

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

An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam
Accredited by NAAC with “A” Grade ISO9001-2015 Certified Institution

2021-2022

B.SC.AQUACULTURE(Industrial Fisheries)

ODD SEMESTER



DEPARTMENT OF ZOOLOGY

MINUTES OF BOARD OF STUDIES

B.SC.AQUACULTURE

01-11-2021

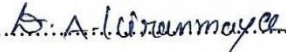
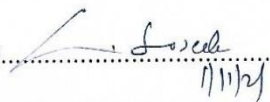

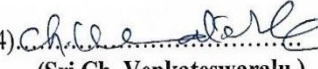
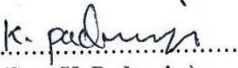
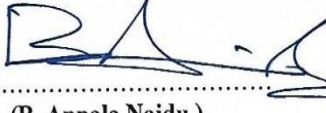



Minutes of the meeting of Board of studies in Zoology for the Autonomous courses of AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2:30 pm on 01-11-2021 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

Presiding

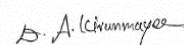
Members Present:

- 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.Viyay 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)  Member Lecturer in Zoology,
(Smt. K. Padmaja.) A.G&S.G.S Degree College
Vuyyuru-521165.
- 6)  Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA
Manikonda.
- 7)  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 I Semester of I B.Sc (A.B.C) for the academic year 2021-2022.
2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II B.Sc (A.B.C) for the academic year 2021-2022.
3. To recommend the syllabi (Theory & Practical), Model question paper for V Semester of III B.Sc (A.B.C) for the academic year 2021-2022.
4. To recommend the syllabi (Theory & Practical), Model question paper and Blue print of I, III & V semester of I, II, III B.Sc (A.B.C.) for the academic year 2021-2022.
5. To recommend the teaching and evaluation methods to be followed under Autonomous statues.
6. Any other matter.



Chairman.

RESOLUTIONS

1. It is resolved to implement the changed syllabi (Theory & Practical), model question paper of I Semester of I B.Sc. (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2021 – 2022.
2. It is resolved to implement the changed syllabi (Theory & Practical), model question paper of III Semester of II B.Sc. (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2021 – 2022.
3. It is resolved to follow the newly framed syllabi (Theory & Practical), model question paper of Semester of III B.Sc. (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2021 – 2022.
4. It is resolved to follow the Model question paper and Blue print of I,III& V semester of I,II& III B.Sc (A.B.C.) for the academic year 2021-2022.
5. It is resolved to introduce Value Added Course in Sericulture to I B.Sc. Aqua Students
6. It is resolved to continue the following teaching & evaluation methods for the Academic year 2021-22.

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.

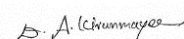
Evaluation of a student is done by the following procedure:

❖ Internal Assessment Examination:

- ❖ Out of maximum 100 marks in each paper for II & III 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,II& III B.Sc (A.B.C).
- ❖ Out of maximum 100 marks in each paper for I B.Sc(A.B.C) 25 marks shall be allocated for internal assessment.
- ❖ Out of these 25 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 / assignment for I, semester.
- ❖ There is no pass minimum for internal assessment for I, II, III B.Sc

❖ Semester – End Examination:

- ❖ The maximum mark for I (ABC) semester – End examination shall be 75 marks and duration of the examination shall be 3 hours.
- ❖ The maximum mark for III, V (A.B.C) semester – End examination shall be 70 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, III & V semester for I, II & III B.Sc, (A.B.C).


B. A. Chinnayee

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

ALLOCATION OF CREDITS

Structure of AQUACULTURE Syllabus

For the Papers offered during I,III & V Semesters

<i>Year</i>	<i>Semester</i>	<i>Title</i>	<i>Teaching hours</i>	<i>Internal marks</i>	<i>External marks</i>	<i>Credits</i>
I	I	Basic Principles of Aquaculture	4	25	75	03
		Practical - I	2	10	40	01
II	III	Fresh water & Brackish water Aquaculture	4	30	70	03
		Practical -III	2	25	25	01
III	V(501)	Fish health Management	4	30	70	03
		Practical - 501p	2	25	25	01
	V(502)	Extension, Economics & Marketing	4	30	70	03
		Practical - 502p	2	25	25	01
		Total Credits				16

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Title of the Paper: **Basic Principles of Aquaculture**

Semester: - I

Course Code	AQUT11A	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 2019-2020	Year of Revision – 2021-22	Percentage of Revision: 70%

AIM

- To know the basic principles of Aquaculture.

OBJECTIVES

- To study the concept of blue revolution and its impact at global, national and state level.
- To get acquainted with different culture systems and culture methods.
- To study the different types of ponds used in culture practices.
- To study the criteria for construction of ideal fish pond.
- To study the management practices in fish/ prawn culture.

PREREQUISITE

- Knowledge of fisheries management acquired in Intermediate.

COURSE OUTCOMES

By the end of the course students will be able to

CO 1	Understand the concept of blue revolution, analyse the history and compare the present status of aquaculture at global, national and state levels and its significance over agriculture and gain knowledge in the various aquaculture resources and advantages of culture over capture.
CO 2	Acquire knowledge in the different types of aquaculture, culture systems and culture methods in practice worldwide.
CO 3	Gain knowledge in the different types of culture ponds.
CO 4	Understand the arrangement of different types of ponds in a fish farm and design an ideal fish farm.
CO 5	Comprehend the best management practices to be adopted in aquaculture for good yield and acquire the skill in the analysis of water and soil parameters of a culture pond.
CO 6	Identify the different types of weeds and predators in a culture pond and suggest the suitable control measures for their eradication.

Syllabus

Unit	Learning Units	Lecture Hours
I	UNIT-I (Introduction) Definition and History of Aquaculture Concept of Blue Revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY) Present status of Aquaculture at global level, India and Andhra Pradesh Aquaculture versus Agriculture; Present day needs with special reference to Andhra Pradesh Aquaculture resources: Ponds, tanks, lakes, reservoirs etc Capture and Culture fisheries; Advantages of culture fishery over capture fishery	11
II	UNIT-II (Types of Fish Ponds) Lotic and lentic systems, streams and springs Classification of ponds based on water resources – spring, rain water, flood water, well water and water course ponds Functional classification of ponds – head pond, hatchery, nursery, rearing, production and stocking ponds; quarantine ponds, isolation ponds and wintering ponds; Hatchery design	11
III	UNIT- III (Design and Construction of Aqua Farms) Important factors in the construction of an ideal fish pond – site selection, topography, nature of the soil, water resources Lay out and arrangement of ponds in a fish farm Construction of an ideal fish pond – space allocation, structure and components of barrage Pond	10
IV	UNIT-IV (Aquaculture Systems and Practices) Types of aquaculture Fresh water aquaculture , Brackish water aquaculture , Mariculture Aquaculture Systems – Pond, Raceways, Cage, Pen, Rafts, Running water, Water Recirculating Systems, Biofloc Technology and 3-C System Pond culture practices- Traditional, Extensive, Modified Extensive, Semi-Intensive, Intensive & Super-intensive systems of fish and shrimp and their significance. Fin fish culture methods - Monoculture, Polyculture and Monosex culture and Integrated fish farming.	12
V	UNIT-IV (Management Factors of Culture Ponds) Pre-stocking Management Dewatering, drying, ploughing/desilting Liming and fertilization; Need of fertilizer and manure application, NPK contents of different fertilizers and manures and precautions in their Application Predators, weeds and weed fish in culture ponds - Advantages and disadvantages of weed plants; Toxins used for weed control and control of predators. Algal blooms and their control Stocking Management – Stocking density and stocking Post-stocking Management Feeding: Role of nutrients Water quality: Physico-chemical conditions of soil and water optimum for culture temperature, depth, turbidity, light, water and shore currents, PH, DOD, CO ₂ , NH ₃ , NO ₂ and nutrients . Measures to increase oxygen and reduce ammonia & hydrogen sulphide in culture ponds; correction of PH	14

PRESCRIBED BOOK(S):

1. Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, New Delhi
2. Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd., London

REFERENCES:

1. Pillay TVR & M.A. Dill, 1979. Advances in Aquaculture. Fishing News Books Ltd., London
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & Sons Inc. 1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing
4. Bose AN et al., 1991. Coastal Aquaculture Engineering. Oxford & IBH Publishing Company.

CO-CURRICULAR ACTIVITIES

1. Collection of data on present status of aquaculture
2. Animal album-making
 - a. Plankton
 - b. Aquatic weeds
 - c. Aquatic Insects
 - d. Algal Blooms
 - e. Weed and Predatory fish
3. Preparation of clay models of different ponds in a fish farm.
4. Field survey of nearby habitat for dietary dependency on and requirement of aqua-products
5. Collection of water and soil samples and estimation of various parameters.
6. Preparation of charts on aeration devices.
7. Collection of different culture species stage-wise {spawn, fry, fingerlings, zero size and adult (more than 200 g)}

I SEMESTER END EXAMINATIONS

PAPER – I MODEL PAPER
Title of the paper: Basic Principles of Aquaculture

Course Code: AQUT11A

Time: 3 Hours

Max. Marks: 75

SECTION –A

Draw neat labeled diagrams wherever necessary.

Answer and FIVE of the following

5x5=25 Marks

1. Explain the significance of Biofloc Technology CO2, L2
2. Explain the concept of blue revolution CO1, L2
3. What is Mari culture?CO2, L1
4. Explain the importance of pond fertilization. CO5, L2
5. Explain the functional role of Rearing and Stocking ponds CO3, L2
6. Mention the criteria for site selection of an ideal fish pond CO4, L1
7. Analyze the control measures for weed fish in culture ponds CO6, L4
8. Justify the role of nutrients in a fish pond. CO5, L5

SECTION – B

Answer the following questions.

5X10=50 Marks

9. Define capture and culture fisheries. List out the advantages of culture fishery over capture fishery. CO1, L1

OR

Mention the present status of Aquaculture at global level, India and Andhra Pradesh.CO1, L1

10. Explain the different types of freshwater aquaculture. CO2, L2

OR

Describe the different types of pond culture methods. CO2, L2

11. Give an account of the different types of hatcheries and describe the design of a modern hatchery. CO4, L2

OR

Classify ponds based on water resources. CO4, L2

12. Describe the structure and components of a barrage pond. CO4, L1

OR

Describe the lay out and arrangement of nursery pond in a fish farm. CO4, L1

13. Analyze the physico-chemical conditions of water optimum for fish culture. CO5, L4

OR

Write an essay on aquatic weed plants in a fish pond, their advantages and disadvantages. CO6, L4

PRACTICAL- I (At the end of I Semester)

Title of the paper: Basic Principles of Aquaculture.

No of Hours: 30

Credits: 01

WEF: 2021-2022 Course Code: AQU P11A

LEARNING OUTCOMES:

By the end of the course students will be able to

Identify the various live food organisms in the culture ponds.

Identify the aquatic weeds, insects and weed fish causing damage to the cultured animals and suggest measures to control the algal blooms in culture ponds.

Understand the mechanism of aeration devices used in culture ponds.

Develop skill in analysing the various water and soil parameters.

Gain practical knowledge in the management of different types of ponds in a fish farm.

Understand the importance of preservation of museum specimens and identify the animals based on special identifying characters.

Maintain a neat, labeled record of identified museum specimens and exhibit the hidden creative talent.

1. Estimation of Carbonates, Bicarbonates in water samples
2. Estimation of Chlorides in water samples
3. Estimation of Dissolved Oxygen
4. Estimation of Ammonia in water.
5. Estimation of Total Hardness of water sample.
6. Determination of soil Nitrogen and Phosphorus.
7. Study of beneficial and harmful algal species
8. Study of aeration devices
9. Collection, identification and isolation of zooplankton and phytoplankton
10. Collection and study of aquatic weeds, aquatic insects, weed fish and larvivorous fish
11. Study of fish species banned from culture (*Clarius gariepinus*, *Hypostomus plecostomus*)
12. Field visit to hatchery, nursery, rearing and stocking ponds of aqua farms.

PRESCRIBED BOOK(S):

1. Jhingran VG 1998. Fish and Fisheries of India, Hindustan Publishing Corporation, New Delhi
2. Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd., London

REFERENCES

1. Boyd CE. 1979. *Water Quality in Warm Water Fish Ponds*. Auburn University
2. Boyd, CE. 1982. *Water Quality Management for Pond Fish Culture*. Elsevier Sci. Publ. Co.
3. FAO. 2007. *Manual on Freshwater Prawn Farming*.
4. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
5. Lovell RT.1998. *Nutrition and Feeding of fishes*.Chapman& Hall.
6. Mcvey JP. 1983. *Handbook of Mariculture*. CRC Press.
7. MPEDA: *Handbooks on culture of carp, shrimp, etc.*
8. Bose AN et.al., 1991. *Costal Aquaculture Engineering*.Oxford & IBH Publishing CompanyPvt.Ltd.
- 9.Stickney RR 1979. *Principles of Warm Water Aquaculture*. John Wiley & Sons Inc.1981
10. Pillay TVR &M.A.Dill, 1979.*Advances in Aquaculture*. Fishing News Books Ltd., London

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I B.Sc AQUACULTURE PRACTICAL EXAMINATION

Practical - I

Course Code: AQU P11A

Title of the paper:Basic Principles of Aquaculture

Time: 3hrs.

Max. Marks 40M

I. Estimate the amount of Chlorides/ Dissolved Oxygen/Free Carbon dioxide /Total
Hardness of the given sample. CO4, L5 **10 M**

Procedure: 5M

Calculations: 3M

Report: 2M

II. Identify, draw labelled diagram, classify and comment on **5x3=15 M**
CO1, CO2, CO6, L3

A. Algal Blooms

Identification : 1M

B. Plankton

Diagram :1/2 M

C. Aquatic weed

Notes : 11/2M

D. Aquatic Insect

E. Weed Fish

III. Practical Record Book CO7, L3 **5M**

IV. Field note Book CO5, L1 **5M**

V. VIVA CO7, L5 **5M**

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Title of the Paper: **Fresh water & Brackish water Aquaculture**

Semester: - III

Course Code	AQU-301C	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 : 2021-2022	Year of Offering 2021-2022	Year of Revision –	Percentage of Revision:

Objective of the course: The students understand Fresh water & Brackish water Aquaculture.

Course outcomes:

CO1: Learn the Status, Scope and Prospects of fresh water aquaculture in the world, India and AP.

CO2: Learn about Major Cultivable Indian Carps and Exotic fish Species introduced in India

CO3: Know about recent developments in the culture of clarius, anabas and murrels and special systems of aquaculture.

CO4: Gain knowledge of commercially valuable Fresh water prawns of India and their culturing methods.

CO5: Learn about culturing of brackish water Prawn Species *P.mondon* and *L.vannamei* and hatchery technology's involved

Learning Objectives:

- To know the present status of freshwater and brackish water aquaculture and their role in world economy and food production.
- To gain knowledge on carp, prawn, shrimp and crab culture and composite fish culture systems.
- To improve the technical knowledge on fish and shrimp hatchery technology and culture practices.
- To improve the knowledge and technical skills for the identification of cultivable fin fish and shell fish.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>UNIT- I: Introduction Status, scope and prospects of freshwater aquaculture in the world, India and AP Status, scope and prospects of brackish water aquaculture in the world, India and AP Freshwater and brackish water resources in India. Special culture systems - brief study of culture in running water, recirculatory systems, cages and pens, sewage-fed fish culture.</p>	10
II	<p>UNIT-II: Culture of carp, air-breathing, and exotic fishes Bundh breeding and Induced breeding of Indian major carp by hypophysation technique .Synthetic harmones used for induced breeding of carps. Types of fish hatcheries- traditional, Chinese and jar hatcheries. Preparation and Management of Indian major carp culture ponds – nursery, rearing and grow-out ponds. Culture of air-breathing fishes in India; Pangasius fish farmin Exotic fishes introduced to India and their impact on indigenous species. Composite fish culture of Indian and exotic carps – compatibility and competition.</p>	10
III	<p>UNIT-III: Culture of prawn and ornamental fishes Breeding and hatchery management of freshwater prawn, <i>Macrobrachium rosenbergii</i>. Culture of <i>Macrobrachium rosenbergii</i> and <i>M. malcolmsonii</i> – biology, seed production, pond preparation, stocking, management, feeding, morph types and harvesting. Ornamental fish culture– Common freshwater and marine ornamental fishes; Fabrication, setting up and maintenance of freshwater and marine aquarium. Breeding and rearing of freshwater ornamental fishes.</p>	15
IV	<p>UNIT-IV: Culture of shrimp and crab Breeding and Hatchery management of a typical penaeid shrimp (<i>Penaeus monodon</i> or <i>Litopenaeus vannamei</i>) Transportation of shrimp seed and nursery management. Culture of <i>P. mondon</i> or <i>L. vannamei</i> –pond preparation, stocking, management of water, feedand diseases, and harvesting. Culture of mud crab, <i>Scylla serrata</i>.</p>	15
V	<p>UNIT-V: Culture of brackish water fishes Breeding and Culture of milk fish, <i>Chanos chanos</i>. Breeding and Culture of Asian sea bass, <i>Lates calcarifer</i>. Breeding and Culture of grey mullet, <i>Mugil cephalus</i>. Fish and shellfish culture in cages and pens.</p>	10

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

**Semester –III
w.e.f. 2021-2022**

Time: 3hrs

Model question paper

Title of the paper: Fresh water & Brackish water Aquaculture.

Code – AQU-301C

max.marks: 70

Section – A

Answer any **four** questions. Each question carries **five** marks.

4 x 5= 20.

Draw neat labeled diagrams wherever necessary.

1. Freshwater culture systems
2. Cages
3. Bundh breeding
4. Nursery pond
5. Seed production
6. Feed and diseases
7. Harvesting
8. Chanos chanos

Section – B

Answer any **five** questions. Each question carries **Ten** marks.

5 x 10 =50

Draw neat labeled diagrams wherever necessary.

9. Describe the status and prospects of freshwater aquaculture in A.P.?
10. Write an essay on major cultivable Indian carps
11. Explain recent culture trends in murrels
12. . Describe composite fish culture system of Indian and exotic carps
13. Explain advantages in the culture of air-breathing fishes.
- 14 Write an essay on the commercial value of Indian freshwater prawn.
15. Breeding and Culture of milk fish

SEMESTER-III

Guide lines to the paper setter
Max.Marks:70

Time: 3 hrs

Paper Title: - Fresh water & Brackish water Aquaculture.

Paper Code: AQU-301C

Note:1. Answer **any four** questions out of eight in Part-A. Each question carries five marks.
4X 5 = 20M.

2. Answer any **five** questions out of eight in Part-B. Each question carries 10 marks.5 X 10 =
50M.

	PART	Unit –I	Unit – II	Unit-III	Unit – IV	Unit – V
5 Marks Questions	A	1	2	2	2	1
10 Marks Questions	B	1	2	2	1	2
Weightage		15	30	30	20	25

- Note:**
1. please provide the scheme of valuation for the paper.
 2. Question paper should be both in English and Telugu media.

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AQUACULTURE
PRACTICAL – III

w.e.f. 2021-2022.
Code: AQU- 301P
(2hrs/week)

MAX.MARKS: 50.

PRACTICAL SYLLABUS

1. Identification of important cultivable carps.
2. Identification of important cultivable air-breathing fishes.
3. Identification of important cultivable fresh water prawns.
4. Identification of different life history stages of fish.
5. Identification of different life history stages of fresh water prawn Collection and study of weed fish.
6. Identification of commercially viable crabs – Scylla cerrata, Portunus pelagicus, P.sanguinolentus, Neptunus pelagicus, N. Sanguinolentus .
7. Identification of lobsters – Panulirus polyphagus, P.ornatus, P.homarus, P.sewelli, P.penicillatus.
8. Identification of oysters of nutritional significance – Crossostrea madrasensis, C.gryphoides C. cucullata, C.rivularis , Picnodanta .
9. Identification of mussels and clams.
10. Identification of developmental stages of oysters.
- 11 .Field visit to aqua farm and study of different components like dykes etc.

PRESCRIBED BOOK(S):

1 Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, New Delhi

REFERENCES:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, New Delhi .
2. Srivatsava 1993. Fresh water aquaculture in India, Oxford-IBH, New Delhi Marcel H 1972. Text book of fish culture.Oxford fishing news books.

Practical - III

w.e.f. 2021 - 2022

Model Question Paper (External)

Max. Marks: 25
Paper Code: AQU-301P

1. Identify, draw labeled diagram & write notes on important cultivable carps. 2x2=4
A & B
2. Identify, draw labeled diagram & write notes on air-breathing fishes. 2x2=4
A & B
3. Identify, draw labeled diagram & write notes on important cultivable fresh water prawns. 2x2=4
A&B
4. Identification of commercially viable crabs 2x2=4
A & B
5. Identify, draw labeled diagram & write notes on A, B, C 3x2=6
- 6 Identification of developmental stages of oysters 3

Total-----25m

Guide lines for the practical Examiners

1. ½ Mark for identification, ½ Mark for labeled diagram & 1 Mark for notes for each question.
(2 specimens / slides / models.)
2. ½ Mark for identification, ½ Mark for labeled diagram & 1 Mark for notes for each question.
(2 specimens / slides / models.)
3. ½ Mark for identification, ½ Mark for labeled diagram & 1 Mark for notes for each question.
(2 specimens / slides / models.)
4. ½ Mark for identification, ½ Mark for labeled diagram & 1 Mark for notes for each question.
(2 specimens / slides / models.)
5. ½ Mark for identification, ½ Mark for labeled diagram & 2 Mark for notes for each question.
(3 specimens / slides / models.)
6. Labeled diagrams 1 mark & 2 marks for notes (3marks)

INTERNAL PRACTICAL- III

Practical –III Code: AQU-301P. MODEL QUESTION PAPER -III

Max.marks:25M.

Time: 3hrs.

- | | | |
|---------------------|-------|------|
| 1. Attendance | ----- | 05M. |
| 2. Record | ----- | 10M. |
| 3. Field note book. | ----- | 05M |
| 4. Assignment | ----- | 05M. |

Total ----- 25M.

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(AUTONOMOUS).**

NACC reaccredited at 'A' level
Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Fish health management**

Semester: - V

Course Code	<i>AQU-501C</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 : 2021-2022	Year of Offering 2021-2022	Year of Revision –	Percentage of Revision:

Objective of the course: The students understand Fresh health management and Diseases of fishes.

Course outcomes:

CO1: Provide students with knowledge about fish diseases and pathological aspects of diseases.

CO2: Learn about Fungal, Viral and Bacterial diseases of finfish.

CO3: Learn about major shrimp viral, bacterial and protozoan diseases and prevention and therapy methods.

CO4: Gain knowledge of Nutritional deficiency related diseases and antibiotic and chemotherapeutics.

CO5: Understand and learn the importance of diagnostic tools in identification of diseases and

application and development of vaccines. To know about production of disease free seeds and good feed management.

Learning Objectives:

- To understand the principles of disease diagnosis and fish health management.
- To know the prophylactic and therapeutic methods to control the diseases.
- To understand the defence mechanism and immune system in fish and shrimp.
- To gain detailed knowledge on the disease symptoms, causative agent, preventive measures and treatment for microbial, parasitic, nutritional and environmental disorders in fish and shrimp.
- To understand the diagnosis tools that is followed in field of aquaculture and vaccine production for fish immunization.

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>UNIT I: Pathology and parasitology Introduction to fish diseases –Definition and categories of diseases – Disease and environment Disturbance in cell structure – changes in cell metabolism, progressive and retrogressive tissue changes, types of degeneration, infiltration, necrosis, cell death and causes Atrophy, hypertrophy, neoplasms, inflammation, healing and repair</p>	10
II	<p>UNIT II: Diseases of fin fish. Fungal diseases (both of shell and finfish) – Saprolegniosis, brachiomyxosis, ichthyophthiriosis 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, aeromonas, 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</p>	15
III	<p>UNIT III: Diseases of shell fish Major shrimp viral diseases – Baculovirus penaei, Monodon Baculovirus, 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>	12
IV	<p>UNIT IV: Nutritional diseases Nutritional pathology – lipid liver degeneration, Vitamin and mineral deficiency diseases. Aflatoxin and dinoflagellates. Antibiotic and chemotherapeutics. Nutritional cataract. Genetically and environmentally induced diseases</p>	8
V	<p>UNIT V: 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. Production of disease-free seeds. Evaluation criteria of healthy seeds. Good Feed management for healthy organisms, Zero water exchange, Probiotics in health management, Issues of bio security.</p>	15

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Semester –V

Model question paper

Title of the paper: Fish health management.

Time: 3hrs.

w.e.f. 2021-2022

Code – AQU-501

Max.marks: 70

4 x 5= 20.

Section – A

Answer any **four** questions. Each question carries **five** marks. Draw neat labelled diagrams wherever necessary.

1. Necrosis.
2. Atrophy
3. Lagenidium diseases
- 4 Bacterial kidney diseases.
5. Monodon Baculovirus
6. Yellow head baculovirus
7. Lipid liver degeneration
- 8, Zero water exchange.

Section – B

5 x 10 =50.

Answer any **five** questions. Each question carries **Ten** marks.

Draw neat labelled diagrams wherever necessary.

9. Write an essay on any two nutritional Requirements for cultivable fish?
10. Explain the changes in cell metabolism?
11. Explain about Bacterial diseases of shell fish?
12. Explain about channel cat fish viral disease prevention and therapy?
13. Describe the Protozoan diseases??
14. Write an essay on genetically and environmentally induced diseases?
15. Explain about application and development of vaccines?
16. Methods and regulations for transplants?

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Semester - V

Guide lines to the Paper Setter

W.e.f. 2021-2022

Title of the paper: Fish health management

Code – AQU-501C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A. Each question carries five marks.
4x5 = 20M.

2. Answer any **five** questions out of eight in Section – B. Each question carries Ten marks.
5x10= 50M.

	Section	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
5 Marks Questions	A	2	2	2	1	1
10 Marks Questions	B	1	2	2	1	2
Weightage		20	30	20	20	25

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be in English medium.

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AQUACULTURE
PRACTICAL -V

w.e.f. 2021-2022.
MAX.MARKS: 50.
(2hrs/week)

Code: AQU- 501P

PRACTICAL SYLLABUS

-
1. Enumeration of Bacteria by TPC Method
 2. Enumeration of total Coli forms
 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, hepatopncreas, lymphoid organ, muscles and nerves of prawn and shrimp
 6. Collection, processing and analysis of data for epidemiological investigations of viraldiseases
 7. Bacterial pathogens – isolation, culture and characterization
 8. Identification of parasites in fishes: Protozoan, Helmiths, 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 shell fish
 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

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

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

A. G.& S.G. SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU

EXTERNAL PRACTICAL- V

w.e.f. 2021-2022.

Code: AQU-501P

MODEL QUESTION PAPER –V

Time: 3 hrs.

Max.marks: 25m.

I.Estimation of antibiotics used in aquaculture practices	5M.
II. Biochemical tests	5M.
III.ELISA	:5M
IV. Identify, draw labelled diagram & write notes on A, B, C, D ,E	5X2=10

TOTAL: ----- 25M.

Guide lines for the practical Examiners

I:Estimation of carbohydrate content in aquaculture feeds (4 marks notes & Result 1 mark.)

II:Biochemical tests. (5 marks notes)

III:ELISA (5 marks notes)

IV. ½ Mark for identification, ½ Mark for labeled diagram & 2 Mark for notes for each question.

4 specimens / slides / models.

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VUYYURU-521165**

INTERNAL PRACTICAL-V

w.e.f. 2021-2022.

Code: AQU-501P

MODEL QUESTION PAPER -V

Max.marks:25M.

Time: 3hrs.

1. Attendance	-----	05M.
2. Record	-----	10M.
3. Field trip	-----	10M

Total ----- 25M.

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(AUTONOMOUS).**

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Title of the Paper: **Extension, Economics & Marketing**

Semester: - V

Course Code	AQU-502C	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 : 2021-2022	Year of Offering 2021-2022	Year of Revision –	Percentage of Revision:

Objective of the course: The students understand Extension, Economics & Marketing aspect of fisheries and aquaculture and help the students in applying their theoretical knowledge into practical in order to be self reliance and to be a good pace setters in the business world.

Course outcomes:

CO1: Gain the Knowledge of basic concepts of economics with reference to fisheries and various factors influencing the fishery products price.

CO2: Will come to know about fisheries marketing, methods of economic analysis of business organizations and preparation of project and project appraisal.

CO3: To know about application of economic principles to aquaculture operations.

CO4: Get the broad knowledge of scope and objectives, principles of fisheries extension.

CO5: Understand the importance of transfer technology of ICAR programmes and training at DAATTCentres and their role in education of aqua farmers through print and electronic media.

Learning Objectives:

- To explain fisheries economics and marketing.
- To understand economics constraints in fisheries development, free access to fisheries, sustainable yield curve and total revenue curve, bio economic equilibrium, factor rents welfare economic theory and its relevance for fisheries externalities.
- To understand fisheries extension methods and rural development
- Write Feasibility report

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	<p>UNIT – I Introduction Meaning and scope of economics with reference to fisheries Basic concepts of economics – goods, services, wants and utility, demand and supply, value price, market demand and individual demand, elasticity of demand, law of diminishing marginal utility Theory of production, production function in fisheries Various factors influencing the fishery product's price.</p>	10
II	<p>UNIT – II Fisheries marketing Basic marketing functions, consumer behavior and demand, fishery market survey and test marketing a product Fish marketing – prices and price determination of fishes Marketing institutions- primary (producer fishermen, fishermen cooperatives, and fisheries corporations) and secondary (merchant/agent/speculative middlemen) Methods of economic analysis of business organizations Preparation of project and project appraisal</p>	15
III	<p>UNIT-III Fisheries economics Aquaculture economics- application of economics principles to aquaculture operations Various inputs and production function. Assumptions of production function in aquaculture analysis, least cost combination of inputs, laws of variable proportions 3 Cost and earnings of aquaculture systems – carp culture, shrimp farming systems, 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</p>	15
IV	<p>UNIT-IV Fisheries extension Fisheries extension – scope and objectives, principles and features of fisheries extension education Fisheries extension methods and rural development Adoption and diffusion of innovations</p>	10
V	<p>UNIT-V Transfer of technology ICAR programs – salient features of ORP, NDS, LLP, IRDP, ITDA, KVK, FFDA, FCS, FTI, TRYSEM Training – meaning, training vs. education and teaching DAATT centers and their role in tot programs, video conferencing, education of farmer through print and electronic media.</p>	15

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Semester –V

w.e.f. 2021-2022

Model question paper

Title of the paper:Extension, Economics & Marketing

Code – AQU-502C

Time: 3hrs.

Max.marks: 70

Section – A

4 x 5= 20.

Answer any **four** questions. Each question carries **five** marks. Draw neat labelled diagrams wherever necessary.

1. Demand and supply.
2. Goods
3. Consumer behaviour
- 4.Preparation of project
5. NABARD
- 6.Scope and objectives
7. IRDP
8. Salient features of ORP

Section – B

5 x 10 =50.

Answer any **five** questions. Each question carries **Ten** marks. Draw neat labelled diagrams wherever necessary.

9. Write an essay on any two nutritional Requirements for cultivable fish?
10. Explain the market demand and individual demand?
11. Explain about production function in fisheries?
12. Give an account of Marketing institutions?
13. Methods of economic analysis of business organizations?
14. Write an essay on shrimp farming systems?
15. Explain about Fisheries extension methods and rural development?
16. DAATT centers and their role in tot programs?

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Semester - V

Guide lines to the Paper Setter.

W.e.f. 2021-2022

Title of the paper: Extension, Economics & Marketing

Code – AQU-502C

Time: 3hrs.

Max. Marks: 70.

1. Answer any **four** questions out of eight in Section – A.

Each question carries five marks. $4 \times 5 = 20M$.

2. Answer any **five** questions out of eight in Section – B

Each question carries Ten marks. $5 \times 10 = 50M$.

	Section	UNIT-I	UNIT-II	UNIT-III	UNIT-IV	UNIT-V
5 Marks Questions	A	2	2	1	1	2
10 Marks Questions	B	2	2	2	1	1
Weightage		30	30	25	20	25

Note: 1. please provide the scheme of valuation for the paper.

2. Question paper should be in English medium.

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

AQUACULTURE
PRACTICAL -VI

w.e.f. 2021-2022.

Code :AQU- 502P
MAX.MARKS : 50.
(2hrs/week)

PRACTICAL SYLLABUS

PRACTICAL:

Project work/on-job training at industry.

PRESCRIBED BOOK(S):

1. Adivi Reddy sv 1997. An introduction to extension education. Oxford & IBH Co.Pvt. Ltd. New Delhi
2. Jayaraman R 1996. Fisheries Economics. Tamilnadu Veterinary and Animal Science University. Tuticorn
3. Subba Rao N 1986. Economics of Fisheries. Daya publishing house, Delhi

REFERENCES:

1. Dewwett KK and Varma JD 1993. Elementary economic theory. S.chand, New Delhi
2. Korakandy R 1996. Economics of Fisheries Mangement. Daya Publishing House, Delhi
3. Tripathi SD 1992. Aquaculture Economics. Asian Fisheries Society, Mangalore.