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

ODD SEMESTER

DEPARTMENT OF ZOOLOGY

MINUTES OF BOARD OF STUDIES

B.Sc. AQUACULTURE

22-10-2022

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 3:00 pm on 22-10-2022 in the Department of Zoology.

S.No	Name	Designation	signature
1.	**Smt. D.A.Kiranmayee** Head, Department of Zoology A.G&S.G.S Degree College Vuyyuru	Chair person	**D.A.Kiranmayee**
2	Smt. Dr.L.Suseela Bio Sciences & Bio technologyKrishna University Machilipatnam.	University Nominee	Dr.L.Suseela 22/10/2
3.	**Sri Dr.M.Vijay kumar** Head,Department of Zoology SRR & CVR Govt. Degree College, Vijayawada.	Subject Expert	**Dr.M.Vijay kumar**
4.	**Sri Ch. Venkateswaralu,** Head, Department of Zoology, P.B. Siddhartha College, Vijayawada.	Subject Expert	**Ch. Venkateswaralu,**
5.	**Sri.B. Appala Naidu,** Asst. Project Manager, RGCA Manikonda.	Industrialist	**B. Appala Naidu,**
6.	**Smt. K. Padmaja,** Lecturer in Zoology, A.G&S.G.S Degree College Vuyyuru-	Member	**K. Padmaja,**
7	**Smt. Dr.V.Subhashini,** Lecturer in Zoology, A.G & S.G.S Degree College Vuyyuru-	Member	**Dr.V.Subhashini**
8	**Sri.Ch.Chiranjeevi,** P.hd –Research Scholar, Dept.of Botany & Microbiology, Acharya Nagarjuna University Guntur.	Student Represent	**Ch.Chiranjeevi,**

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 2022-2023.

2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II B.Sc (A.B.C) for the academic year 2022-2023.

3.To recommend Semester End Internship (Apprenticeship) to students of III ABC for the academic year 2022-2023 in V Semester

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 status.

6. Any other matter.

Chairman.

RESOLUTIONS

1. It is resolved to continue the same 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 2022 – 2023.
2. It is resolved to continue the change 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 2022 – 2023.
3. It is resolved to send students of III ABC for Semester End Internship (Apprenticeship) for the academic year 2022-2023 in V Semester
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 2022-2023.
5. It is resolved to continue the following teaching & evaluation methods for the Academic year 2022-23.
6. Any other matter.

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 & 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& III 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 III 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).

Chairman

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NAAC reaccredited at 'A 'level

Autonomous –ISO 9001-2015 Certified

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

Semester: - I

Course Code	***AQTTI1A***	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 : 2019-2020	Year of Offering 2019-2020	Year of Revision – 2021-22	Percentage of Revision: 50%

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
Course Details

Unit	Learning Units	Lecture Hours
I	**UNIT-I (Introduction)** Definition and History of Aquaculture Concept of Blue Revolution and PradhanMantriMatsyaSampadaYojana (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 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 Aquaculture Systems – Pond, Raceways, Cage, Pen, Rafts, Running water, Water Recirculating Systems, Biofloc Technology and 3-C System Pond cu Fin fish culture methods - Monoculture, Polyculture and Monosex culture and Integrated fish farming**.**	**12**
V	**UNIT-V (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	**14**

	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	

PRESCRIBED BOOK(S):

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

Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd., London

REFERENCES:

Pillay TVR &M.A.Dill, 1979. Advances in Aquaculture. Fishing News BooksLtd., London

Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & SonsInc. 1981

Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsivier Scientific Publishing

Bose AN et.al, 1991. Costal 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

Collection of water and soil samples and estimation of various parameters.

Preparation of charts on aeration devices.

Collection of different culture species stage-wise {spawn, fry, fingerlings, zero size and adult (more than 200 g)}

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I SEMESTER END EXAMINATIONS

MODEL PAPER **Code:AQTT11A**

Title of the paper: Basic Principles of Aquaculture
(W.E.F 2022-2023)

Time: 3 Hours **Max. Marks: 70**

Answer **ALL** the following questions 5X14=70m

1(a) Define capture and culture fisheries. List out the advantages of culture fishery over capture fishery CO1, L1 10M

b)Explain the significance of Biofloc Technology CO2, L2 5M

OR

c).Mention the present status of Aquaculture at global level, India and Andhra Pradesh CO,1 L1- 10 M

d) Explain the concept of blue revolution CO1, L2 5M

2. a) Explain the different types of freshwater aquaculture CO2, L2 10M

b). Lotic and lentic systems CO2 L1 5M

OR

c) Describe the different types of pond culture methods. CO2, L2 10M

d)What is Quarantine ponds CO1, L1 5M

3. a) Give an account of the different types of hatcheries and describe the design of a modern hatchery. CO4 L2 10M

b). Classify ponds based on water resources. CO4, L2 5M

OR

c) Explain the space allocation CO3 L2 10M

d) Mention the criteria for site selection of an ideal fish pond CO4, L1 5M

4. a). Describe the structure and components of a barrage pond. CO4, L1 10M

b). What is Mari culture? CO2, L1 5M

OR

c). Describe the lay out and arrangement of nursery pond in a fish farm. CO4, L1 10M

d). Explain the importance of Integrated fish farming. CO4 CL3 5M

5. a) Analyze the physico-chemical conditions of water optimum for fish culture. CO5L4 10 M

b).Analyze the control measures for weed fish in culture ponds CO6, L4 5M

OR

c).Write an essay on aquatic weed plants in a fish pond, their advantages and disadvantages CO6, L4 10M

d). Justify the role of nutrients in a fish pond. CO5, L 5 5 M

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AQUACULTURE

PRACTICAL – I

w.e.f. 2022-2023.
Code:*AQTP11A*
MAX.MARKS: 40.
(2hrs/week)

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 importanceof preservation ofmuseum specimens and identify the animals based on special identifyingcharacters.
- Maintain a neat, labeledrecord ofidentified museum specimens and exhibit the hidden creative talent.

SYLLABUS

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 (*Clariusgariepinus*, *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.

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I B.Sc AQUACULTURE
PRACTICAL EXAMINATION

Practical - I **Course Code:**
AQT 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
B. Plankton
C. Aquatic weed
D. Aquatic Insect
E. Weed Fish

Identification : 1M
Diagram :1/2 M
Notes : 11/2M

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	**AQTT31A**	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 : 2020-2021	Year of Offering 2020-2021	Year of Revision – 2022-23	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

LearningObjectives:

- 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	**Freshwater Fin Fish Aquaculture** Status, scope and prospects of freshwateraquaculturein theworld,India and AP Criteria for the selection of species for culture Natural seed resources and procurement of seed for stocking Culture of cultivable major Indiancarps–*Labeo, Catla*and*Cirrhinus* AndMinorcarps Culture of Exoticfish species – *Tilapia,Pangassius*and*Clarius species* Impactofexoticfish,compatibilityofIndianandexoticcarpsand Competitionamong them Compositefish culturesystem ofIndian and exotic and genetically modified carps (Amur common carp, JayanthiRohu	13
II	**Freshwater Shell Fish Aquaculture** Freshwaterprawns ofIndia -commercial value Natural seed resources and procurement of seed for stocking *Macrobrachiumrosenbergii*– biology, seed production, pond preparation, stocking, Managementofnursery andgrow-outponds,feeding,morphotypesand harvesting *M. malcolmsonii* - biology, seed production, pond preparation,stocking, Managementofnursery andgrow-outponds,feeding,morphotypesand harvesting	**14**
III	**Brackish Water Fin Fish Aquaculture** Status, scope and prospects of brackishwateraquaculturein theworld,India and AP Major cultivable species for brackish water aquaculture Biology and culture of *Latescalcarifer* Biology and culture of *Chanoschanos* Biology and culture of *Mugilcephalus* Biology and culture of *Etroplussuratensis* Biology and culture of *Trachinotus*sps (Pampano)	**15**
IV	**Brackish Water Shell Fish Aquaculture-I** Cultureof*P.mondon*–Hatcherytechnologyandculturepracticesincludingfeedand Diseasemanagement Cultureof*L.vannamei*– Hatcherytechnologyandculturepracticesincludingfeedand Diseasemanagement. Mixed cultureof fish and prawns	**11**
V	**Export – oriented Brackish Water Shell Fish Aquaculture-II** Biology and culture of *Scylla serrata* Biology and culture of *Pinctada vulgaris* Biology and culture of *Crassostrea* species	**07**

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Semester –III
Time: 3hrs Model question paper **w.e.f. 2022-2023**
Title of the paper: Fresh water & Brackish water Aquaculture. **Code – AQTT31A**
max.marks: 75

SECTION – A

Answer and FIVE of the following **5x5=25 Marks**

1. Discuss the status of freshwater aquaculture in Andhra Pradesh. CO2, L2
2. Analyse the advantages of composite fish culture of carps CO1, L2.
3. Explain the natural seed resources of freshwater prawns CO3, L1
4. Analyze the significance of morpho types in scampi CO3, L4
5. Explain the culture aspects of sea bass in Andhra Pradesh CO4, L2
6. Explain the impact of disease management on the harvest in *L.vennamei*CO5, L4
7. Describe the off-bottom culture methods of edible oysters CO6, L1
8. Describe the biology of silver pompano CO4, L3

SECTION – B

Answer the following questions. **5X10=50 Marks**

9. Enumerate the various criteria for the selection of species for culture. CO1 L1

   OR

   Explain the culture of Indian major carps. CO1, L1

10. Discuss the pond management practices of *Macrobrachium rosenbergii* CO3, L2

    OR

    Describe the seed production methods in *Macrobrachium malcolmsonii* CO3, L2

11. Discuss the culture methods of sea bass. CO4, L2

    OR

    Explain the biology and culture of milk fish. CO4, L2

12. Describe the hatchery technology of *L.vennamei.* CO5, L1

    OR

    List out the various diseases of *P.monodon* add a note on prophylaxis and treatment. CO5, L1

13. Write an essay on pearl oyster culture CO6, L1

    OR

    Explain the culture aspects of mud crab. CO6, L1

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AQUACULTURE

PRACTICAL - III

w.e.f. 2022-2023.
Code: AQTP31A
MAX.MARKS: 50.
(2hrs/week)

PRACTICAL SYLLABUS

PRACTICALS:

1. Identification of important cultivable fresh water fishes (carps, cat fishes and Murrells)
2. Identification of important cultivable brackish water fishes
3. Identification of important cultivable fresh water prawns
4. Identification of important cultivable brackish wate rprawns
5. Identification of commercially viable crabs – Scyllaserrata, *Portunuspelagicus, P.sanguinolentus*, *Neptunuspelagicus*, *N.Sanguinolentus*
6. Identification of oysters of nutritional significance – *Crossostrea madrasensis, C.gryphoides, C. cucullata, C.rivularis, Picnodanta*.
7. Morph types of *Macro brachiumrosenbergii*
8. Identification of crustacean larval sequences (shrimp and crab)
9. Identification of diseases of *L. vennamei* and *P. monodon*
10. Field visitto freshwater/brackish water/prawn/shrimpfarmand studyof culture aspects.

Demonstration of dissection / dissected / virtual dissection:

1. *Channa*- Reproductive system
2. Shrimp – Reproductive system (Identification of male & female)

PRESCRIBED BOOK(S):

1. JhingranVG1998.FishandFisheriesofIndia, HindustanPublishingCorporation,New Delhi

REFERENCES:

1. SanthanamR,NSukumaranandPNatarajan1987.AManualofAquaculture, Oxford- IBH, New Delhi
2. Srivatsava1993. Fresh water AquacultureinIndia, Oxford-IBH,New Delhi
3. Marcel H 1972.Text book of Fish Culture. Oxford fishingnews books

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Practical - III

w.e.f. 2022 - 2023

Max. Marks: 40

Model Question Paper –External **Paper Code: AQTP31A**

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1. Identify and draw a neat labelled diagram of *Channa* reproductive system.
   Or
   Identify and draw a neat labeled diagram of prawn reproductive system. **10M**

   Identification: 1M
   Diagram: 4M
   Labelling: 5M

2. Identify, classify, draw labelled diagram and comment on

5X3=15M

   A. Cultivable fresh water fish
   B. Cultivable prawn/shrimp
   C. Cultivable brackish water fish
   D. Cultivable shell fish (crabs and oysters)
   E. Shrimp/prawn disease

   Identification: 1M
   Diagram: 1M
   Notes: 1M

3. Field Note Book **5M**

4. Record Book **5M**

5. VIVA **5M**

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SEMESTER V - APPRENTICESHIP