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

Aquculture -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).

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

Semester: - II

Course Code	***AQTT21A***	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	**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	**11**
II	**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	**17**
III	**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	**09**
IV	**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 Environmentalfactorsaffectingreproductionanddevelopmentofcultivable Aquaticfin&shellfish	**12**

V	**5.0. Hormones & Growth** Endocrine system in fishes Neurosecretorycells,androgenicgland,ovary,Y-organ,chromatophores, Pericardial glands and cuticle. Molting, molting stages, metamorphosis in crustacean shellfish	**11**

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 andManagement.
4. Barrington FJW 1971. Invertebrates: Structure andFunction. 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.

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II SEMESTER END EXAMINATIONS

Model paper

Title of the paper: Biology of Fin fish and Shell fish (W.E.F 2022-2023)

Cours Code: AQTT21A

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 habitsCO2, 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

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

Semester: - IV

Course Code	***AQTT01***	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 theirlife.
2 To understand the different types of feeds, and feed additives used in the preparation of fish andshell fish feeds.
3 To improve the knowledge on feed manufacture and feedstorage.
4 To gain knowledge on feeding and feed evaluationmethods.
5 To gain knowledge on feed manufacture andstorage
6 To know the nutritional pathology and remedial methods of cultivable fish andshrimp.
7 To improve the technical knowledge feed quality and nutritional valueanalysis.

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	Nutritional requirements of cultivable fish and shellfish Classification of nutrients; Nutritional requirements (energy, proteins, carbohydrates, lipids, fiber, micronutrients) of different stages of cultivable fish andshellfish. Essential aminoacids and fatty acids, protein to energy ratio, nutrient interactionsand proteinsparingeffect Dietary sources of energy, effect of ration on growth, determination of feedingrate, check tray, factors affecting energy partitioningandfeeding Importance of natural and supplementary feeds, balanceddiet**.**	**10**
II	**Types of feeds and Feed additives** Live foods**:** Fish food organisms – Bacterioplankton, phytoplankton, zooplankton and their role in larvalnutrition. 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; advantagesof pelletization Water stability feeds, farm made aqua feeds, micro-coated feeds, micro-encapsulated feeds andmicro-bounddiets Feed additives: Binders, antioxidants, probiotics, enzymes, pigments, growth promoters, feed stimulants; use ofpreservatives.	**10**
III	**Feed formulation, manufacture & storage** Feed ingredients**:** selection, nutrient composition and nutrientavailability. Feed formulation and manufacturing – extrusion processing and steam pelleting - grinding, mixing and drying, pelletization,andpacking Microbial,insectandrodentdamageoffeed,chemicalspoilageduringstorageperiod and feed storage methods.	**15**
IV	**Feeding methods** Feeding devices and methods: Manual feeding, demand feeders, automatic feeders, surface spraying, bag feeding &trayfeeding Feeding schedules: Frequency of feeding, feeding rates and rationsize Feed evaluation:feed conversion ratio, feed conversion efficiency and protein efficiencyratio.	**15**
V	**Nutritional pathology of fish and shrimp** Protein(Essential amino acid) and Lipid (Essential fatty acid) deficiency disorders; Fatty liver disease in fishes Vitamin and mineral deficiency disorders Anti-nutrients and afflatoxins.	**10**

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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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ZOOLOGY PRACTICAL SYLLABUS

PAPERS – IV w.e.f. 2022 – 2023.

Max.Marks:40
Credits: 2
Paper Title: Fish Nutrition & Feed Technology Paper Code: AQTP01

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

1. Estimation of protein content in aquaculturefeeds
2. Estimation of carbohydrate content in aquaculturefeeds
3. Estimation of lipid content in aquaculturefeeds
4. Estimation of ash in aquaculturefeed
5. Study of water stability of pellet feeds
6. Feed formulation and preparation in thelab
7. Study of binders used in aquaculturefeeds
8. Study of feed packing materials
9. Study of physical and chemical change duringstorage
10. Study on physical characteristics of floating and sinking feeds
11. Visit to a aqua-feedproduction unit
12. Visit to a farm for studyingfeeding practices

PRESCRIBED BOOK(S):

1. HalverJE 1989.Fish Nutrition. Academicpress, San diego

REFERENCES:

1. LovellR.T. 1998. Nutritionand Feedingof Fishes, Chapmann& Hall, NewYork
2. SenaDeSilva,TrevorAAnderson1995.FishNutritioninAquaculture**.**Chapman andHall, AquacultureSeries,London.

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EXTERNAL PRACTICAL- IV

w.e.f. 2022-2023.

MODEL QUESTION PAPER –IV **Code: AQTP01**

2hrs/week)

Time: 3 hrs. **Max.marks: 40m.**

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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 andchemical changeduringstorage of fish feed.
   Or
   Explain the physical characteristics offloating and sinkingfeeds. **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

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

Semester: - IV

Course Code	***AQTT42***	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 thefish 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	DISEASES OF FIN FISH .Fungal diseases– Saprolegniasis, branchiomycosis, ichthyophiriasis diseases – Lagenidium diseases – Fusarium disease, prevention andtherapy Viral diseases – Emerging viral diseases in fish, haemorrhagic scepticemia, springviremia of carps, infectious hematopoietic necrosis in trout,infectious pancreatic necrosis in salmonids, swim-bladder inflammation in cyprinids, channel cat fish viral disease, prevention andtherapy Bacterial diseases – Emerging bacterial diseases, *Aermonas,Pseudomonas* and*Vibrio*infections, columnaris, furunculosis, epizootic ulcerative syndrome, infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease, proliferative kidney disease, prevention and therapy	10
II	DISEASES OF SHELL FISH Major shrimp viral diseases – *Bacculoviruspenaeii*, *MonodonBacculovirus*, Bacculoviralmidgut necrosis, Infectious hypodermal and haematopoietic necrosis virus, Hepatopancreaticparvo like virus, Yellow head bacculovirus, white spotbacculovirus. 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	**10**
III	**FISH HEALTH MANAGEMENT** Diagnostic tools – immune detection- DNA/RNA techniques, General preventive methods and prophylaxis. Application and development ofvaccines. Quarantine – Significance, methods and regulations fortransplants**.** GoodFeedmanagement for healthy organisms, Zero water exchange, Probiotics in health management, Issues ofbiosecurity.	**15**
IV	**FISHERIES ECONOMICS** **.**Meaningand scopeof economics with referenceto fisheries Principles of aquaculture economics – Capital costs, variable costs, cost- benefit analysis,Aquaculture economics- Application of economics principles to aquacultureoperations Various inputs and production function, laws of variableproportions Cost and earnings of aquaculture systems – carp culture, shrimp farming systems,	**15**

	hatcheries, Cost andearnings of fishingunits andfreezingplants Socio-economic conditions of fishermen in Andhra Pradesh Role of Matsyafedand NABARD in uplifting fishermen's conditions, fishermen Cooperatives,Contribution of fisheries to the nationaleconomy	
V	**FISHERIESEXTENSION AND MARKETING** **.**Fisheriesextension-scopeandobjectives,principlesandfeaturesoffisheries extensioneducation **.**Fisheriesextensionmethods 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 analysisof business organizations Preparation ofproject and project appraisal	**10**

PRESCRIBED BOOK(S):

1. Shaperclaus W. 1991 Fish Diseases- Vol.I& II. Oxonian PressPvt.ltd
2. Roberts RJ 1989. Fish pathology. BailliereTindall, NewYork
3. Lydia Brown 1993. Aquaculture for veterinarians- fish husbandray and medicine. Pergamon Press.Oxford
4. Jayaraman R 1996. Fisheries Economics. Tamilnadu Veterinary and Animal Science University.Tuticorn
5. SubbaRao 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. AcademicPress
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, NewJersey
5. Post G 1987. Text book of Fish Health. TFH publications, NewJersey
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, NewDelhi
8. Korakandy R 1996. Economics of Fisheries Mangement. 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 bacculovirus 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

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

AQUACULTURE

PRACTICAL -IV

Code: AQTP42 **MAX.**

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

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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 inaquaculture
4. Examination of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves offish
5. Examination of pathological changes in gutlumen, hepatopancreas, lymphoid organ, muscles and nerves of prawn andshrimp
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 diseasediagnosis
15. Cost benefit analysis calculations

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3. Lydia Brown 1993. Aquaculture for veterinarians- fish husbandray and medicine. Pergamon Press.Oxford
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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 reaccredited at 'A 'level
Autonomous –ISO 9001-2015 Certified

VI SEMESTER : APPRENTICE SHIP