

**A.G&S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &
SCIENCE VUYYURU, KRISHNA Dt. A.P.(Autonomous)**
Accredited by NAAC with “A” Grade



DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES

B.Sc. AQUACULTURE(industrial Fisheries)

16-10-2019

EVEN SEMESTER



2

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 10.30 AM on 16-10-2019 in the Department of Zoology.

Smt.D.A. Kiranmayee. ...

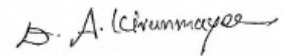
Presiding

Members Present:

- 1) S. Aruna Kiranmayee Chair person
(Smt. D.A.Kiranmayee.) 16/10/19 Head, Department of Zoology,
A.G&S.G.S Degree College of
Vuyyuru-521165.
- 2) J. Navaneetha Latha University Nominee
(Dr.J.N.Lavanya Latha.) 16/10/19 Dr. J.N.Lavanya Latha,
Krishna University,
Machilipatnam.
- 3) K. Daniel Academic Council
(Dr. K.Daniel.) 16/10/19 Nominee Head, Department of Zoology,
JKC College,
Guntur,
- 4) B. Elia Academic Council
(B. Elia.) 16/10/19 Nominee Head, Department of Zoology,
Gov. Degree College,
Pitapuram.
- 5) M. Lakshmi Priyanka Member
(kum.M.Lakshmi Priyanka.) 16/10/19 Lecturer in Zoology,
A.G&S.G.S Degree College
Vuyyuru-521165.
- 6) B. Appala Naidu Industrialist
(B. Appala Naidu.) 16/10/19 Asst. Project Manager,
RGCA
Manikonda.
- 7) Ch. Chiranjeevi Student Represent
(Ch.Chiranjeevi.) 16/10/19 P.hd –Research Scholar,
Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.

Agenda for B.O.S Meeting.

1. To recommend the new course aquaculture for the academic year 2019-2020.
2. To recommend the syllabi (Theory & Practical), Model question paper for II Semester of I B.Sc (A.B.C) for the academic year 2019-2020.
3. To recommend the syllabi (Theory & Practical), Model question paper and Blue print of II semester of I, B.Sc (A.B.C.) for the academic year 2019-2020.
4. To recommend the teaching and evolution methods to be followed under Autonomous statues.
5. Any other matter.



Chairman.

RESOLUTIONS

1. It is resolved to implement the new course B.Sc Aquaculture

2. It is resolved to implement the framed 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 2019 – 2020.

3. It is resolved to follow the Model question paper and Blue print of II semester of I B.Sc.(A.B.C.) for the academic year 2019-2020.

4. It is resolved to continue the following teaching & evolution methods for the Academic year 2019-20.

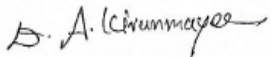
5 Any other matter.

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, 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).
- **Semester – End Examination:**
- The maximum mark for I (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 II semester for I B.Sc. (A.B.C).



**Adusumilli Gopalakrishnaiah & Sugar Cane Growers Siddhartha Degree
College of Arts & Science, Vuyyuru-521165, Krishna Dt. ,A.P.
(Autonomous).**

Aquaculture

Class: I B.Sc .(ABC)

Credits : 3

Title of the paper: Biology of fin fish & shell fish

60 hrs.(4hrs/week)

Semester – II

PAPER-II

w.e.f. 2019-2020

(Code: Aqu-201C)

Max.Marks : 70

Objective of the course: To introduce the Biology of fin fish & shell fish. General characters, Classification, growth and Development crustacean shellfish

Course outcomes:

1. Understand the characters and classification of cultivable Fin and Shell fish and commercial importance of crustaceans and Fish .
2. Gain Knowledge of feeding habits, gut content analysis and growth factors in fishes.
3. Understand and learn breeding in fishes, method of induced breeding in fishes.
4. To create awareness on parental care of Fishes and embryonic and larval development and environmental factors affecting development of major aquaculture organisms.
5. Acquire knowledge about Endocrine system in fishes.

UNIT- I: General character & Classification of Cultivable finShellfish

- 1.1 General Characters and classification of fishes & crustaceans up to the level of Class
- 1.2 Fish and Crustaceans of commercial importance
- 1-3 Sense organs of fishes and crustaceans .
- 1.4 Specialized organs in fishes – electric organ, venom and toxins
- 1.5 Buoyancy in fishes- swim bladder and mechanism of gas secretion

UNIT- II: Food, Feeding and Growth

- 2.1 Natural fish food, feeding habits, feeding intensity, stimuli for feeding, utilization of food, gut content analysis, forageratio
- 2.2 Principles of Age and growth determination; growth regulation, Growth rate measurement – scale method, otolith method, skeletal parts as age indicators
- 2.3 Length-frequency method, age composition, age-length keys, absolute and specific growth, back calculation of length and growth, annual survival rate,
- 2.4 Length-weight relationship.

UNIT- III: Reproductive Biology

- 3.1 Breeding in fishes, breeding places, breeding habits & places, breeding in natural environment and in artificial ponds, courtship and reproductive cycles
- 3.2. Induced breeding in fishes
- 3-3 Breeding in shrimp, oysters, mussels, clams, pearl oyster, pila, and cephalopods.

UNIT- IV: Development

- 4.1. Parental care in fishes, ovo-viviparity, oviparity, viviparity, nest building and brooding
- 4.2 Embryonic and larval development of fishes
- 4.3 Embryonic and larval development of shrimp, crabs and molluscs of commercial importance
- 4.4 Environmental factors affecting reproduction and development of cultivable aquatic fin & shell fish

UNIT- V: Hormones & Growth.

- 1.1 Endocrine system in fishes.
- 1.2 Neurosecretory cells, androgenic gland, ovary, chromatophores,
- 1.3 Molting, molting stages, metamorphosis in crustacean shellfish

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Krishna Dt. A.P. (Autonomous)

Semester –II
Model Question Paper

w.e.f. 2019-2020

Title of the paper: Biology of fin fish & shell fish

Time: 3hrs.

Code – AQU-201C

Max.marks: 70

Section – A

4 x 5 = 20.

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

1. Writethegeneralcharactersofthefishes?
2. Explaintheelectricorganinfishes?
3. writethedefinitionanddifferenttypesofnaturalfishfeeding?
4. Definethegrowthratemeasurementinfish?
5. Whatisthebreeding?writethebreedinginnaturalenvironment?
6. What is nestbuilding?
7. Explain the structure of fish ovary?
8. pearl oyster

Section – B

5 x 10 =50.

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

9. Definethe“fishgutcontentanalysis”?
10. Explaintheinducedbreedinginfishesanddrawthediagram?
11. Explain about the Breeding in shrimps
12. Explain about parental care of fishes?
13. Explain the environmental factors affecting reproduction of fin fishes?
- 14 Explain the fish endocrinesystem?
- 15 Explain about Molting stages of crustaceans

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

Semester - II

Guide lines to the Paper Setter.

W.e.f. 2019-2020

Title of the paper: Biology of fin fish & shell fish.

Code – AQU-201C

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	1	2	1
10 Marks Questions	B	1	1	2	2	2
Weightage		20	20	25	30	25

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

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

AQUACULTURE
PRACTICAL - II

w.e.f. 2019-2020

.Code :AQU- 201P

MAX.MARKS : 50.

(2hrs/week)

SYLLABUS]

1. Study of mouth parts in herbivorous and carnivorousfishes
- 2.Comparative study of digestive system of herbivorous and carnivorousfishes
3. Length-weight relationship offishes
4. Gut content analysis in fishes andshrimp
5. Mouth parts and appendages of cultivable prawns, shrimps and othercrustaceans
6. Study of eggs of fishes, shrimps, prawns and othercrustaceans
7. Study of oyster eggs
8. Embryonic and larval development offish
9. Study of gonadal maturity and fecundity in fishes and shellfish
- 10.Observation of crustaceanlarvae
- 11.Study of nest building and brooding offishes

PRESCRIBED BOOK(S)

Bone Q et al., 1995. Biology of fishes, Blackie academic & professional, LONDON
1.14SaxenaAB1996.LifeofCrustaceans.AnmolPublicationsPvt.Ltd.,NewDelh

REFERENCES:

Tandon KK & Johal MS 1996. Age and Growth in Indian Fresh Water Fishes.
Narendra Publishing House, New Delhi.
Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, New York

Guiland J.A (ed) 1984. Penaeid shrimps- Their Biology and Management. 1.18Barrington
FJW 1971. Invertebrates: Structure andFunction.ELBS

1.19Parker F & Haswell 1992. The text book of Zoology, Voll. Invertebrates (eds. Marshal
AJ & Williams). ELBS & Mc Millan &Co.

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VUYYURU, KRISHNA Dt. A.P.(Autonomous)
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DEPARTMENT OF ZOOLOGY
MINUTES OF BOARD OF STUDIES

B.Sc. AQUACULTURE(Industrial Fisheries)

16-04-2019

ODD SEMESTER



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 10.30 AM on 16-04-2019 in the Department of Zoology.

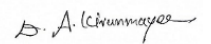
Smt.D.A. Kiranmayee. ... Presiding

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 Dr. J.N.Lavanya Latha,
(Dr.J.N.Lavanya Latha.) Krishna University,
Machilipatnam.
- 3)  Academic Council Head, Department of Zoology,
(Dr. K.Daniel.) Nominee JKC College,
Guntur,
- 4)  Academic Council Head, Department of Zoology,
(B.Elia.) Nominee Gov. Degree College,
Pitapuram.
- 5)  Industrialist Asst. Project Manager,
(B. Appala Naidu.) RGCA
Manikonda.
- 6)  Student Represent P.hD –Research Scholar,
(Ch.Chiranjeevi.) Dept.of Botany & Microbiology,
Acharya Nagarjuna University,
Guntur.
- 7)  Member Lecturer in Zoology,
(kum.M.Lakshmi Priyanka.) A.G&S.G.S Degree College
Vuyyuru-521165.

Agenda for B.O.S Meeting.

1. To recommend the **New program B. Sc. Aquaculture** for the academic year 2019-2020.
2. To recommend the syllabi (Theory & Practical), Model question paper for I Semester of I B.Sc (Aquaculture) for the academic year 2019-2020.
3. To recommend the teaching and evaluation methods to be followed under Autonomous status.
4. Any other matter.



Chairman.

RESOLUTIONS

1. It is resolved to implement the **new program B.Sc Aquaculture**
2. It is resolved to implement the recommend syllabi (Theory & Practical), model question paper for I Semester of I B.Sc. Aquaculture (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2019 – 2020.
3. It is resolved to follow the Model question paper and Blue print of I semester of I B.Sc.(A.B.C.) for the academic year 2019-2020.
4. It is resolved to continue the following teaching & evaluation methods for the Academic year 2019-20.

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:

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Semester – End Examination:

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- 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 semester for I B.Sc. (A.B.C).

B. A. Chinnayee

Chairman

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

Aquaculture

Semester – I

Class: I B.Sc Aquaculture.(ABC)

PAPER-I

**w.e.f. 2019-2020
(Code: Aqu-101C)**

Credits : 3

Title of the paper: Basic principles of aquaculture.

60 hrs.(4hrs/week)

Max.Marks : 70

Objective of the course: To introduce the basic principles of Aquaculture (Industrial fishers). Understand the nature and basic concept of aquaculture.

Course outcomes:

1. Learn about the concept of Blue Revolution, Types of Aquaculture systems and scope of Aquaculture at global, India and Andhra level.
2. Understand the concepts of Ecology, and Nutrient cycles in culture ponds.
3. Acquire knowledge of different types of ponds and their functional classification.
4. Understand the important factors involved in construction of ideal fish pond.
5. Acquire knowledge of pond management factors, eradication of predators and weed control, physico-chemical Conditions to be maintained.

UNIT- I: Introduction

10hrs.

- 1.1: Concept of Blue Revolution - History and definition of Aquaculture.
- 1.2: Scope of Aquaculture at global level, India and Andhra Pradesh.
- 1.3: Fresh water aquaculture, brackish water aquaculture and mariculture
- 1.4: Different Aquaculture systems – Pond, Cage, Pen, Running water, Extensive, Intensive and & Semi-Intensive Systems and their significance. Monoculture, Polyculture and Monosex culture systems
- 1.5: Aquaculture versus Agriculture; Present day needs with special reference to Andhra Pradesh

UNIT-II : Pond Ecosystem

15hrs.

- 2.1 General Concepts of Ecology, Carrying Capacity and Food Chains
- 2.2: Lotic and lentic systems, streams and springs
- 2.3: Nutrient Cycles in Culture Ponds – Phosphorus, Carbon and Nitrogen
- 2.4. Importance of Plankton and Benthos in culture ponds, nutrient dynamics and algal blooms
- 2.5 Concepts of Productivity, estimation and improvement of productivity

UNIT-III: Types of fish ponds

10hr

- 3.1 Classification of ponds based on water resources – spring, rain water, flood water, well water and water course ponds
- 3.2: Functional classification of ponds – head pond, hatchery, nursery, rearing, production, stocking and quarantine ponds
- 3.3: Hatchery design

UNIT-IV : pond preparation

15hrs.

- 4.1 Important factors in the construction of an ideal fish pond – site selection, topography, nature of the soil, water resource
- 4.2. Lay out and arrangements of ponds in a fish farm
- 4.3 . Construction of an ideal fish pond – space allocation, structure and components of barrage pond

UNIT- V : Pond management factor

10hrs

- 5.1: Need of fertilizer and manure application in culture ponds; Role of nutrients; NPK contents of different fertilizers and manures used in aquaculture; and precautions in their application.
- 5.2. Physico-chemical conditions of soil and water optimum for culture – temperature, depth, turbidity, light, water and shore currents, PH, DOD, CO₂ and nutrients; measures to increase oxygen and reduce ammonia & hydrogen sulphide in culture ponds; correction of PH.
- 5.3 Eradication of predators and weed control – advantages and disadvantages of weed, weed plants in culture ponds, aquatic weeds, weed fish, toxins used for weed control and control of predators

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

Semester – I

Model Question Paper

Title of the paper: Basic principles of aquaculture .
Time: 3hrs.

w.e.f. 2019-2020
Code – AQU-101C
Max.marks: 70

Section – A

4 x 5= 20.

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

1. What is Aquaculture? Write the scope of aquaculture in India.
2. Polyculture.
3. Write about Food Chains.
4. Flood water.
5. Write about Nursery and Stocking ponds.
6. Site selection.
7. Draw diagram of Barrage pond and write its importance.
8. Toxins used for Weed control.

Section – B

5 x 10 =50.

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

11. Write different types of Aquaculture Systems.
12. Define Mari culture and explain about it.
13. Write about Nutrient cycles in culture Ponds
14. Explain Concepts and improvement of productivity.
15. Explain Hatchery design with the help of diagrams.
16. Write about important factors in the construction of an ideal fish Pond
17. Physico-chemical conditions of soil and water optimum for Culture pond
18. Explain advantages and disadvantages of Weeds in Culture ponds

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

Semester - I

Guide lines to the Paper Setter

W.e.f. 2019-2020

Title of the paper: Basic principles of aquaculture

Code – AQU-101C

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	1	2	2	1
10 Marks Questions	B	2	2	1	1	2
Weightage		30	25	20	20	25

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

2. Question paper should be both in English and Telugu media.

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

**AQUACULTURE
PRACTICAL - I**

w.e.f.2019-20

2019-2020.

Code :AQU- 101P

MAX.MARKS : 50.

(2hrs/week)

[PRACTICALS]

- 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.Field visit to nursery, rearing and stocking ponds of aquafarms.
- 6.Field visit to hatchery.
- 7.Study of algal blooms and their control.
- 8.Collection & identification of zooplankton and phytoplankton.
- 9.Determination of soil nitrogen and phosphorus.
10. Collection and study of aquatic weeds.
- 11.Field survey of nearby habitat for dietary dependency on and requirement of aqua-products.

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 Books Ltd., London
- 1.16StickneyRR1979.PrinciplesofWarmWaterAquaculture.JohnWiley&SonsInc.1981
- 1.17Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company. 1.18Bose AN et.al., 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt.Ltd.

EXTERNAL PRACTICAL- I
w.e.f. 2019-2020.
(Practical-1)

MODEL QUESTION PAPER –I

)
Code: AQU-101P

Time: 3 hrs.

Max.marks: 25m.

- I. Estimation of dissolved oxygen. 6M.
II. Study of algal blooms and their control 4M.

III.: Identify, draw labeled diagram & write notes on
A, B, C, D 4X3=12M

1. Viva. 3M
TOTAL: ----- 25M.

Guide lines for the practical Examiners

I: Estimation of dissolved oxygen.(5marks notes &1 mark for result.)

II : Study of algal blooms and their control. (3 marks notes, labeled diagram 1 marks)

III :1Mark for identification, 1 Mark for labeled diagram & 3Mark for notes for each question.

4 specimens / slides / models.

INTERNAL PRACTICAL- I

(2 hrs/week).

(Practical -I)Code: AQU-101P.

MODEL QUESTION PAPER -I

Max.marks:25M.

Time: 3hrs.

1. Attendance ----- 05M.
2. Record -----10M.
3. Field note book. ----- 05M
4. Assignment ----- 05M.
Total ----- 25M.
