



# SRI Y.N.COLLEGE (Autonomous)

(Affiliated to Adikavi Nannaya University)

Thrice Accredited by NAAC at 'A' Grade

Recognised by UGC as 'College with Potential for Excellence'

**NARSAPUR-534 275, W.G.Dt.,A.P.,**

Date: 23-08-2022

## NOTICE

All the Heads of the Departments are requested to go through the agenda for the Board of Studies meeting for the academic year 2022-2023 of your respective departments and see that they are discussed thoroughly and the respective resolutions are recorded in the minutes book of the respective departments.

### **AGENDA:**

1. To prepare the syllabi and model question papers for the degree I, II and III years for the academic year 2022-23 by making appropriate modifications (above or equal to 20%) to the University syllabus.
2. To prepare the syllabi and model question papers for Add-on courses, Certificate courses for the academic year 2022-2023.
3. To prepare syllabus for Bridge course for the newly admitted students.
4. To prepare course outcomes, programme outcomes and programme specific outcomes for the degree I, II & III years for the academic year 2022-2023.
5. To discuss the modalities for conducting the Social Immersion Programme (Community Service Project) at the end of the 1<sup>st</sup> year degree, Internship/Project at the end of second year degree and Internship during V semester or VI semester for III year degree students.
6. To discuss the modalities and topics for conducting Seminars/Workshops.
7. To discuss the issue of online courses to be done by the students and staff.
8. To discuss the staff publications in the UGC recognised journals.
9. To discuss the issue of getting functional MOUs with the industry.
10. To discuss the feasibility of developing collaborations with other Colleges.
11. To evolve a plan of action for the Consultancy activity.
12. To discuss about ICT enabled teaching to the students.
13. Any other item with permission of the chair.

*Ch. R. V. Reddy*  
**MEMBER SECRETARY**

*[Signature]*  
**PRINCIPAL**  
PRINCIPAL

Sri Y.N.College (Autonomous)  
NAAC Accredited 'A' Grade College  
NARSAPUR - 534 275, W.G.Dt., (A.P)

**SRI Y N COLLEGE(A): NARSAPUR**  
(Affiliated to Adikavi Nannaya University)

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**DEPARTMENT OF ZOOLOGY**

**MEMBERS OF THE BOARD**

The Board of Studies for Zoology & Aquaculture technology for the year

2022-2023 is constituted with the following members.

- |                                    |          |
|------------------------------------|----------|
| 1. Dr.P.Y.V.Satyanarayana          | HOD      |
| 2. Ms. K. S. S. V. N. Lakshmi      | Lecturer |
| 3. Mrs. G. Sunitha <i>Gmmunite</i> | Lecturer |
| 4. Ms. Ch. Bhavani                 | Lecturer |

Chairman

Member

Member

Member

*M. Satyanarayana 03/9/22*  
*K. S. S. V. N. Lakshmi 3/9/22*  
*Gmmunite state*  
*Ch. Bhavani state*

**University Nominee :** Dr. K. Ramaneswari ,

Principal, AKNU

Rajahmahendravaram.

Mobile no. 9491520547

Mail.id: [ramaneswari.zoo@aknu.edu.in](mailto:ramaneswari.zoo@aknu.edu.in)

**Subject experts:**

- 1) P. Lakshmi Chaya,  
HOD of Zoology,

K G R L Degree College and PG courses

Bhimavaram,

Mobile.no: 8341544303

Mail. Id: [chayakgrl@gmail.com](mailto:chayakgrl@gmail.com)

- 2) Ms. G. Radha,

HOD of Zoology,

B G B S Women's College, Narsapur

Ph.no 9133256557 or 9949134541

mail.id: [radhagunde@gmail.com](mailto:radhagunde@gmail.com).

*G. Radha state*

**Industrialist:**

Radha Krishna Murthy

NG Feeds Pvt .Ltd..

Area Manager

Kaikaluru.

Mobile.no. 9666759534

Mail.id: radhakrishnamurthy55555@gmail.com

M. Radh Krishna Murthy  
31/9/22

**Alumni:**

B. Anu

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Mobile.no. 8500675697

Mail.id. baduguanu@gmail.com

B. Anu  
3/9/22

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**DEPARTMENT OF ZOOLOGY**

**Board of studies in Zoology & Fisheries for the Year 2022-2023**

**Resolutions:**

The members of the **Board of Studies** met in the Zoology Dept. under the Chairmanship of Dr. P. Y. V. Satyanarayana, Reader & HOD of Zoology in the Chair on **3.09.2022 at 10 A.M.** and resolved the following.

1. It is resolved to approve the **Syllabus for I,II,III,IV and V Semesters** for the academic year **2022-2023** as appended here with.
2. It is resolved to approve "**Bridge course**" in I Sem and **Certificate Course "Ornamental Fishes"** in III Sem for the academic year **2022-2023**.
3. Resolved to approve **Model papers, scheme & Blue prints**.
4. Resolved to prepare **Course outcomes, Programme outcomes, and PSO's** for degree I,II, & III years for the academic year 2022-2023.
5. Resolved to conduct social **immersion programme** (community service project) at the end of I/II year degree and **Internship** (Project) during V semester or VI Semester for III year degree students.
6. Resolved to conduct – **Seminars, Workshops, ICT enabled teaching** (Digital classes) **practices, field trips, and student projects**.
7. Resolved to extend extension activity like "**Consultancy activity**" to the Aquaculture farmers.
8. Resolved to encourage **Staff publications** in UGC recognized journals.
9. Resolved to get functional **MOU'S & Collaborations** with other colleges/ Industry.

**APPROVED**



Mr. Satyanarayana  
CHAIRMAN 03/9/22  
BOARD OF STUDIES  
DEPARTMENT OF ZOOLOGY  
SRI Y.N. COLLEGE (AUTONOMOUS)  
(NAAC ACCREDITED 'A' GRADE COLLEGE)  
NARSAPUR - 534 275

1. K. H. S. 03/9/22  
2. P. Y. V. Satyanarayana  
3. G. R. K. S. 03/9/22  
4. M. R. K. S. 03/9/22

5. S. S. 03/9/22  
6. P. Y. V. Satyanarayana 03/9/22  
7.  
8.  
9.



**SRI YN COLLEGE (A) – NARSAPUR**  
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I B.Sc Aquaculture Technology – Semester – I

**Theory syllabus for 2021 -24 batch (w.e.f.2020-21) Paper – 1**  
**Basic Principles of Aquaculture**

**UNIT – I : INTRODUCTION**

- 1-1 Concept of Blue Revolution – History and definition of Aquaculture.
- 1-2 Fresh Water Aquaculture, Brackish Water Aqua Culture and Mari Culture.
- 1-3 Different aquaculture system. Pond, Cage, Pen, Running Water, Extensive, Semi Intensive, Intensive System and their Significance Monoculture, Poly Culture and Mono Sex Culture Systems and Mixed Culture.

**UNIT – II : POND ECOSYSTEM**

- 2-1 Food chains and Food Web
- 2-2 Lotic and lentic system, Streams and Springs.
- 2-3 Importance of plankton and Benthos in culture ponds and primary productivity.

**UNIT – III : TYPES OF FISH PONDS**

- 3-1 Functional classification of Pond – Nursery, rearing, production, stocking and quarantine ponds.
- 3-2 Hatchery design – Fish Hatchery

**UNIT – IV : POND PREPARATION**

- 4-1 Important, (nature of soil, water resources) Factors in the construction of an ideal fish Pond – site selection topography, nature of the soil, water resources.
- 4-2 Lay out and arrangements of Ponds in a Fish Farm.

**UNIT – V : POND MANAGEMENT FACTORS**

- 5-1 Manure application in culture ponds
- 5-2 Physico - chemical conditions of soil and water (PH, temperature, depth turbidity, light) to increase oxygen and reduce ammonia and hydrogen sulphide in culture pond, 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.

**Text Books: 1) A textbook of Aquaculture – K Kondaiah, G Vijaya Lakshmi**

**2) Principles of Aquaculture–S.B Zade,C.J Khume,S.R Sitre, R.V. Tijare**

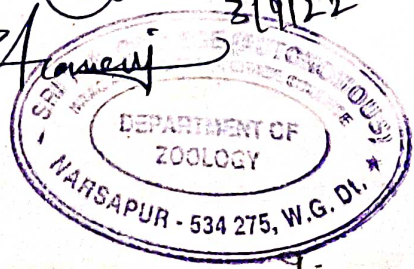
**3) Aquaculture Principles and Practices – T.V.R Pillay**

1. K. Kondaiah 2. S. B. Zade 3. C. J. Khume 4. S. R. Sitre 5. R. V. Tijare

6. T. V. R. Pillay

7. M. Reddy Krishnaiah

8. M. Reddy Krishnaiah

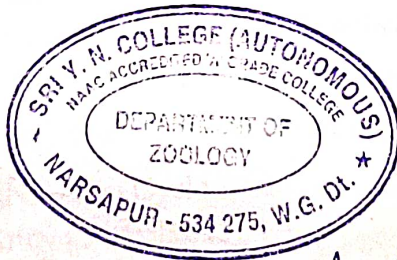


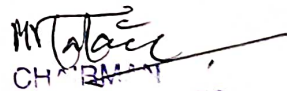
M. Reddy Krishnaiah  
CHAIRMAN  
BOARD OF STUDIES  
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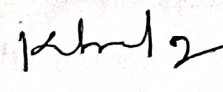
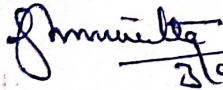



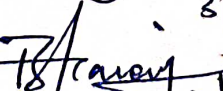
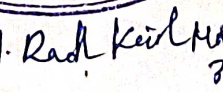

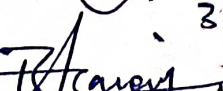
**BLUE PRINT**

Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT - I	01	01	15	<b><u>SECTION - A</u></b> 1 Essay and 1 Short
UNIT - II	01	01	15	<b><u>SECTION - A</u></b> 1 Essay and 1 Short
UNIT - III	01	01	15	<b><u>SECTION - A</u></b> 1 Essay and 1 Short
UNIT - IV	04	01	45	<b><u>SECTION - A - 2 Essays</u></b> <b><u>SECTION - B - 2 Essays</u></b> 4 Essays and 1 Short
UNIT - V	03	04	50	<b><u>SECTION - B - 3 Essays</u></b> 3 Essays and 4 Short
TOTAL	10	08	140	

**APPROVED**



  
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1.  2/3/9
2.  2/9
3.  2/9/22
4.  2/9/22
5.  2/9/22
6.  2/9/22
7.  2/9/2022
8.  2/9/22
9.  2/9/22



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**I B.Sc Aquaculture Technology – Semester – I**  
**For 2021 -24 batch (w.e.f.2020-21) Paper – 1**

**Theory Model Question Paper - Basic Principles of Aquaculture**

**Time: 3Hrs**

**Max.Marks:75**

**PART – I**

**Answer any Five of the following**

**5 x 5 = 25M**

- |   |                               |
|---|-------------------------------|
| 1. Cage Culture                         | పెట్టెల యందు పెంపకము          |
| 2. Food Chains                          | ఆహారపు గొలుసులు               |
| 3. Nursery Ponds                        | నర్సరీ కుంటలు                 |
| 4. Soil Characters of Pond              | చెరువు యొక్క మృత్తిక లక్షణాలు |
| 5. Manure applications in Culture Ponds | చెరువుల యందు ఎరువుల వాడకం     |
| 6. pH                                   | పి.హెచ్.                      |
| 7. Aquatic Weeds                        | నీటికలుపు మొక్కలు             |
| 8. Weed Fishes                          | భక్షక చేపలు                   |

**PART –II**

**Answer any Five of the following atleast two questions from each section A and section B. All questions carry equal marks.**

**5 x 10 = 50M**

**SECTION – A**

9. Write an essay on Mono culture and Poly culture.  
ఏక సంవర్ధనము మరియు బహు సంవర్ధనము గూర్చి ఒక వ్యాసము వ్రాయుము.
10. Describe the differences between Lotic and Lentic waters.  
లిటిక్ మరియు లెన్టిక్ జలాల మధ్య వ్యత్యాసములను తెల్పుము.
11. Given an account of the design and construction of Culture Ponds.  
సంవర్ధన చెరువుల యొక్క డిజైన్ మరియు నిర్మాణమును గూర్చి వివరింపుము.
12. Give an account on Nitrogen Cycle.  
నత్రజని వలయము గూర్చి వ్రాయుము.
13. Explain the Fish Hatchery design.  
చేపల హేచరీ డిజైన్ గూర్చి తెల్పుము.

**SECTION - B**

14. Describe the organic and inorganic fertilizers used in fresh water culture ponds.  
మంచినీటి చెరువుల యందు సహజ ఎరువు, కృత్రిమ ఎరువుల వాడకమును గూర్చి వివరింపుము.
15. Write an essay on physic – chemical characters of fresh water culture ponds.  
సంవర్ధన చెరువుల భౌతిక - రసాయనిక లక్షణాలపై ఒక వ్యాసము వ్రాయుము.
16. Describe the detailed account on Aquatic Weeds and their control in Aqua Culture Ponds.  
జలసంవర్ధన చెరువుల యందు కలుపు మొక్కలను గూర్చి తెలిపి వాటి నివారణ పద్ధతులను వివరింపుము.
17. Write an essay on predatory and weed fishes.  
సరభక్షక చేపలు మరియు వీడ్ చేపలను గూర్చి ఒక వ్యాసము వ్రాయుము.
18. Write an account on lay out of a fish farm.  
చేపల చెరువు యొక్క లే - అవుట్ గూర్చి వ్రాయుము.

**APPROVED**



*M. C. S. Rao*  
CHAIRMAN  
BOARD OF STUDIES  
DEPARTMENT OF ZOOLOGY  
SRI Y. N. COLLEGE (AUTONOMOUS)  
(NAAC ACCREDITED 'A' GRADE COLLEGE)  
NARSAPUR - 534 275

1. *K. M. S. Rao* 3/9

4. *M. Radhika Kumari* 3/9/2022

2. *J. S. S. Rao* 3/9

5. *S. S. Rao* 3/9/22

3. *S. S. Rao* 3/9/22

6. *T. S. S. Rao* 3/9/22

8.

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**SRI YN COLLEGE (A) – NARSAPUR**  
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I B.Sc Aquaculture Technology – Semester – I  
Practical syllabus for 2021 -24 batch (w.e.f.2020-21) Paper – 1  
**Basic Principles of Aquaculture**

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**PRACTICALS :**

1. Estimation of carbonates, Bicarbonates in water sample.
2. Estimation of dissolved oxygen.
3. Field visit to nursery, rearing and stocking ponds of qua farms.
4. Field visit to hatchery.
5. Study of algal bloom and their control.
6. Collection and identification of phytoplankton and zooplankton.
7. Study of aeration devices.
8. Collection and study of aquatic weeds.
9. Filed survey of nearby aqua farm.

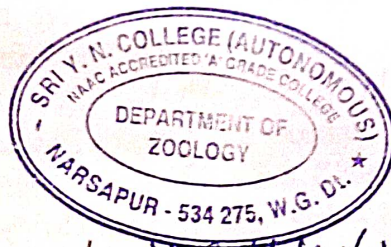
**PRACTICAL MODEL QUESTION PAPER**

Time : 3 Hrs.

Max. Marks : 50

- |  |              |
|--|--------------|
| 1. Estimation of DO <sub>2</sub> un the given sample of water and write the procedure adopted. | 10 + 5 = 15M |
| 2. Identify draw and comment on the given spotters A, B, C, D, E                               | 5 x 4 = 20M  |
| 3. Record and field Book   | 10 + 5 = 15M |
| <b>TOTAL :</b>   | <b>50M</b>   |

**APPROVED**



*Mr. [Signature]*  
CHAIRMAN  
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NARSAPUR - 534 275

1. K. [Signature] 2/3/9

4. H. Radhika [Signature] 3/09/2022

2. [Signature] 3/9

5. [Signature] 8.

3. [Signature] 3/9/22

6. [Signature] 3/9/22 9.

[Signature] 3/9/22



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I B.Sc Aquaculture Technology – Semester – II  
Theory syllabus for 2021 -24 batch (w.e.f.2020-21) Paper – 2  
Biology of Fin Fish & Shell Fish

**UNIT – I : GENERAL CHARACTERS AND CLASSIFICATION OF CULTIVABLE FIN AND SHELL FISH**

- 1-1 General characters and classification of fishes up to the classes.
- 1-2 Fish, crustaceans and molluscs of commercial importance.
- 1-3 Sense organs of Fishes.
- 1-4 Specialized organs in Fishes – electric Organ, Venom and Toxins.
- 1-5 Buoyancy in Fishes – Swim bladder or air bladder.

**UNIT – II : FOOD, FEEDING AND GROWTH**

- 2-1 Natural Fish Food, Feeding habits, Stimuli for Feeding, gut content analysis, structural modifications in relation to feeding habits.
- 2-2 Principles of age and growth determination, Growth rate measurement – scale method, otolith method.
- 2-3 Length – weight relationship, condition factor.

**UNIT – III : REPRODUCTION BIOLOGY**

- 3-1 Breeding in Fishes, breeding places, breeding habits, breeding in natural environment and in artificial ponds.
- 3-2 Induced breeding in fishes (Fresh water)

**UNIT – IV : DEVELOPMENT**

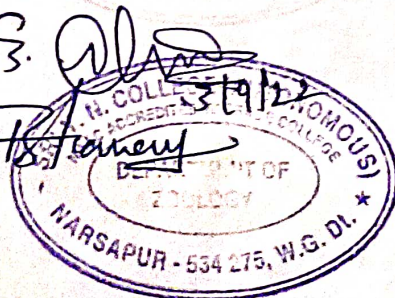
- 4-1 Parental care in Fishes, Ovo – Viviparity, Oviparity, viviparity, nest building and brooding.
- 4-2 Embryonic and larval development of Fish.
- 4-3 Embryonic and larval development of Shrimp.
- 4-4 Environmental factors affecting reproduction and development of cultivable fish fishes.

**UNIT – V : HORMONES AND GROWTH**

- 5-1 Endocrine system in fishes.
- 5-2 Neurosecretory cell, ovary and chromatophores.
- 5-3 Molting in crustacean shell fish.

Text Books : 1) Introduction to Fishes – H.S Bamrah, Kavitha, Juneja  
2) An introduction to Fishes – S.S. Khanna  
3) Physiology of Finfish & Shell Fish – Kasturi Samantaray  
4) Fish Biology & Fisheries – S.S. Khanna

1. K. H. M. 2/3/19
2. J. M. 2/29
3. B. Reddy 2/29
4. H. Reddy 2/29
5. S. 2/29
6. 2/29
7. 2/29
8. 3/09/2022
9. 3/09/2022



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SRI Y.N. COLLEGE (AUTONOMOUS)  
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NARSAPUR - 534 275

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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT - I	02	02	30	<b><u>SECTION - A</u></b> 2 Essays and 2 Shorts
UNIT - II	02	02	30	<b><u>SECTION - A</u></b> 2 Essays and 2 Shorts
UNIT - III	02	01	25	<b><u>SECTION - A - 1</u></b> Essay <b><u>SECTION - B - 1</u></b> Essay 2 Essays and 1 Short
UNIT - IV	01	02	20	<b><u>SECTION - B</u></b> 1 Essay and 2 Shorts
UNIT - V	03	01	35	<b><u>SECTION - B</u></b> 3 Essays and 1 Short
TOTAL	10	08	140	

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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT - I	02	02	30	<b><u>SECTION - A</u></b> 2 Essays and 2 Shorts
UNIT - II	02	02	30	<b><u>SECTION - A</u></b> 2 Essays and 2 Shorts
UNIT - III	02	01	25	<b><u>SECTION - A</u></b> - 1 Essay <b><u>SECTION - B</u></b> - 1 Essay 2 Essays and 1 Short
UNIT - IV	01	02	20	<b><u>SECTION - B</u></b> 1 Essay and 2 Shorts
UNIT - V	03	01	35	<b><u>SECTION - B</u></b> 3 Essays and 1 Short
TOTAL	10	08	140	

**APPROVED**



Mr. Talwar  
 CHAIRMAN " 03/9/22  
 BOARD OF STUDIES  
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1. Khuntia 3/9
2. Jannetty 3/9
3. S. C. Reddy 3/9
4. M. Ravi Kumar 3/09/2022
5. S. Alankar 3/9/22
6. T. Anand 3/9/22
- 7.
- 8.
- 9.



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**I B.Sc Aquaculture Technology – Semester – II**  
Practical syllabus for 2021 -24 batch (w.e.f.2020-21) Paper – 2  
**Biology of Fin Fish & Shell Fish**

**PRACTICALS :**

1. Study of mouth parts in herbivorous and carnivorous fishes.
2. Comparative study of digestive system of herbivorous and Carnivorous fishes.
3. Length – Weight relationship of fishes.
4. Gut content analysis in fishes.
5. Mouth parts and appendages of cultivable prawns.
6. Study of eggs of fishes, shrimps, prawns.
7. Embryonic and larval development of fish.
8. Study of gonads maturity and fecundity in fishes.
9. Observation of Crustacean larvae.
10. Observation of Molluscan larvae.

**PRACTICAL MODEL QUESTION PAPER**

Time : 3 Hrs.

Max. Marks : 50

- |  |                    |
|--|--------------------|
| 1. Identify the gut contents of given specimen and analyse & note down the gut contents and draw the diagrams. | 10 + 5 = 15M       |
| 2. Identify, draw and comment on the given spotters A, B, C, D & E   | 5 x 3 = 15M        |
| 3. Length - Weight relationship of given specimens   | 1 x 10 = 10M       |
| 4. Record and Viva   | 5 + 5 = <u>10M</u> |
| <b>TOTAL :</b>   | <u>50M</u>         |

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I B.Sc Aquaculture Technology – Semester – II  
For 2021 -24 batch (w.e.f.2020-21) Paper – 2

Theory Model Question paper - Biology of Fin Fish & Shell Fish

Time: 3Hrs

Max.Marks:75

PART – I

Answer any Five of the following

5 x 5 = 25M

- |   |                              |
|---|------------------------------|
| 1. Chanos Chanos                            | చానాస్ చానాస్                |
| 2. Eye of Fish                              | చేపయొక్క కన్ను               |
| 3. Feeding Habits of Fishes                 | చేపల యొక్క ఆహారపు అలవాట్లు   |
| 4. Otolith method – Growth Rate Measurement | ఆటోలిత్ - పెరుగుదల కొలత      |
| 5. Breeding Habits in Fishes                | చేపల ప్రత్యుత్పత్తి అలవాట్లు |
| 6. Parental care in Fishes                  | చేపల యందు సంతానపాలన          |
| 7. Ovary                                    | ఓవరీ                         |
| 8. Moulting                                 | కుబుస విసర్జన                |

PART – II

Answer any Five of the following atleast two questions from each section A and section B. All questions carry equal marks.

5 x 10 = 50M

SECTION – A

9. Describe the general characters and classification of Bony fishes upto classes.  
అస్థి చేపల యొక్క సామాన్య లక్షణములను తెల్పి తరుగుదల వరకు వర్గీకరింపుము.
10. Describe the important characters of any two commercially important fishes.  
ఆర్థిక ప్రాముఖ్యము కల ఏవైనా రెండు చేపల యొక్క ముఖ్య లక్షణములను తెల్పుము.
11. Write an essay on feeding adaptations in fishes.  
చేపల యందు ఆహారం తినడానికి చూపు అనుకూలనాలను గూర్చి ఒక వ్యాసము వ్రాయుము.
12. Write a detailed account on length – weight relationship of fishes.  
చేపల యొక్క పొడువు - బరువు సంబంధమును గూర్చి విపులముగా వివరింపుము.
13. Describe the different breeding habits of fishes.  
చేపల యొక్క వివిధ ప్రత్యుత్పత్తి అలవాట్లను గూర్చి వివరింపుము.

**SECTION - B**

14. Write an essay on induced breeding technique in fishes.

చేపల యందు ప్రేరేపితి ప్రజననము గూర్చి ఒక వ్యాసము వ్రాయుము.

15. Describe the larval development in fishes.

చేపల యొక్క లార్వాల అభివృద్ధిని గూర్చి వివరింపుము?

16. Write an essay on endocrine glands in fishes.

చేపల యొక్క వినాళ గ్రంధులను గూర్చి ఒక వ్యాసము వ్రాయుము.

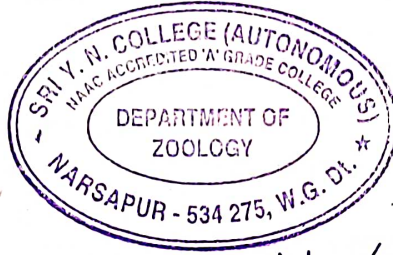
17. Describe the environmental factors affecting reproduction in Fishes.

చేపలలో ప్రత్యుత్పత్తిని ప్రభావితం చేసే పర్యావరణ కారకాలను వివరింపుము.

18. Describe the moulting process in Shell fish.

రొయ్యల యొక్క మౌల్టింగ్ పద్ధతిని వివరింపుము.

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**II B.Sc Aquaculture Technology – Semester – III**  
**Theory syllabus for 2020-23 batch (w.e.f.2021-22) Paper – 3**  
**Fish Nutrition & Feed Technology**

**UNIT – I : NUTRITIONAL REQUIREMENTS OF CULTIVABLE FISH.**

- 1-1 Requirement for protein, carbohydrates, lipids, fiber, for different of cultivable fish.
- 1-2 Essential Amino acid and fatty acids.

**UNIT – II : FORMS OF FEEDS & FEEDING METHODS**

- 2-1 Feed conversion efficiency, feed conversion ratio.
- 2-2 Wet feeds, Moist feeds, dry feeds, mash, pelleted feeds, floating and sinking pellets, advantage of pelletization.
- 2-3 Manual feeding, automatic feeders, surface spraying, bag feeding and tray feeding.

**UNIT – III : FEED MANUFACTURE & STORAGE**

- 3-1 Feed ingredients and their selection.
- 3-2 Feed formulation – Steam pelleting, grinding, mixing and drying, pelleting and packing.
- 3-3 Water stability of feeds, farm made aqua feeds, Micro-Coated feeds, Micro-Encapsulated feeds and micro – bund 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.

**UNIT – V : NUTRITIONAL DEFICIENCY IN CULTIVABLE FISH**

- 5-1 Protein deficiency, Vitamin and Mineral deficiency Symptoms.
- 5-2 Nutritional pathology and Anti Nutrients.
- 5-3 Importance of Natural and supplementary feeds, balance diet.

- References :**
- 1) Aquaculture – Dr.N.Arumugan – Saras Publications
  - 2) Fish Biology – Dr. Ravi Shankar Piska
  - 3) Fish & Fisheries – Prof. Kamaleshwar Randey, Dr J.P.Shukla, Rastogi publications.
  - 4) Aquaculture – Principles & Practices – T.V.R. Pillay

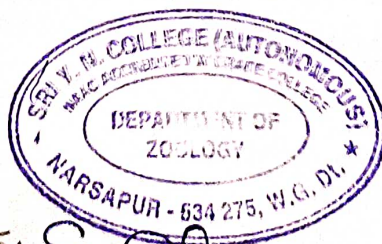
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Unit No	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
UNIT - I	02	01	25	<b><u>SECTION - A</u></b> 2 Essays and 1 Short
UNIT - II	02	02	30	<b><u>SECTION - A</u></b> 2 Essays and 2 Shorts
UNIT - III	02	01	25	<b><u>SECTION - A</u></b> - 1Essay <b><u>SECTION - B</u></b> - 1Essay 2 Essays and 1 Short
UNIT - IV	02	02	30	<b><u>SECTION - B</u></b> 2 Essay and 2 Shorts
UNIT - V	02	02	30	<b><u>SECTION - B</u></b> 2 Essays and 2 Shorts
TOTAL	10	08	140	

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3. *[Signature]* 23/9/22
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II B.Sc Aquaculture Technology – Semester – III  
For 2020 -23 batch (w.e.f.2021-22) Paper – 3

**Theory Model Question paper - Fish Nutrition & Feed Technology**

Time: 3Hrs

Max.Marks:75

**PART – I**

Answer any Five of the following

5 x 5 = 25M

- |                            |                       |
|----------------------------|-----------------------|
| 1. Proteins                | మాంసకృత్తులు          |
| 2. F.C.R                   | ఎఫ్. సి. ఆర్          |
| 3. Natural food            | సహజ ఆహారము            |
| 4. Storage methods of Feed | ఆహారపు నిల్వ పద్ధతులు |
| 5. Probiotics              | ప్రోబయోటిక్స్         |
| 6. Anti metabolites        | యాంటి మెటబోలైట్స్     |
| 7. Supplementary           | అనుబంధ ఆహారము         |
| 8. Anti Nutrients          | వ్యతిరేక పోషకాలు      |

**PART – II**

Answer any Five of the following atleast two questions from each section A and section B. All questions carry equal marks.

5 x 10 = 50M

**SECTION – A**

9. Describe various requirements for energy of different stages of cultivation fishes.  
పెంపకపు చేపల వివిధ దశలకు అవసరమగు వివిధ శక్తులను గూర్చి వర్ణించుము.
10. Write an essay on factors effecting energy partitioning and feeding.  
ఆహారము మరియు శక్తి వినియోగములను ప్రభావితం చేయు ప్రభావకాలను గూర్చి ఒక వ్యాసము వ్రాయుము.
11. Differentiate feed conversion ratio and protein efficiency ratio.  
ఆహారపు మార్పు నిష్పత్తి మరియు మాంసకృత్తుల సామర్థ్యపు నిష్పత్తుల మధ్య బేధములను గూర్చి చర్చించుము.
12. Give an account on different types of feedings.  
వివిధ రకముల ఆహారములను గూర్చి వ్రాయుము.
13. Write an essay on Feed formulation.  
ఆహారపు నిష్పత్తులను గూర్చి ఒక వ్యాసము వ్రాయుము.

**SECTION – B**

14. Give an account on feed spoilage methods.

ఆహారము నిల్వచేయుటలో పాడగుటకు గల వివిధ పద్ధతులను గూర్చి వ్రాయుము.

15. What are the differences between Feed attractants and Feed stimulants?

ఆహారపు ఆకర్షకాలు మరియు ఆహారపు ప్రేరేపకాల మధ్య గల తేడాలు ఏమి?

16. Write an essay on growth promoters and pigments.

పెరుగుదల ప్రోత్సాహకాలను గూర్చి ఒక వ్యాసము వ్రాయుము.

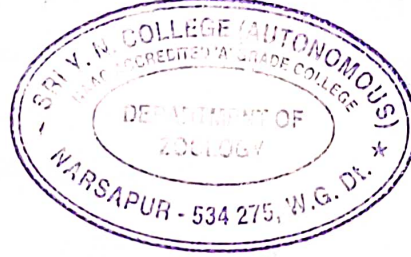
17. Give an account on different deficiency symptoms.

వివిధ క్షీణత లక్షణములను గూర్చి వ్రాయుము.

18. Describe the importance of natural and supplementary feeds.

సహజ మరియు అనుబంధ ఆహారముల యొక్క ప్రాముఖ్యతను గూర్చి వర్ణింపుము.

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II B.Sc Aquaculture Technology – Semester – III  
Practical syllabus for 2020 -23 batch (w.e.f.2021-22) Paper – 3  
Fish Nutrition & Feed Technology

**PRACTICALS**

1. Estimation of carbohydrates content in aquaculture feeds.
2. Estimation of ash in aquaculture feed.
3. Study of water stability of pellet feeds.
4. Feed formulation and preparation in the lab.
5. Study of binders used in aquaculture feeds.
6. Study of feed packing Materials.
7. Study of physical and chemical change during storage.
8. Study of physical characteristics of floating and sinking feeds.
9. Visit to a aqua feed production unit.
10. Visit to a farm for studying feeding practices.

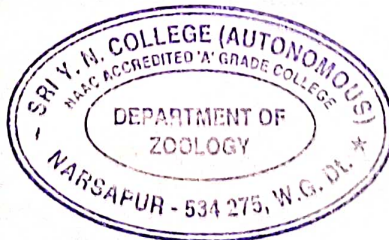
**PRACTICAL MODEL QUESTION PAPER**

Time : 3 Hrs.

Max. Marks : 50

- |  |                   |
|--|-------------------|
| 1. Estimate the amount of carbohydrates present in Aquaculture feed and write the procedure adopted. | 10 + 5 = 15M      |
| 2. Describe the binders used in Aquaculture feed.  | 1 x 10 = 10M      |
| 3. Write the physical and chemical changes of feed during storage near Aqua farms.                   | 1 x 10 = 10M      |
| 4. Record + Field Visit Note book  | 8 + 7 = 15M       |
| <b>TOTAL :</b>   | <b><u>50M</u></b> |

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| 2. J. S. Reddy 3/9    | 6. T. S. Reddy 3/9/22 | 9. |
| 4. M. S. Reddy 3/9/22 | 7.                    |    |

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**II B.ScAquaculture Technology – Semester – IV**  
Theory syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – 4  
**Fresh Water & Brackish Water Aquaculture**

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**UNIT – I : INTRODUCTION TO FRESH WATER AQUACULTURE**

- 1-1.1 Status, scope and prospects of fresh water aquaculture in the world, India and A.P.  
1-1.2 Different fresh water Aquaculture systems.

**UNIT – II : CARP CULTURE**

- 2-1 Major cultivable Indian carps – Labeo, Catla and Cirrhinus & Minor carps.  
2-2 Exotic fish species introduced to Indian – Tilapia, Pangassius and clarius sp.

**UNIT – III : CULTURE OF AIR-BREATHING AND COLD WATER FISH**

- 3-1 Recent developments in the culture of Clarius, Anabas, Murrels.  
3.2 Special systems of Aqua culture - brief study of culture in sewage-fed fish culture.

**UNIT – IV : CULTURE OF PRAWN**

- 4-1 Fresh Water prawns of India – Commercial value.  
4-2 Pond preparation, Stocking, Management of nursery and grow-out ponds, feeding and harvesting.

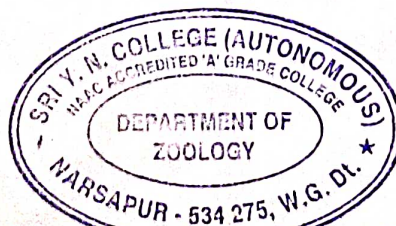
**UNIT – V : CULTURE OF BRACKISH WATER SPECIES.**

- 5-1 Culture of P.Mondon – Hatchery technology and culture practices including feed and disease management.  
5-2 Mixed culture of fish and prawns.

**PRACTICALS**

1. Identification of important cultivable carps.
2. Identification of important cultivable air-breathing fishes.
3. Identification of important cultivable fresh water prawns
4. Collection and study of weed fish.
5. Identification of commercially viable crabs – scylla serrata
6. Identification of lobsters – Panulirus polyphagus
7. Identification of oysters of Nutritional significance crossostrea Madrasens.
8. Identification of Mussels and clams.
9. Identification of developmental stages of oyster

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3. *S. Reddy* 2/19

4. *H. Reddy* 3/1/2021

6. *S. Reddy* 2/19

7. *S. Reddy* 2/19

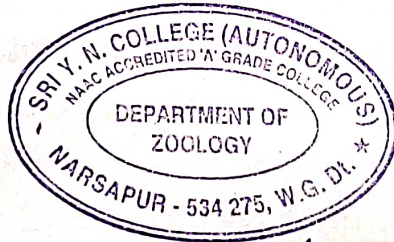
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Unit No.	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
<u>UNIT - I</u>	02	01	25	Section - A 2 Questions- Essay
<u>UNIT - II</u>	02	01	25	Section - A 2 Questions- Essay
<u>UNIT - III</u>	02	02	30	Section - A - 1 Ques. Section - B - 2 Ques.
<u>UNIT - IV</u>	02	02	30	Section - B 2 Questions- Essay
<u>UNIT - V</u>	02	02	30	Section - B 2 Questions- Essay

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**II B.ScAquaculture Technology – Semester – IV**  
For 2020 -21 batch (w.e.f.2021-22) Paper – 4  
**Fresh Water & Brackish Water Aquaculture**  
**Theory Model question paper**

Time : 3Hrs

Max.Marks:75

**PART - I**

Answer any FIVE of the following. Draw labelled diagrams wherever necessary.

ఏవైనా ఐదు ప్రశ్నలకు సమాధానం వ్రాయుము. అవసరమైన చోట పటములు గీయండి.

5 x 5 = 25M

- |  |   |
|--|---|
| 1. Types of fresh water culture          | మంచి నీటి యందు సంవర్ధన రకాలు            |
| 2. Mixed culture                         | మిశ్రమ సంవర్ధనము                        |
| 3. Pangassius                            | పంగేషియస్                               |
| 4. Murrel culture                        | ముర్రెల్ సంవర్ధనము                      |
| 5. Cage culture                          | పంజరముల యందు సంవర్ధనము                  |
| 6. Commercial value of fresh water prawn | మంచి నీటి రొయ్య యొక్క ఆర్థిక ప్రాముఖ్యత |
| 7. Mixed culture                         | మిశ్రమ సంవర్ధనము                        |
| 8. Clarius                               | క్లారియస్                               |

**PART - II**

Answer any FIVE questions choosing atleast two from each section. Draw labelled diagrams wherever necessary.

ప్రతి సెక్షన్ లో నుండి కనీసం రెండు ప్రశ్నలు ఎన్నుకుంటూ మొత్తం ఐదు ప్రశ్నలకు సమాధానం వ్రాయండి. అవసరమైన చోట పటము గీసి భాగములు గుర్తించుము. ఒక్కొక్క ప్రశ్నకు పది మార్కులు.

5 x 10 = 50M

**SECTION – A**

9. Write an essay on the status of freshwater aquaculture in India  
మంచి నీటి జల సంవర్ధనము యొక్క ప్రస్తుత పరిస్థితిపై ఒక వ్యాసము వ్రాయుము.
10. Describe different types of freshwater culture systems in aquaculture.  
పవిధ రకాలైన మంచి నీటి జల సంవర్ధనములను గూర్చి తెల్పుము.

11. Write an essay on the Biology of CatlaCatla.

కట్లా కట్లా ( బొచ్చె ) యొక్క సామాన్య జీవ శాస్త్రమును గూర్చి వ్రాయుము.

12. Describe the composite fish culture system with the exotic carps.

విదేశీ చేపల యొక్క మిశ్రమ జీవుల సంవర్ధనమును గూర్చి తెల్పుము.

13. Describe in detail the recent developments cold water fish culture.

శీతల చేపల జల సంవర్ధనము నందు ప్రస్తుత అభివృద్ధిని గూర్చి తెల్పుము.

### SECTION - B

14. Explain in detail R.A.S system of aquaculture.

జల సంవర్ధనము నందు ఆర్. ఏ. యస్ వ్యవస్థను గూర్చి విపులంగా తెల్పుము.

15. Write an essay on the seed production technology of M. rosenbergii.

మాక్రోబ్రెకియమ్ రొజెన్ బెర్గము విత్తన తయారీ పై ఒక వ్యాసము వ్రాయుము.

16. Write an essay on the management of Nursery ponds in prawn culture.

రొయ్యల సంవర్ధనము నందు నర్సరీ కుంటల యాజమాన్యముపై ఒక వ్యాసము

వ్రాయుము.

17. Describe the culture practice of P. monodon.

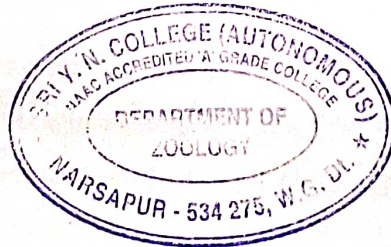
పినియస్ మోనోడాన్ సంవర్ధనము విధానమును గూర్చి వివరింపుము.

18. Explain the feed and disease management in L. vannamei culture.

లెప్టాపినియస్ వెన్నామి సంవర్ధనము నందు మేత మరియు వ్యాధుల యాజమాన్యమును

గూర్చి తెల్పుము.

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Theory Syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – 5  
Fish Health Management

**UNIT – I : DISEASES OF FIN FISH**

- 1.1 Fungal diseases – Saprolegniosis, Branchiomycosis, Ichthyophorus diseases.
- 1.2 Viral diseases – Emerging viral diseases in fish, haemorrhagic septicemia, Spring viremia of carps, Swim – bladder inflammation in cyprinids.
- 1.3 Bacterial diseases – Emerging bacterial diseases, Aeromonas, Pseudomonas and Vibrio infections, columnaris, furunculosis, epizootic ulcerative syndrome, infectious abdominal dropsy, Bacterial gill disease.

**UNIT – II : DISEASES OF SHELL FISH**

- 2.1 Major shrimp viral diseases – Baculovirus, Baculaviral midgut necrosis, infections hypodermal and haematopoietic, yellow head baculovirus.
- 2.2 Bacterial diseases of shell fish - Aeromonas, Pseudomonas and Vibrio infections, luminous bacterial disease, filamentous bacterial disease, Prevention and therapy.
- 2.3 Protozoan diseases – Ichthyophthiriasis, Costiasis, Whirling disease, Trypanosomiasis. Prevention and therapy.

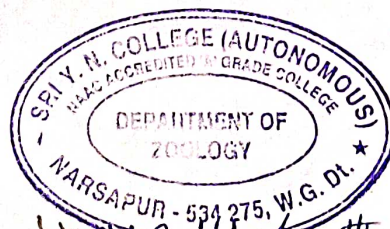
**UNIT – III : FISH HEALTH MANAGEMENT**

- 3.1 General preventive methods and prophylaxis, Application and development vaccines.
- 3.2 Quarantine – Significance
- 3.3 Good feed management for healthy organisms, , Probiotics in health management.

**UNIT – IV : FISHERIES ECONOMICS – I**

- 4.1 Aquaculture economics – application of economics principles to aquaculture operations, Various inputs and production function, laws of viable proportions.
- 4.2 Cost and earnings of Aquaculture systems – Carp culture, Shrimp culture systems.

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## UNIT - V : FISHERIES ECONOMICS - II

- 5.1 Socio - economic conditions of fishermen in Andhra Pradesh.
- 5.2 Role of Matsyafed and NABARD in uplifting fishermen's conditions, fishermen cooperatives, Contribution of fisheries to the national economy.

### PRESCRIBED BOOKS :

1. Shaperclaus W. 1991 Fish diseases - Vol. I & II. Oxonian press Pvt. Ltd.,
2. Roberts RJ 1989. Fish Pathology. Bailliere Tindall.

### REFERENCES :

1. Shankar KM 7 Mohan CV 2002. Fish and Shellfish Health Management. UNESLO. Publ. Sindermann. CJ 1990.
2. Bullock G et.al, 1972 Bacterial diseases of fishes. The publications, New Jersey.

## FISH HEALTH MANAGEMENT

### BLUE PRINT

Unit No.	Essay Questions	Short Questions	Marks allotted to the unit	Remarks
<u>UNIT - I</u>	02	01	25	Section - A 2 Questions- Essay
<u>UNIT - II</u>	02	01	25	Section - A 2 Questions- Essay
<u>UNIT - III</u>	02	02	30	Section - A - 1 Ques. Section - B - 2 Ques.
<u>UNIT - IV</u>	02	02	30	Section - B 2 Questions- Essay
<u>UNIT - V</u>	02	02	30	Section - B 2 Questions- Essay

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**II B.ScAquaculture Technology – Semester – IV**  
For 2020 -21 batch (w.e.f.2021-22) Paper – 5  
Fish Health Management  
Theory Model question paper

Time : 3Hrs

Max.Marks:75

**PART - I**

Answer any FIVE of the following. Draw labelled diagrams wherever necessary.  
ఏవైనా ఐదు ప్రశ్నలకు సమాధానం వ్రాయుము. అవసరమైన చోట పటములు గీయండి.

5 x 5 = 25M

- |  |                     |
|--|---------------------|
| 1. Fusarium disease                          | పూసోరియమ్ వ్యాధి    |
| 2. Black gill disease                        | నల్ల శంఖువ్యాధి     |
| 3. Mano Bacculo Virus                        | యం.బి.వి            |
| 4. Bio security in aquatic health management |                     |
| జల ఆరోగ్య యాజమాన్యము నందు జీవ రక్షణ వ్యవస్థ  |                     |
| 5. Vaccines in aquaculture                   |                     |
| జల సంవర్ధనము నందు వాక్సిన్ల వినియోగము        |                     |
| 6. Need of economic analysis in aquaculture  |                     |
| జల సంవర్ధనము నందు ఆర్థిక - విశ్లేషణ          |                     |
| 7. Matyafed                                  | మత్స్యాఫీడ్         |
| 8. Project appraisal                         | ప్రాజెక్ట్ అప్రైజల్ |

**PART - II**

Answer any FIVE questions choosing atleast two from each section. Draw labelled diagrams wherever necessary.

ప్రతి సెక్షన్ లో నుండి కనీసం రెండు ప్రశ్నలు ఎన్నుకుంటూ మొత్తం ఐదు ప్రశ్నలకు సమాధానం వ్రాయండి. అవసరమైన చోట పటము గీసి భాగములు గుర్తించుము. ఒక్కొక్క ప్రశ్నకు పది మార్కులు.  
5 x 10 = 50M

**SECTION – A**

9. Write an essay on emerging viral diseases symptoms – treatment – therapy in fin fish.  
ఫిన్ ఫిష్ నందు ప్రభలె వైరస్ వ్యాధులు, వాటి లక్షణాలు, నివారణ - ధైరపీపై ఒక వ్యాసము వ్రాయండి.
10. Describe in detail any three bacterial diseases in fin fish.  
ఫిన్ ఫిష్ కు వచ్చు ఏవైనా మూడు బ్యాక్టీరియా వ్యాధులను గూర్చి విపులంగా వివరింపుము.

11. Explain in detail the bacterial diseases of shell fish.

షెల్ ఫిష్ కు వచ్చేడి బ్యాక్టీరియా వ్యాధులను గూర్చి తెలుపుము.

12. Describe the protozoan diseases of shell fish with a note on their prevention and therapy.

షెల్ ఫిష్ కు వచ్చేడి ప్రోటోజోవా జీవుల వ్యాధులు - నివారణ మరియు ధరపిని గూర్చి తెలుపుము.

13. Describe the role of quarantine in fish health management.

చేపల ఆరోగ్య యాజమాన్యములో క్వారెంటైన్ యొక్క పాత్రను వివరింపుము.

### SECTION - B

14. Describe the good feed management practices.

మంచి ఆహార యాజమాన్య పద్ధతులను వివరింపుము.

15. Describe the laws of variable proportions in relation to aquaculture.

జల సంవర్ధనము నందు లా - ఆఫ్ వెరియబిల్ ప్రపోర్షన్స్ యొక్క బాంధవ్యమును తెలుపుము.

16. Describe the cost earnings for Carp culture.

కార్ప్ సంవర్ధనమునుండు కాస్ట్ - యర్నింగ్స్ గూర్చి వివరింపుము.

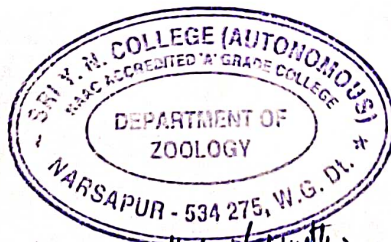
17. Write an essay on the socio economic conditions of fisherman in Andhra Pradesh.

ఆంధ్రప్రదేశ్ నందు మత్స్యకారుల సామాజిక - ఆర్థిక స్థితి గతులను గూర్చి ఒక వ్యాసము వ్రాయుము

18. Write an essay on the fishermen cooperative societies in Andhra Pradesh.

ఆంధ్రప్రదేశ్ నందు మత్స్యకారులు కో - ఆపరేటివ్ సొసైటీలను గూర్చి ఒక వ్యాసము వ్రాయుము.

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**II B.ScAquaculture Technology – Semester – IV**  
**Practical Syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – 5**  
**Fish Health Management**

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1. Observation of gross pathology and external lesions of fish and prawn with reference to the common diseases in aquaculture.
2. Examination of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves of fishes.
3. Examination of pathological changes in gut lumen, hepatopancreas, lymphoid organ, muscles and nerves of prawn and shrimp.
4. Identification of parasites – isolation, culture and characterization.
5. Identification of parasites in fishes : Protozoan, Helminths, Crustaceans.
6. Molecular and immunological techniques, Biochemical tests, PCR, ELISA, Agglutination test challenge tests.
7. Estimation of antibiotics used in aquaculture practices.
8. Estimation of probiotics used in aquaculture.
9. Field visit to farm for health monitoring and disease diagnosis.
10. Preparation of project and project appraisal.

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| 2. <i>J. Srinivas</i> 3/9/22 | 5. <i>S. Srinivas</i> 3/9/22   | 8. |
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III B.Sc Aquaculture Technology – Semester – V  
Theory Syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – 6  
**SOIL AND WATER QUALITY MANAGEMENT**

**Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Know various types of soil and their properties 2.
2. Monitor and manage optimum water quality parameters in fish/shrimp culture ponds
3. 3. Maintain the soil and water quality by using required dose of lime, manures and fertilizers for optimum yields in culture ponds
4. 4. Acquire knowledge on advanced technologies for improving water quality
5. Demonstrate skills related to chemical treatments for combating soil and water quality problems in aquaculture farms.

**UNIT I : Soil Quality**

1. Soil types and their distribution. Physical and chemical properties of soil: Soil colour, texture, structure, pore space, bulk density, and water holding capacity; Conductivity, pH, redox potential, soil salinity, calcium carbonate, organic carbon, available nitrogen, available phosphorus, Carbon-Nitrogen ratio, organic matter and soil fertility.
2. Pond Seepage and its control. Soil quality criteria/requirements for aquaculture.

**UNIT II: Water quality**

1. Water quality parameters: Temperature, transparency, salinity, dissolved oxygen, carbon dioxide, pH, alkalinity, hardness, conductivity, ammonia, nitrites, nitrates, orthophosphates and hydrogen sulphide; phytoplankton, zooplankton and benthos.
2. Water quality criteria for freshwater and brackish water aquaculture.

**UNIT III: Soil and Water amendments**

1. Liming: Liming materials, effects of liming on pond ecosystem, liming rates for ponds, calculation of lime requirements and application of liming materials to ponds.
2. Pond fertilization: Role of organic and inorganic fertilizers in aquaculture; Problems in ponds with indiscriminate fertilization.

#### UNIT IV: Pond water management

1. Dial changes in dissolved oxygen concentration, oxygen depletion in ponds, Aeration, Water exchange, Bio-floc technology.
2. Water quality management in freshwater carp culture; brackish water shrimp culture; and hatcheries.

#### UNIT V: Pond treatments

1. Pond conditioners and Chemical treatments: Potassium permanganate, Hydrogen peroxide, Calcium hydroxide, Rotenone, Formalin and Malachite green. Methods of applying chemicals.
2. Control of algal blooms and aquatic weeds. Bioremediation: Soil and water probiotics for aquaculture ponds.

#### REFERENCES:

1. Boyd, C.E. (1982). Water Quality Management for Pond Fish Culture. Elsevier Sci. Publishing Co.
2. Boyd, C.E. and Tucker, C.S. (1992). Water Quality and Pond Soil Analyses for Aquaculture. Alabama Agricultural Experimental Station, Auburn University, USA.
3. Boyd, C.E. and Tucker, C.S. (2012). Pond aquaculture water quality management. Springer Science & Business Media.
4. ICAR. (2006). Hand Book of Fisheries and Aquaculture. ICAR.
5. MPEDA: Handbooks on culture of carp, shrimp, etc
6. Training Manual on Recent advances in soil and water management in brackishwater aquaculture (2018). Saraswathy, R., Kumararaja, P., Lalitha, N., Suvana, S., SatheeshaAvunje, Muralidhar, M. (Eds.), CIBA-TM Series -No.8 (2nd Ed), ICAR-Central Institute of Brackishwater Aquaculture, Chennai, India pp.137.
7. Boyd, C.E. (1995). Soil and water quality management in aquaculture ponds. INFOFISH international, 5(95), 29-36.
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11. APHA, AWWA, WPCF. (1998). Standard Methods for the Examination of Water and Wastewater, 20th Ed. American Public Health Association, American Water Works Association and Water Pollution Control Federation, Washington, D.C.

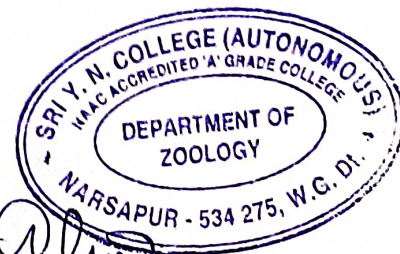
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6. *Dr. S. Reddy*



12. Chattopadhyay, G.N. (1998). Chemical analysis of Fish Pond Soil and Water. Daya Publishing House, Delhi.

13. Ramadhas, V. and R. Santhanam (1996). A Manual of Methods of Seawater and Sediment analysis. Fisheries College & Research Institute, Tuticorin.

14. Adhikari, S and Chatterjee, D.K. (2008). Management of Tropical Freshwater Ponds. Daya Publication.

15. Boyd, C.E. (2003). Guidelines for aquaculture effluent management at the farm-level. Aquaculture, 226(1-4), 101-112. 16. Harry, O. Buckman and Nyle, C. Brady. (1963). The Nature and Properties of Soils. The Macmillan Company, New York. 17. Rajagopalsamy, C.B.T. and Ramadhas, V. 2002. Nutrient Dynamics in Freshwater Fish Culture System. Daya Publication. 18. Stickney, R.R. (1979). Principles of Warm water Aquaculture. John-Wiley & sons Inc.

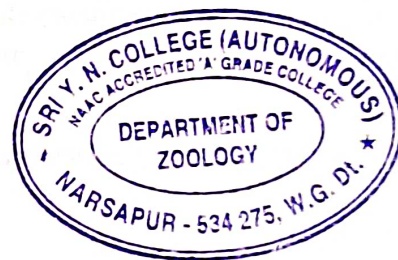
19. Sverdrup, H.V., Johnson, M.W. and Fleming, R.H. (1942). The Oceans: their physics, chemistry and general biology. Prentice Hall, Inc. New York.

20. Web resources suggested by the teacher concerned and the college librarian including reading material.

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3. *E. Reddy* 3/9/22
4. *M. Radh. Krishna* 3/9/22
5. *G. @ J. Reddy*
6. *R. Reddy*



## Soil and Water Quality Management

### Skill Outcomes:-

On successful completion of this practical course, student shall be able to:

1. Identify and handle various glassware, equipment and analytical instruments used for soil and water analyses.
2. Exhibit skills for preparing standard and working solutions for soil & water analyses.
3. Collect and analyze the physico-chemical and biological parameters of soil & water.
4. Calculate the dosages of lime and fertilizers required in ponds.
5. Apply the advanced techniques for quality improvement in ponds for better yields.

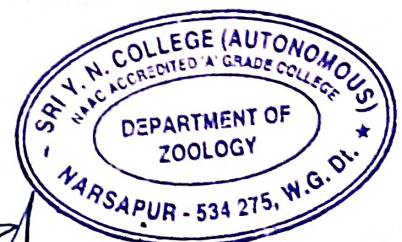
### Practical Syllabus:

1. Demonstration of laboratory glassware and equipment used in water and soil analysis.
2. Principles of Titrimetry, Gravimetry, Potentiometry, Conductometry, Refractometry, Colorimetry, Turbidimetry, Spectrophotometry (Vis, UV-Vis, Flame, Atomic Absorption Spectrophotometer (AAS)).
3. Solutions: Standard, and dilute solutions; units of concentration; standard curve. Soil Analysis:
4. Collection and Processing of soil samples
5. Determination of Soil texture, pH, Redox potential and Conductivity.
6. Determination of Organic carbon, available nitrogen and available phosphorus. Water Analysis:
7. Measurement of Temperature, Transparency, Turbidity, and Salinity of water.
8. Estimation of Dissolved oxygen, Free carbon dioxide, Total alkalinity and Total hardness in water.
9. Estimation of ammonia, nitrites, nitrates, and orthophosphates.
10. Collection and identification of phytoplankton, zooplankton and benthos
11. Calculation of doses of lime and fertilizers for ponds
12. Design and fabrication of different filters.

*M. Satish*  
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**APPROVED**

1. *K. H. S. 3/19/22*
2. *J. M. S. 3/19/22*
3. *P. S. S. 7/*
4. *H. R. K. 3/19/22*
5. *S. D. S. 3/19/22*





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II B.Sc Aquaculture Technology – Semester – V  
Theory Syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – 6  
**SOIL AND WATER QUALITY MANAGEMENT**

**MODEL QUESTION PAPER**

Time : 3 hrs

Max. Marks : 75

**PART - I**

Answer any FIVE of the following

5x5 = 25 Marks

1. Types of soils
2. Pond seepage
3. Phytoplankton
4. Phosphorus
5. Aqua fertilizers
6. Fertilization
7. Waste water treatment
8. Bioremediation

**PART - II**

Answer any FIVE questions choosing atleast two from each section. Draw labelled diagrams wherever necessary.

5x10=50 Marks

**SECTION – A**

9. what is soil? Write about Physical and chemical properties of soil?
10. Explain in detail about Soil quality criteria and requirements for aquaculture?
11. Describe the Water quality parameters in culture ponds?
12. What is biogeochemical cycle? Explain role of microorganisms in Nitrogen cycle?
13. What is liming ? Explain liming process in culture ponds?

**SECTION - B**

14. What is fertilizer? Explain the Role of organic and inorganic fertilizers in aquaculture?
15. Explain in detail about Bio-floc technology
16. Describe the Water quality management in shrimp hatcheries?
17. What is the chemicals used in pond treatment ? Which Methods follow to applying chemicals in pond treatment?
18. What is probiotic ? Soil and water probiotics for aquaculture ponds?

**Model for Practical Examination  
Soil and Water Quality Management**

Max. Time : 3 Hours

Max. Marks : 50

- |   |            |
|---|------------|
| 1. Determination of a soil parameter 'A'  | 8 M        |
| 2. Estimation of a water parameter by titrimetry 'B'                            | 8 M        |
| 3. Estimation of a water parameter by colorimetry/ spectrophotometry 'C'        | 12 M       |
| 4. Identification, salient features and ecological importance of the following. | 4x3=12 M   |
| a. Phytoplankton/ Algae   |            |
| b. Zooplankton  |            |
| c. Aquatic weed   |            |
| d. Benthic organism   |            |
| 5. Record + Viva-voce   | 6+4 = 10 M |

*K. V. S. R.*  
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1. K. V. S. R. 3/19/22
2. J. M. S. R.
3. S. C. S. R.
4. H. Radhakrishna
5. G. S. R.
6. J. S. R.
- 7.



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**Theory Syllabus for 2020 -21 batch (w.e.f.2021-22) Paper – VII**

**ORNAMENTAL FISH CULTURE**

**Learning Outcomes:**

Students after successful completion of the course will be able to:

1. Acquire knowledge on the status of world and Indian ornamental fish farming and trade
2. Identify various commercially important freshwater and marine ornamental fishes
3. Fabricate, set up and maintain the freshwater and marine aquaria
4. Demonstrate skills for breeding and larval rearing of ornamental fishes
5. Develop the commercial production units for large scale production of ornamental fishes and aquarium plants and their trade.

**UNIT I: Status of Ornamental fish farming and trade**

1. Global status of ornamental fish trade and export potential.
2. Types of aquaria – Home and Public aquaria (freshwater and marine), Oceanarium.

**UNIT II: Ornamental fishes**

1. Origin and Benefits of ornamental fish keeping as a hobby.
2. Freshwater ornamental fishes – their taxonomy and biology - varieties of Gold fish Koi, Barbs, Danios (cyprinids); Gourami, Betta (anabantids); Tetras (characins), Live bearers (Guppy, molly, sword tail, platy); Angel fish and other Cichlids, Catfishes, Loaches.

**UNIT III: Aquarium Management**

1. Water quality management for freshwater and marine aquariums. Water filtration systems – biological, mechanical and chemical. Types of filters.
2. Aquarium fish feeds – Live feeds, Dry and wet feeds. Pigmented feeds for color enhancement, larval feeds and feeding.

**UNIT IV: Breeding and Rearing of ornamental fishes**

1. Breeding of Live bearers and Egg layers – sex identification, conditioning of parent fish, stimulating spawning, parental care, hatching, and fry rearing.

2. Breeding of marine ornamental fishes (clown and damsel fishes) and larval rearing.

#### UNIT V: Commercial Production of Aquarium fish and Plants

1. Mass production of aquarium plants.

2. Fish conditioning, packing, transport and quarantine methods. Retail marketing and export of ornamental fish.

#### REFERENCES:

1. Ramachandran, A. (2002). Manual on breeding, farming and management of ornamental fishes. School of Industrial Fisheries, Cochin, India.

2. Biswas, SP., Das, JN., Sarkar, UK and Lakra, WS (2007). Ornamental Fishes of North East India: An Atlas. ICAR, National Bureau of Fish Genetic Resources, Lucknow, India.

3. Dick Mills (1998). Aquarium Fishes, Dorling Kindersly Ltd., London.

4. Spotte, S. (1993). Marine Aquarium Keeping. John Wiley and Sons, USA.

5. Kurup, BM., Harikrishnan, M. and Renjithkumar, CR (2012). Breeding, farming and trade of ornamental fishes in India-Prospects and challenges. Souvenir- Ornamentals Kerala 2012.

6. Jameson, JD. and Santhanan, R. (1996). Manual of Ornamental Fishes and Farming Technologies, Fisheries College and Research Institute, Tuticorin.

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8. Olivier, K. (2003). World trade in ornamental species (pp.49-63). Iowa State Press.

9. Van Ramshorrt, JD. (1978). The complete aquarium encyclopedia, Elsevier publishers.

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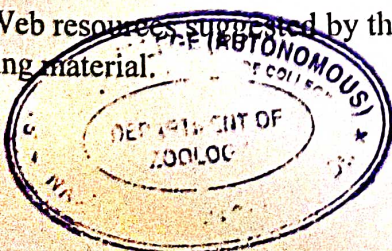
11. Cato, JC. And Brown, CL. (Eds.) (2008). Marine ornamental species: collection, culture and conservation. John Wiley & Sons.

12. Bunting, BW., Holthus, P. and Spalding, S. (2003). The marine aquarium industry and reef conservation. Marine Ornamental Species: Collection, Culture and Conservation, 109-124.

13. Santhanam, R., Sukumaran, N. and Natarajan, P. (1987). Manual of Freshwater Aquaculture. Oxford & IBH Publishing.

14. Sirajudheen, TK., Salim, SS., Bijukumar, A. and Antony, B. (2014). Problems and prospects of marine ornamental fish trade in Kerala, India. J. Fish. Eco. Dev., 1151:14-30.

15. Web resources suggested by the teacher concerned and the college librarian including reading material.



**APPROVED**

1. Khulsi 3/9/22
2. Jomunni
3. S. Reddy
4. M. Radhika
5. 3. [Signature]
6. J. Hanu

[Signature]  
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## ORNAMENTAL FISH CULTURE

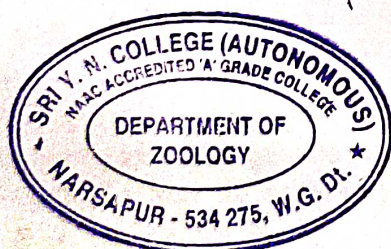
### Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Identify the common ornamental fishes and aquarium plants.
2. Fabricate a glass aquarium and set up with equipment and accessories
3. Maintain the fishes in aquarium with proper water quality, feeding and disease management.
4. Exhibit skills for breeding egg-layers and live-bearers and fry rearing.
5. Condition the fish for packing and transport.

### Practical Syllabus:

1. Identification of common freshwater and marine aquarium fishes
2. Construction of a glass aquarium
3. Setting up and maintenance of aquarium (maintained by students can be evaluated after one month)
4. Water quality management in freshwater and marine aquariums
5. Identification of Aquarium plants and live food organisms, and decoratives
6. Aerators and Types of Filters
7. Breeding of egg layers (Gold fish), live bearers (Guppy) and bubble nest builder (Gourami)
8. Ornamental fish diseases and their diagnosis and treatment. Calculation of medicine/ chemical treatment dosages.
9. Conditioning and packing of ornamental fishes.



**APPROVED**

1. [Signature] 3/9/22
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3. [Signature] 3/9/22
4. M. Radhikavathi 3/9/22
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- 7.

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**ORNAMENTAL FISH CULTURE**

**MODEL QUESTION PAPER**

Time : 3 hrs Max.

Marks : 75

**SECTION – A**

**Answer any FIVE of the following**

**5x5 = 25 Marks**

1. Global status of Ornamental fish
2. Types of aquaria
3. Gold fish
4. Benefits of Ornamental Fish keeping as a hobby
5. Types of filters
6. Aquarium fish feeds
7. Damsel fishes larval rearing
8. Fish conditioning

**PART - II**

**Answer any FIVE questions choosing atleast two from each section. Draw labelled diagrams wherever necessary**

**5x10=50 Marks**

**SECTION – A**

9. Explain the Global status of ornamental fish trade and export potential?
10. Give a detail account on types of Aquaria.
11. Write the taxonomy of Freshwater Ornamental Fishes?
12. Explain in detail about benefits of ornamental fish keeping as a hobby.

13. Write an essay on Aquarium fish feed?

**SECTION - B**

14. Explain the biological, mechanical and chemical water filtration systems?

15. Explain in detail about Breeding of Live bearers and Egg layers

16. Describe the breeding of Marine Ornamental Fishes.

17. Write the notes on Mass production of aquarium plants?

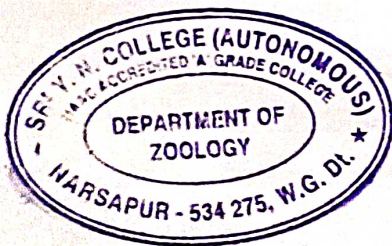
18. Describe the Retail marketing and export of ornamental fish?

**Paper Model for Practical Examination  
Ornamental Fish Culture**

Max. Time : 3 Hours

Max. Marks : 50

- |   |              |
|---|--------------|
| 1. Identification of two freshwater aquarium fishes 'A'               | 8 M          |
| 2. Identification of two marine aquarium fishes 'B'                   | 8 M          |
| 3. Demonstration of breeding technique of egg layers/live bearers 'C' | 12 M         |
| 4. Write about the following.   | 4 x 3 = 12 M |
| a. Aerators   |              |
| b. Biofilters   |              |
| c. Aquatic plant  |              |
| d. Live feed / Fish disease and its treatment                         |              |
| 5. Record + Viva-voce   | 6+4 = 10 M   |



**APPROVED**

1. K. K. K. 3/9/22
2. J. J. J. 3/9/22
3. S. S. S. 8/1/22
4. M. Radhika K. 3/9/22
5. G. G. G.
6. J. J. J.
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