B.Sc
(A.B.C) for the academic year 2022-2023.
- 3 To recommend the Blue print for the semester end exam for II&IV semester of I &II B.Sc
(ABC) for the academic year 2022 - 2023.
4. To recommend Semester End Internship (Apprenticeship) to students of III ABC for the
academic year 2022-2023
- 5 To recommend the teaching and evaluation methods to be followed under Autonomous
status.
- 6 Any other matter.



Chairman.

Aquaculture -Resolutions

1.It is resolved to continue the same syllabi (Theory & Practical), model question paper of II Semester of I B.Sc (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2022 – 2023.

2. It is resolved to implement the changed syllabi (Theory & Practical), model question paper of IV Semester of II B.Sc. (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2022 – 2023. The title of the paper is Fish Nutrition and Feed Technology and Fish health Management.

3. It is resolved to follow the Model question paper and Blue print of II & IV semester of I & II B.Sc (A.B.C.) for the academic year 2022-2023.

4. It is resolved to continue the following teaching & evaluation methods for the Academic year 2022-23

5. It is resolved to send the III ABC students for APPRENTICESHIP

Teaching methods:

Besides the conventional methods of teaching, we use modern technology i.e. Using of OHP and LCD projector to display on U boards etc; for better understanding of concepts.

Evaluation of a student is done by the following procedure:

❖ **Internal Assessment Examination:**

❖ Out of maximum 100 marks in each paper for I B.Sc (A.B.C) 30 marks shall be allocated for internal assessment.

❖ Out of these 30 marks, 20 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment for I B.Sc (A.B.C).

❖ Out of maximum 100 marks in each paper for II B.Sc(A.B.C) 25 marks shall be allocated for internal assessment.

❖ Out of these 25 marks, 15 marks are allocated for announced tests (i.e . IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated on assignment and remaining 5 marks seminars for IV semester.

❖ There is no pass minimum for internal assessment for I & II B.Sc

❖ **Semester – End Examination:**

❖ The maximum mark for I (ABC) semester – End examination shall be 70 marks and duration of the examination shall be 3 hours.

❖ The maximum mark for IV (ABC) semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.. Even though the candidate is absent for two IA exams/ obtain Zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS”.

❖ Semester – End examination shall be conducted in theory papers at the end of every semester, while in practical papers, these examinations are conducted at the end of I, IV semester for I & II B.Sc, (A.B.C).

B. A. Chinnayee

Chairman

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE
COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

ALLOCATION OF CREDITS

Structure of AQUACULTURE Syllabus

For the Papers offered during II, IV & V/ VI Semesters

Year	Semester	Title	Teaching hours	Internal marks	External marks	Credits
I	II	Biology of fine fish & shell fish	4	30	70	03
		Practical - II	2	10	40	02
II	IV	Fish Nutrition & Feed Technology	4	25	75	03
		Fish Nutrition & Feed Technology - Practical	2	10	40	02
		Fisheries - Health Management, Extension and Marketing	4	25	75	03
		Fisheries - Health Management, Extension and Marketing - Practical	2	10	40	01
III	V/VI	Aquarium Management And Ornamental Fish Culture	3	30	70	03
		Practical – VI				
		Lab Aquarium Management And Ornamental Fish Culture	3	25	25	02
		Postharvest Technology Of Fish And Fisheries	3	30	70	03
	Practical – VII					
	Lab Postharvest Technology Of Fish And Fisheries	3	25	25	02	
	VI	Apprenticeship				
		Total Credits				

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COLLEGE OF ARTS & SCIENCE, VUYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC reaccredited at 'A' level

Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Biology of fine fish & shell fish**

Semester: - II

Course Code	<i>AQTT21A</i>	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	4	Semester End Exam Marks	70
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2019-20	Year of Offering 2022-23	Year of Revision – 2021-22	Percentage of Revision: 50%

AIM

- To know the biology of fin fish and shell fish.

OBJECTIVES

- To study the systematics of cultivable finfish and shellfish.
- To understand feeding habit and growth patterns of cultured species.
- To study the factors responsible for longevity of fishes.
- To study the reproductive biology of finfish and shell fish.
- To study the developmental aspects of cultivable finfish and shell fish.
- To study the role of hormones in the growth of finfish and shell fish.

PREREQUISITE

- Knowledge of fisheries management acquired in Intermediate.

COURSE OUTCOMES

By the end of the course students will be able to

CO 1	Classify the finfish and shellfish, analyse the cultivable species of fin fish and shellfish of commercial importance, describe their salient features and appreciate the diversity and uniqueness of different groups.
CO 2	Comprehend the relationship between food and growth, age and growth, hormones and growth in cultivable fin and shell fish.
CO 3	Gain knowledge and compare the feeding habits, mouth parts and digestive systems and analyze gut contents.
CO 4	Develop the skill of identifying the gut contents, gonadal maturity and fecundity and comprehend the concept of breeding behaviour, embryonic and larval development of cultivable aquatic fin and shell fish.
CO 5	Acquaint with the significance of unique mechanisms and behavioural patterns like sense organs, electric organs, buoyancy, moulting and metamorphosis exhibited by finfish and shell fish.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Classification of Finfish and Shell fish Classification of fishes up to the level of Class. Classification of crustaceans up to the level of Class Finfish and Shell fish of commercial Importance Cultivable fin fish Cultivable shell fish Sense organs of fishes and crustaceans Specialized organs in fishes – electric organ, venom and toxins buoyancy in fishes- swim bladder and mechanism of gas secretion</p>	11
II	<p>Food, Feeding and Growth Natural fish food Feeding habits, feeding intensity, stimuli for feeding, utilization of food Gut content analysis. Structural modifications in relation to feeding habits. Forage ratio and food selectivity index Age and Growth Principles of Age and growth determination Growth regulation Growth rate measurement – scale method, otolith method, skeletal parts as age indicators Genetic, biotic & ecological factors in determining the longevity of fishes Length frequency method, age composition, age-length keys, absolute and specific growth, back calculation of length and growth, annual survival rate, asymptomatic length, fitting of growth curve . Length-weight relationship Condition factor/Ponderal index, relative condition factor</p>	17
III	<p>Reproductive Biology Breeding in Fishes .Breeding habits & breeding grounds Breeding in natural environment and in artificial ponds, courtship Reproductive cycles Induced breeding in fishes Breeding in shrimp Breeding in pearl oyster</p>	09
IV	<p>Development Ovo-viviparity, oviparity, viviparity in fishes Parental care in fishes, nest building and brooding Embryonic and larval development of fishes Embryonic and larval development of shrimp Embryonic and larval development of crabs Environmental factors affecting reproduction and development of cultivable Aquatic fin & shell fish</p>	12

V	<p>5.0. Hormones & Growth Endocrine system in fishes Neurosecretory cells, androgenic gland, ovary, Y-organ, chromatophores, Pericardial glands and cuticle. Molting, molting stages, metamorphosis in crustacean shellfish</p>	11
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PRESCRIBED BOOK(S):

1. Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON
2. Saxena AB 1996. Life of Crustaceans. Anmol Publications Pvt.Ltd., New Delhi

REFERENCES:

1. Tandon K.K & Johal M.S 1996. Age and Growth in Indian Fresh Water Fishes.
Narendra Publishing
2. Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press,
New York
3. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology and Management.
4. Barrington FJW 1971. Invertebrates: Structure and Function. ELBS
5. Parker F & Haswell 1992. The text book of Zoology, Vol I. Invertebrates

CO-CURRICULAR ACTIVITIES

1. Collection of cultivable finfish and shellfish
2. Animal album-making on cultivable finfish and shellfish
3. Preparation of models of digestive system of herbivorous, omnivorous and carnivorous fishes.
4. Preparation of charts on sense organs of fish and crustaceans
5. Growth rate measurement of different fishes using various methods.
6. Collection of data and finding the length –weight relationship in fishes.
7. Preparation of charts on reproductive cycles in fishes.
8. Preparation of models on fish nests.

II SEMESTER END EXAMINATIONS

Model paper

Title of the paper: Biology of Fin fish and Shell fish

(W.E.F 2022-2023)

Cours Code: AQT21A

Time: 3 Hours

Max. Marks: 70

SECTION –A (20M)

Answer all Questions Restrict to maximum of 2 sub divisions

Draw neat labelled diagrams wherever necessary.

1. i. Explain the Classification of fishes up to the level of Class. CO1 L1 4m
(Or)
ii. Enumerate the general characters of Cultivable fin fish CO1 L3
2. i. Explain the – electric organ – CO2 L2 4m
(Or)
ii. Explain the different fish feeding habits CO2, L5
3. i. Describe the– Length-weight relationship CO3, L2 4m
(Or)
ii. Describe the – Breeding habits CO3, L2
4. i. Distinguish Breeding in shrimp – CO4, L2 4m
(Or)
ii. Explain Ovo-viviparity in Fishes – CO4, L2
5. i. Explain the Embryonic and larval Development in Crabs- CO2, L5 4m
(Or)
ii. Write a short note on Neurosecretary cells – CO3, LI

SECTION – B

(50M)

Answer all Questions (Restrict to maximum of 2 sub divisions)

- 6.i. Explain the structure and function of Sense organs in fishes – CO1 , L2 10m
(Or)
ii. Give an account of Buoyancy in fishes – CO5, L2
7. i. Explain different factors that determine the longevity of fishes – CO2, L4 10m
(Or)
ii. Describe the different methods of estimating age and growth of fish – CO2, L4
8. i. Describe the process of Induced breeding in Fishes- CO2, L2 10m
(Or)
ii. Explain the breeding technique in shrimp- CO2, L2
9. i. Explain the role of Environmental factors on reproduction and development of finfish 10m
CO2, L2
(Or)
ii. Write an essay on Embryonic and larval development in shrimp CO2, L2
10. i. Describe the structure of Pituitary gland and explain the functions of its hormones –
CO2, L2 10M
(Or)
ii. Describe the process of Moulting in Crustaceans- CO2, L2
10M

A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYURU-
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AQUACULTURE
PRACTICAL - II

Semester- II

Max. Marks: 40

Title Of The Paper:-Biology of Fin Fish and Shell Fish

NO OF HOURS: 30

CREDITS: 02

LEARNING OUTCOMES:

By the end of the course students will be able to

- Differentiate between the feeding habits of different fish and shell fish basing on their mouth parts and alimentary canal and identify the various appendages of shellfish.
- Understand the length – weight relationship and analyse the gut contents of fish and shrimp.
- Identify the eggs and larval stages of different cultured species of fish and shell fish and confirm the maturity and fecundity in fish and shell fish.
- Gain knowledge in nest building and brooding in fishes.
- Maintain a neat, labeled record of identified museum specimens and exhibit the hidden creative talent.

1. Study of mouth parts in herbivorous omnivorous and carnivorous fishes
2. Comparative study of digestive system of herbivorous and carnivorous fishes
3. Length-weight relationship of fishes
4. Gut content analysis in fishes and shrimp
5. Mouth parts and appendages of cultivable prawns, shrimps and other crustaceans
6. Study of eggs of fishes, shrimps, prawns and other crustaceans
7. Study of gonadal maturity and fecundity in fishes and shellfish
8. Observation of crustacean larvae
9. Study of nest building and brooding of fishes
10. Biostatistics – Mean, Mode, Median, Standard Deviation, Correlation and t-test

REFERENCES

1. Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON
2. Saxena AB 1996. Life of Crustaceans. Anmol Publications Pvt.Ltd., New Delhi
3. Tandon K.K &Johal M.S 1996. Age and Growth in Indian Fresh Water Fishes. Narendra Publishing
4. Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, New York
5. Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology
6. Thomas PC, Rath SC &Mohapatra KD.2003.Breeding and Seed Production of Finfish and Shellfish. Daya Publ.
7. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn. Daya Publ. House

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521165, KRISHNA Dt.,A.P. (AUTONOMOUS)

AQUACULTURE

Biology of fin fish and shell fish

MODEL QUESTION PAPER

PARTICAL PAPER- II

SEMESTER-II

COURSE CODE: AQT

P21A

Time: 3 Hours

Max. Marks: 40M

1. Identify and draw labeled diagram of digestive system of *Labeo rohita*.

Compare it with that of a carnivorous fish. CO1, L2 &L3

10M

Or

Identify and draw labeled diagram of digestive system of *Channa punctatus*.

Compare it with that of a herbivore fish. CO1, L2 &L3

Identification: 1M

Diagram: 2M

Labelling: 3M

Comparison: 4M

2. Identify and draw labeled diagram of abdominal appendages of *Macrobrachium malcolmsonii*. CO1, L3

10M

Or

Identify and draw labelled diagram of thoracic appendages of *Scylla serrata*.CO1, L3

Identification: 2M

Diagram: 4M

Labelling: 4M

3. Identify and comment on CO1, CO3 & CO4, L3 & L1

4x2½ =10M

A. Mouth parts of fish/prawn/crab

B. Egg mass of fish/prawn/shrimp/crab

C. Crustacean larvae

D. Types of fish nests

Identification: 1M

Diagram: ½M

Notes: 1M

4. Record Book CO5, L3

5M

5. VIVA CO5, L5

5M

Total **40M**

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KRISHNA Dt., A.P. (AUTONOMOUS).**

NAAC recredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Fish Nutrition & Feed Technology**

Semester: - IV

Course Code	<i>AQTT01</i>	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2019-20	Year of Offering 2022-2023	Year of Revision – 2021-2022	Percentage of Revision: 100%

Learning Objectives:

- 1 To know the nutritional requirements of fish and shell fish at different stages of their life.
- 2 To understand the different types of feeds, and feed additives used in the preparation of fish and shell fish feeds.
- 3 To improve the knowledge on feed manufacture and feed storage.
- 4 To gain knowledge on feeding and feed evaluation methods.
- 5 To gain knowledge on feed manufacture and storage.
- 6 To know the nutritional pathology and remedial methods of cultivable fish and shrimp.
- 7 To improve the technical knowledge feed quality and nutritional value analysis.

Course outcomes:

CO 1	Understand Nutritional requirements of cultivable fishes and factors affecting energy partitioning and feeding.
CO 2	Know different types of feed and FCR and different types of feeders
CO 3	Gain Knowledge of Feed manufacture and storage methods of feeds
CO 4	Understand the value of Feed additives and Non-Nutrient ingredients
CO 5	To create awareness of different nutritional deficiency and importance of natural and supplementary feeds and balanced diet.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>Nutritional requirements of cultivable fish and shellfish Classification of nutrients; Nutritional requirements (energy, proteins, carbohydrates, lipids, fiber, micronutrients) of different stages of cultivable fish and shellfish.</p> <p>Essential amino acids and fatty acids, protein to energy ratio, nutrient interactions and protein sparing effect</p> <p>Dietary sources of energy, effect of ration on growth, determination of feeding rate, check tray, factors affecting energy partitioning and feeding</p> <p>Importance of natural and supplementary feeds, balanced diet.</p>	10
II	<p>Types of feeds and Feed additives</p> <p>Live foods: Fish food organisms – Bacterioplankton, phytoplankton, zooplankton and their role in larval nutrition.</p> <p>Artificial feeds: Supplementary feed stuffs; Non-conventional feed ingredients; Forms of processed feeds - wet feeds, moist feeds, dry feeds, mashes, pelleted feeds - floating and sinking pellets; advantages of pelletization</p> <p>Water stability feeds, farm made aqua feeds, micro-coated feeds, micro-encapsulated feeds and micro-bound diets</p> <p>Feed additives: Binders, antioxidants, probiotics, enzymes, pigments, growth promoters, feed stimulants; use of preservatives.</p>	10
III	<p>Feed formulation, manufacture & storage</p> <p>Feed ingredients: selection, nutrient composition and nutrient availability.</p> <p>Feed formulation and manufacturing – extrusion processing and steam pelleting - grinding, mixing and drying, pelletization, and packing</p> <p>Microbial, insect and rodent damage of feed, chemical spoilage during storage period and feed storage methods.</p>	15
IV	<p>Feeding methods</p> <p>Feeding devices and methods: Manual feeding, demand feeders, automatic feeders, surface spraying, bag feeding & tray feeding</p> <p>Feeding schedules: Frequency of feeding, feeding rates and ration size</p> <p>Feed evaluation: feed conversion ratio, feed conversion efficiency and protein efficiency ratio.</p>	15
V	<p>Nutritional pathology of fish and shrimp</p> <p>Protein (Essential amino acid) and Lipid (Essential fatty acid) deficiency disorders; Fatty liver disease in fishes</p> <p>Vitamin and mineral deficiency disorders</p> <p>Anti-nutrients and aflatoxins.</p>	10

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Dt.,A.P. AUTONOMOUS
SEMESTER-IV

Model Question paper

w.e.f. 2022 – 2023

Paper Title: **Fish Nutrition & Feed Technology**

Paper Code: AQTT01

Time: 3 hrs Max.Marks:70

Note: Draw neat labelled Diagrams wherever necessary.

SECTION-A

Answer any Five of the following Questions.

5X5=

25M

1. List out the factors affecting energy partitioning. CO1 , L1
2. Explain the significance of Micronutrients CO1, L2
3. Differentiate between FCE and FCR CO2, L1
4. What is feeding frequency CO2, L1
5. Mention the types of feed damage CO4, L1
6. Explain the significance of aflatoxins in the feed– CO4, L2
7. Analyse the role of antioxidants in the fish nutrition CO3, L4
8. Explain the importance of supplementary feeds CO5, L2

SECTION-B

Answer all the Questions.

5X10=50M

9. Explain the nutritional requirements of cultured fish. CO1, L2
OR
Analyse the effect of ration on growth and determination of feeding rate. CO1, L2
10. Give an account of the different forms of fish feed– CO2, L2
OR
Explain the various feeding devices and methods. CO2, L2
11. Mention the various steps involved in feed preparation. CO3, L1
OR
Describe the various feed ingredients and their selection. CO3, L1
12. Explain the role of probiotics in fish feed .CO4, L1
OR
List out the various feed attractants and feed stimulants used in aqua feeds. CO4, L1
13. List out the various diseases caused due to nutritional deficiency. CO5 L2
OR
Explain the importance of natural feed in aquaculture. CO5 L2

PRESCRIBED BOOK(S):

1. HalverJ.E 1989.Fish Nutrition.Academicpress, San Diego.
2. NRC.NutritionalRequirements ofWarmWaterFishes.NationalAcademyofSciences, Washington.

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KRISHNA Dt., A.P. (AUTONOMOUS)

ZOOLOGY PRACTICAL SYLLABUS

PAPERS – IV

w.e.f. 2022 – 2023.

Max.Marks:40

Credits: 2

Paper Title: Fish Nutrition & Feed Technology
AQTP01

Paper Code:

PRACTICALS: (Any 8 as per the local Industry needs and Requirement)

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

PRESCRIBED BOOK(S):

1. Halver JE 1989. Fish Nutrition. Academic press, San diego

REFERENCES:

1. Lovell R.T. 1998. Nutrition and Feeding of Fishes, Chapman & Hall, New York
2. Sena De Silva, Trevor A Anderson 1995. Fish Nutrition in Aquaculture. Chapman and Hall, Aquaculture Series, London.

EXTERNAL PRACTICAL- IV

w.e.f. 2022-2023.

Code: AQTP01

**MODEL QUESTION PAPER –IV
2hrs/week)**

Time: 3 hrs.

Max.marks: 40m.

1. Estimate the amount of protein/carbohydrate /lipid content in the fish feed. **10 M**

Procedure: 5M

Calculation: 3M

Result: 2M

2. Explain the physical and chemical changes during storage of fish feed.

Or

Explain the physical characteristics of floating and sinking feeds.

10M

3. Formulate a feed with the given ingredients.

5 M

4. Record Work Book

5 M

5. Field notes

5 M

6. VIVA

5M

Total 40M

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P.
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NAAC reaccredited at 'A' level
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Title of the Paper: **Fish Health Management and Fisheries Economics, Extension and Marketing**

Semester: - IV

Course Code	<i>AQTT42</i>	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	4	Semester End Exam Marks	75
Total Number of Lecture Hours	60	Total Marks	100
Year of Introduction : 2022-2023	Year of Offering 2022-2023	Year of Revision –	Percentage of Revision:

AIM

To know the fish health management strategies and different fisheries economic policies.

OBJECTIVES

- To understand the diseases of fin fish
- To understand the diseases of shell fish.
- To understand the fish health management strategies.
- To understand the different fisheries economic policies .
- To understand the various schemes for the welfare of fishermen community

PREREQUISITE

- Knowledge of fisheries management acquired in Intermediate.

COURSE OUTCOMES

By the end of the course students will be able to

CO 1	Describe the various fungal, viral and bacterial diseases of fin fish and their prevention and therapy.
CO 2	Explain the various viral, bacterial and protozoan diseases of shell fish and their prevention and therapy.
CO 3	Describe the fish health management strategies.
CO 4	Explain different fisheries economic policies.
CO 5	Describe the various schemes for the welfare of fishermen community.

**Syllabus
Course Details**

Unit	Learning Units	Lecture Hours
I	<p>DISEASES OF FIN FISH .Fungal diseases– Saprolegniasis, branchiomycosis, ichthyophiriasis diseases – Lagenidium diseases – Fusarium disease, prevention and therapy Viral diseases – Emerging viral diseases in fish, haemorrhagic septicemia, 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 and therapy Bacterial diseases – Emerging bacterial diseases, <i>Aeromonas</i>, <i>Pseudomonas</i> and <i>Vibrio</i> infections, columnaris, furunculosis, epizootic ulcerative syndrome, infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease, proliferative kidney disease, prevention and therapy</p>	10
II	<p>DISEASES OF SHELL FISH Major shrimp viral diseases – <i>Baculovirus penaei</i>, <i>Monodon baculovirus</i>, Baculoviral midgut necrosis, Infectious hypodermal and hematopoietic necrosis virus, Hepatopancreatic parvo like virus, Yellow head baculovirus, white spot baculovirus. Bacterial diseases of shell fish – aeromonas, pseudomonas and vibrio infections, Luminous bacterial disease, filamentous bacterial disease. Prevention and therapy Protozoan diseases- Ichthyophthiriasis, Costiasis, whirling diseases, trypanosomiasis. Prevention and therapy</p>	10
III	<p>FISH HEALTH MANAGEMENT Diagnostic tools – immune detection- DNA/RNA techniques, General preventive methods and prophylaxis. Application and development of vaccines. Quarantine – Significance, methods and regulations for transplants. Good Feed management for healthy organisms, Zero water exchange, Probiotics in health management, Issues of biosecurity.</p>	15
IV	<p>FISHERIES ECONOMICS .Meaning and scope of economics with reference to fisheries Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis, Aquaculture economics- Application of economics principles to aquaculture operations Various inputs and production function, laws of variable proportions Cost and earnings of aquaculture systems – carp culture, shrimp farming systems,</p>	15

	hatcheries, Cost and earnings of fishing units and freezing plants Socio-economic conditions of fishermen in Andhra Pradesh Role of Matsyafed and NABARD in uplifting fishermen's conditions, fishermen Cooperatives, Contribution of fisheries to the national economy	
V	FISHERIES EXTENSION AND MARKETING .Fisheries extension-scope and objectives, principles and features of fisheries extension education .Fisheries extension methods and rural development Fisheries Training and Education in India; Role of extension in community development .Fish marketing methods in India; Basic concepts in demand and price analysis 2 .Methods of economic analysis of business organizations Preparation of project and project appraisal	10

PRESCRIBED BOOK(S):

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. Jayaraman R 1996. Fisheries Economics. Tamilnadu Veterinary and Animal Science University. Tuticorn
5. Subba Rao N 1986. Economics of Fisheries. Daya publishing house, Delhi
- 6.

REFERENCES:

1. Shankar KM & Mohan CV. 2002. Fish and Shellfish Health Management. UNESCO Publ. Sindermann CJ. 1990
2. Walker P & Subasinghe RP. (Eds.). 2005 Principal Diseases of Marine Fish and Shellfish. Vols. I, II. 2nd Ed. Academic Press
3. DNA Based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases. FAO Publ. Wedmeyer G, Meyer FP & Smith L. 1999.
4. Bullock G et.al., 1972 Bacterial diseases of fishes. TFH publications, New Jersey
5. Post G 1987. Text book of Fish Health. TFH publications, New Jersey
6. Johnson SK 1995. Handbook of shrimp diseases. Texas A & M University, Texas
7. Dewwett KK and Varma JD 1993. Elementary economic theory. S.chand, New Delhi
8. Korakandy R 1996. Economics of Fisheries Management. Daya Publishing House, Delhi
9. Tripathi SD 1992. Aquaculture Economics. Asian Fisheries Society, Mangalore.

**A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru – 521165, Krishna
Dt. A.P. (Autonomous)**

Semester –IV

w.e.f. 2022-2023

**Title of the paper: Fish Health Management and Fisheries Economics, Extension and
Marketing**

Code – AQTT42

Model question paper

Time: 3hrs.

Max.marks: 75

Note: Draw neat labelled Diagrams wherever necessary.

SECTION-A

Answer any Five of the following Questions.

5X5= 25M

1. Explain Spring Viremia of carp disease.
2. Explain Yellow head baculovirus disease in shrimp
3. Write about probiotics in health management of fish.
4. Describe the contribution of fisheries to national economy
5. Give an account on rural development in aquaculture.
6. Write about the bacterial gill disease in fish
7. Explain IHHNV disease in shrimp
8. Write a short note on socio economic conditions of fishermen in A.P.

SECTION-B

Answer all the Questions.

5X10=50M

9. a) Answer the following fungal diseases of fin fish
i)Saprolegniasis ii) Branchiomycosis
OR
b) Explain the bacterial diseases of fish
i) Columnaris ii) Enteric red mouth disease
10. a)Write about the following shell fish diseases
i) Luminous bacterial disease ii) Filamentous bacterial disease
OR
b) Explain the following protozoan diseases
i) Costiasis ii) Whirling disease
11. a) Write an essay on ELISA- immune detection technique
OR
b) Write about Quarantine methods
12. a) Explain the role of Matsyafed And Nabard in uplifting fishermen's conditions.
OR
b) Write an essay on principles of aquaculture economics
13. a) Describe the fisheries extension methods.
OR
b) Explain fisheries training and education in India

AQUACULTURE
PRACTICAL -IV

Code: AQTP42

MAX.

Title of the paper:-Fish Health Management and Fisheries Economics, Extension and Marketing

LEARNING OUTCOMES:

By the end of the course students will be able to

- Identify the pathological changes in the visceral organs of fish, prawn and shrimp.
- Analyse the data for epidemiological investigations of viral diseases.
- Isolate, culture and characterize the bacterial pathogens.
- Identify the external parasites, prepare and evaluate antibiograms
- Develop skill in molecular and immunological techniques.
- Estimate the dose of antibiotics and probiotics used in aquaculture practices and methods of administering various chemotherapeutics.
- Maintain a neat record of experiments and exhibit the hidden creative talent.

Syllabus

1. Enumeration of Bacteria by TPC Method
2. Enumeration of total Coliformes
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. Antibiograms – 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
15. Cost benefit analysis calculations

PRESCRIBED BOOK(S):

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
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A.G. & S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165,
KRISHNA Dt.,A.P. (AUTONOMOUS)

AQUACULTURE
PRACTICAL -IV

w.e.f. 2022-2023.

MODEL QUESTION PAPER -IV

Code: AQTP42

MAX.MARKS: 40.

(2hrs/week)

Title of the paper:-Fish Health Management and Fisheries Economics, Extension and Marketing

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- | | |
|-------------------------------------------------------------------------|----------------------|
| 1. Enumeration of bacteria by TPC method? | 10M |
| 2. Examine the following pathological changes
i) Gills ii) Gut lumen | 2x5 = 10M |
| 3. Identify the following
i) Ichthyophthiriasis ii) Myxobolus | 2 ½ x 2 = 5 M |
| 4. Cost Benefit Analysis Calculations | 5M |
| 5. Record Book | 5M |
| 6. Field notes | 5M |

**ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA
DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P.
(AUTONOMOUS).**

NAAC reaccruited at 'A 'level
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VI SEMESTER : APPRENTICE SHIP