

**A.G &S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &  
SCIENCE VUYYURU, KRISHNA Dt. A.P.(Autonomous)**

**Accredited by NAAC with “A” Grade**



**2020-2021**

**DEPARTMENT OF ZOOLOGY**

**MINUTES OF BOARD OF STUDIES**

**B.Sc. AQUACULTURE(Industrial Fisheries)**

**04-07-2020**

**ODD SEMESTER**



meeting of Board of studies in Zoology for the Autonomous courses  
A.G&S.G.S Siddhartha Degree College of Arts & Science, Vuyyuru, held at 11.00  
AM on 04-07-2020 in the Department of Zoology.

Smt.D.A.

Presiding

KiranmayeeMembers

Presente

1) *B. Aruna Kiranmayee* Chair person

Head, Department of Zoology,  
A.G&S.G.S Degree College of  
Vuyyuru-521165.

(Smt. D.A.Kiranmayee.)

2) *J. Navene Latha* University Nominee  
(Dr.J.N.Lavanya Latha.) 4/7/2020

Krishna  
University,  
Machilipatnam.

3) .....  
(Dr.K.Daniel)

Academic Council  
Nominee

Head, Dept.of Zoology,  
JKC College, Guntur.

4) .....  
(B.Elia)

Academic Council  
Nominee

Head, Dept.of Zoology,  
Govt.DegreeCollege,  
Pitapuram.

5) *M. Lakshmi Priyanka*  
(kum.M.Lakshmi Priyanka.)

Member

A.G&S.G.S Degree College  
Vuyyuru-521165.

6) *B. Appala Naidu*  
ProjectManager.  
(B.Appala Naidu)

Industrialist Asst.

RGCA

7) *Ch. Chiranjeevi*  
(Ch.Chiranjeevi.)

Student Represent

P.hd -Research Scholar,  
Dept.of Botany& Microbiology,

Acharya Nagarjuna University,  
Guntur.

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 11.00 AM on 04-07-2020 in the Department of Zoology.

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

Members Present:

- 1) ..... Chair person . Head, Department of Zoology,  
A.G&S.G.S Degree College of Vuyyuru-521165.  
(Smt. D.A.Kiranmayee.)
- 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.Elha.) Nominee Gov. Degree College,  
Pitapuram.
- 5)..... Member Lecturer in Zoology,  
(kum.M.Lakshmi Priyanka.) 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.

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 11.00 AM on 04-07-2020 in the Department of Zoology.

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

Members Present:

1) ..... Chair person Head, Department of Zoology,  
A.G.&S.G.S Degree College of Vuyyuru-521165.  
(Smt. D.A.Kiranmayee.)

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,  
(Dr. B.Elia.) Nominee Gov. Degree College,  
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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.

**Agenda for B.O.S Meeting.**

1. To recommend the syllabi (Theory & Practical), Model question paper for I& II Semester of I  
B.Sc (A.B.C) for the academic year 2020-2021.
2. To recommend the syllabi (Theory & Practical), Model question paper for III Semester of II  
B.Sc (A.B.C) for the academic year 2020-2021.
3. To recommend the syllabi (Theory & Practical), Model question paper and Blue print of I&III semester of I, II B.Sc (A.B.C.) for the academic year 2020-2021.
4. To recommend the syllabi of Competitive Zoology as Unit- VI in I, III Semesters for the Academic year 2020-2021.
5. To recommend the teaching and evolution methods to be followed under Autonomous statues.
6. Any other matter.

*B. A. Chinnayee*

Chairman.

## **RESOLUTIONS**

1. It is resolved to continue the same syllabi (Theory & Practical), model question paper of I & II Semester of I B.Sc. (A.B.C) under Choice Based Credit System (CBCS) for the academic Year 2020 – 2021.

2. It is resolved to continue the newly framed 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 2020 – 2021.

3. It is resolved to follow the Model question paper and Blue print of I&III semester of I, II B.Sc (A.B.C.) for the academic year 2020-2021.

4. It is resolved to continue the following teaching & evaluation methods for the Academic year 2020-21.

### **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.

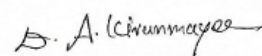
### **Evaluation of a student is done by the following procedure:**

- **Internal Assessment Examination:**

- Out of maximum 100 marks in each paper for I, II 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 B.Sc (A.B.C).

- **Semester – End Examination:**

- The maximum mark for I, III (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).



**Chairman**

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

**Aquaculture**

**Semester – I**

**Class: I B.Sc. (ABC)**

**PAPER-I**

**w.e.f. 2019-2020**

**Credits : 3**

**(Code: Aqu-101C)**

**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 globalLevel, India and Andhra Pradesh.
- 1.3: Fresh water aquaculture, brackish water aquaculture andmariculture
- 1.4: Different Aquaculture systems – Pond, Cage, Pen, Running water, Extensive, Intensive and & Semi- Intensive Systems and their significance. Monoculture, Polyculture and Monosex culturesystems
- 1.5: Aquaculture versus Agriculture; Present day needs with special reference to AndhraPradesh

**UNIT-II : Pond Ecosystem**

**15hrs.**

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

**UNIT-III: Types of fish pods**

**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 andquarantine ponds
- 3.3: Hatcherydesign

**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 fishfarm
- 4.3 . Construction of an ideal fish pond – space allocation, structure and components of barragepond

**UNIT- V :Pond management factor**

**10hrs**

- 5.1: Need of fertilizer and manure application in culture ponds; Role of nutrients; NPKcontents of different fertilizers and manures used in aquaculture; and precautions in theirapplication.
- 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 ofPH.
- 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

**UNIT- VI – Competitive Aquaculture** 6.1. Fish Biology,6.2. Biology of Indian major carps.

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

Semester – I

Model Question Paper

w.e.f. 2019-2020

Title of the paper:  
**101C**

Basic principles of aquaculture .

Code – AQU-

Time: 3hrs.

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 –  
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**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.  
70.**

**Max. Marks:**

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.  $5 \times 10 = 50M$ .

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

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

**AQUACULTURE (Industrial Fishers)**

**PRACTICAL - I**

**w.e.f.2019-20**

**2019-2020.**

**Code :AQU- 101P**

**MAX.MARKS : 50.**

**(2hrs/week)**

**[PRACTICALS]**

- 1.Estimation of Carbonates, Bicarbonates in watersamples.
- 2.Estimation of Chlorides in watersamples.
- 3.Estimation of dissolvedoxygen.
- 4.Estimation of ammonia inwater.
- 5.Field visit to nursery, rearing and stocking ponds of aquafarms.
- 6.Field visit tohatchery.
- 7.Study of algal blooms and theircontrol.
- 8.Collection & identification of zooplankton andphytoplankton.
- 9.Determination of soil nitrogen and phosphorus.
10. Collection and study of aquaticweeds.
- 11.Filed 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.

Elsivier Scientific Publishing Company. 1.18Bose AN et.al., 1991. Costal

Aquaculture Engineering. Oxford & IBH Publishing Company Pvt.Ltd.

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

**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
<b>TOTAL:</b>	<b>25M.</b>

**Guide lines for the practical Examiners**

I: Estimation of dissolvedoxygen.( 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.

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

**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.

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

**Aquaculture**

**Semester – III**

**Class: II B.Sc .( ABC)**

**PAPER-III**

**Credits : 3**

**w.e.f. 2020-2021**

**(Code: Aqu-301C)**

**Title of the paper: Fish nutrition & Feed technology**

**60 hrs.(4hrs/week)**

**Max.Marks : 70**

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**UNIT-I: Nutritional requirements of cultivable fish**

- 1.1 Requirements for energy, proteins, carbohydrates, lipids, fiber, micronutrients for different stages of cultivable fish and prawns
- 1-2 Essential amino acids and fatty acids, protein to energy ratio, nutrient interactions and protein sparing effect
- 1-3 Dietary sources of energy, effect of ration on growth, determination of feeding rate, check tray
- 1-4 factors affecting energy partitioning and feeding

**UNIT-II: Forms of feeds & Feeding methods**

- 2-1 Fed conversion efficiency, feed conversion ratio and protein efficiency ratio
- 2-2 Wet feeds, moist feeds, dry feeds, mashes, pelleted feeds, floating and sinking pellets, advantages of pelletization
- 2-3 Manual feeding, demand feeders, automatic feeders, surface spraying, bag feeding and tray feeding
- 2-4 Frequency of feeding

**UNIT-III: Feed manufacture & Storage**

- 3-1 Feed ingredients and their selection, nutrient composition and nutrient availability of feed ingredients
- 3-2 Feed formulation – extrusion processing and steam pelleting, grinding, mixing and drying, pelletization, and packing
- 3-3 Water stability of feeds, farm made aqua feeds, micro-coated feeds, micro-encapsulated feeds and micro- bound diets
- 3-4 Microbial, insect and rodent damage of feed, chemical spoilage during storage period and proper storage methods.

**UNIT-IV: Feed additives & Non-nutrient ingredients**

- 4-1 Binders, anti-oxidants, probiotics
- 4-2 Feed attractants and feed stimulants
- 4-3 Enzymes, hormones, growth promoters and pigments
- 4-4 Anti-metabolites, aflatoxins and fiber .

**UNIT-V: Nutritional Deficiency in Cultivable fish**

- 5-1 Protein deficiency, vitamin and mineral deficiency symptoms
- 5-2 Nutritional pathology and ant-nutrients
- 5-3 Importance of natural and supplementary feeds, balanced diet.

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

**Semester –III**

w.e.f. 2020-2021

**Title of the paper: Fish nutrition & Feed technology**

**Code – AQU-301C**

**Time: 3hrs.**

**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. writethe about protein to energy ratio?
2. Dry feeds.
3. Surface spraying
4. Insect and rodent damage of feed.
5. Nutrient composition
6. What is probiotics .
7. Growth pigments.
8. Vitamin deficiency symptoms.

**Section – B**

**5 x 10 =50.**

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

9. Write an essay on any two Nutritional Requirements for cultivable fish ?
10. Explaintheeffect of ration on growth?
11. Explain about Frequency of feeding?
12. Describe the Feed formulation?
13. Explain the Feed attractants and feed stimulants?
14. Write anessay on**Feed additive**hormones?
15. Explain about Nutritional pathology?
16. Importance of natural and supplementary feeds

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

**Guide lines to the Paper Setter.**

**W.e.f. 2020-2021**

**Title of the paper Fish nutrition & Feed technology:**

**Code – AQU-301C**

**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
<b>5 Marks Questions</b>	<b>A</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
<b>10 Marks Questions</b>	<b>B</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>
<b>Weightage</b>		<b>25</b>	<b>20</b>	<b>20</b>	<b>30</b>	<b>25</b>

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

2. Question paper should be in English medium.

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

AQUACULTURE  
PRACTICAL - III

w.e.f. 2020-2021.  
MAX.MARKS : 50.  
(2hrs/week)

Code :AQU- 301P

**PRACTICAL SYLLABUS**

1. Estimation of protein content in aquaculture feeds
2. Estimation of carbohydrate content in aquaculture feeds
- 3 Estimation of lipid content in aquaculture feeds
4. Estimation of ash in aquaculture feed
5. Study of water stability of pellet feeds
6. Feed formulation and preparation in the lab
7. Study of binders used in aquaculture feeds
8. Study of feed packing materials
9. Study of physical and chemical change during storage
- 10.Study on physical characteristics of floating and sinking feeds
- 11.Visit to a aqua-feed production unit

**PRESCRIBED BOOK(S):**

- 1.HALVER JE 1989. Fish nutrition. Academic press, San diego

**REFERENCES:**

- 1.1 Lovell rt 1998. Nutrition and feeding of fishes, Chapman & Hall, New York
- 1.2 Sena de silva, trevor a anderson 1995. Fish nutrition in aquaculture. Chapman & Hall, New York.

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

**EXTERNAL PRACTICAL- III**

**w.e.f. 2020-2021.  
(2hrs/week)  
Code: AQU-301P**

**MODEL QUESTION PAPER –III**

**Time: 3 hrs.**

**Max.marks: 25m.**

I. Estimation of carbohydrate content in aquaculture feeds	7M.
II. Estimation of ash in aquaculture feed	5M.
III. Study of feed packing materials	5M
IV. Study of physical and chemical change during storage	5M
V. Viva.	3M
<b>TOTAL: -----</b>	<b>25M.</b>

**Guide lines for the practical Examiners**

I: Estimation of carbohydrate content in aquaculture feeds ( 5 marks notes & Result 2 mark .)

II : Estimation of ash in aquaculture feed ( 5 marks notes)

III :Study of feed packing materials ( 5 marks notes)

IV. Study of physical and chemical change during storage( 5 marks notes)

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

**INTERNAL PRACTICAL- III**

**w.e.f. 2020-2021.  
(2 hrs/week).**

**(Practical -III)Code: AQU-301P.**

**MODEL QUESTION PAPER -III**

**Max.marks:25M.**

**Time: 3hrs.**

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

**Total ----- 25M.**