Krishna University
కృష్ణా విశ్వవిద్యాలయం
(Established under AP Act No. 29 of 2008)
Machilipatnam, Andhra Pradesh, India - 521004

BOARD OF STUDIES - AY:2025-26

As Per New APSCHE Syllabus

B.Sc AQUACULTURE (Honours) COURSE

SYLLABUS

FOR

SEMESTERS- I & II

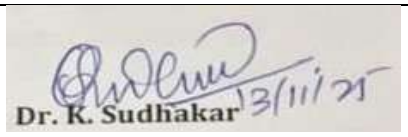
13-11-2025

Minutes of Board of Studies in UG Aquaculture – AY 2025-26

Board of Studies meeting in UG Programs of FOUR-YEAR B.Sc. (Hons) AQUACULTURE (Semesters VII & VIII) was held on 23th May 2025 at 12.30 PM through Google meet **online mode** under the Chairmanship of **Dr. M. Vijaya Kumar**, Lecturer in Zoology, YVNR Government Degree College, Kaikaluru for the Academic year 2025-26.

The Composition of Board of Studies and the members attended are as follows:

UG BOARD OF STUDIES FOR AQUACUTLURE

S.No	Designation	Name of the Faculty	Signature
1.	Chairman	Dr.M.Vijaya Kumar YVNR Government Degree College, Kaikaluru Mobile: 9490086886, E-Mail : mekalavkumar@gmail.com gdcjkc.kaikaluru@gmail.com	
2	Member	Dr.K.Sudhakar Lecturer in Zoology SRR & CVR Government Degree College (A), Vijayawada Mobile:8985685227, E-mail: sudhakarkurmeti06@gmail.com	
3	Member	Dr.N.Sreenivas Government Degree College, Ramchandrpuram BR Ambedkar Konaseema District Mobile:9912760880, E-mail: zoonsreenivas4@gmail.com	
4	Industrialist	Sri B.Appala Naidu Principal Scientific Officer Rajiv Gandhi Center for aquaculture Mobile: 9866560366, E-mail: naidurgca@gmail.com	
5	University Nominee	Dr.P.Veera Bramhachari Professor Dept. of Biosciences & Biotechnology Krishna University, Machilipatnam	Attended Online
6	Student Member-1	D. Rupa Sri B.Sc. Aquaculture II Year SRR & CVR Govt. Degree College (A), Vijayawada	
7	Student Member-2	M. Anitha B.Sc. Aquaculture II Year SRR & CVR Govt. Degree College (A), Vijayawada	

MINUTES AND RESOLUTIONS OF BOARD OF STUDIES MEETING

As per the instructions of the Registrar, Krishna University Machilipatnam, conducted Board of Studies meeting in UG Aquaculture to approve the syllabi, blueprint, model question papers and question paper setters for I and II Semesters courses for UG FIRST YEAR B.Sc. (Hons) Aquaculture under the chairmanship of Dr. M. Vijaya Kumar, Lecturer in Zoology, YVNR Government Degree College, Kaikaluru on 13th Nov 2025 @ 1.00 PM through online mode.

The above committee members have attended the meeting to approve the syllabus for the academic year 2025-26 onwards through online mode.

The members discussed in detail the various aspects presented before them and unanimously resolved the following:

Agenda, Discussion & Resolutions.

Agenda-1	Approval of the new syllabus adopted from the Andhra Pradesh State Council for Higher Education for Semesters I & II for the academic year 2025-26 onwards of FIRST-YEAR B.Sc. AQUACULTURE (Honours).
Discussion	Chairman of the BOS in aquaculture presented the details of the courses, credits, hours, marks (CIA and SEE) details for each course in detail for the I and II semesters Members Dr. K. Sudhakar, Sri B. Appalanaidu and the University Nominee Prof. Veera Brahmacharini actively participated in the discission and gone trough the presentation, University nominee suggested to list out the semester wise credit totals for the core/Major courses. Dr. Sudhakar opined that the syllabus is in tune with the NEP 2020 guidelines, Sri B. Appala Naidu Industry Nominee from the RGCA opined that the practical exposure in the field should be in the needs of the Aquaculture Industry. Another member Dr. N. Sreenivas opined that Aquaculture syllabus is designed in tune with Andhra Pradesh state Governments vision towards aquaculture. All the members followed the guidelines issued by the Hon'ble Vice Chancellor through the VC held on 07.05.2025. The University Representative and members gone through the changes made in the credits of courses, and framework of the courses. The chairman and faculty members explained the changes made in the courses. It is resolved to adopt the syllabus prescribed by APSCHE.
Resolutions	It is resolved to approve the FIRST-YEAR B.Sc. AQUACULTURE (Honours). structure and Syllabi for I & II Semesters from the Academic year 2025-26 onwards.

Agenda-2	Approval of Blue Print, Model Question papers and Question paper setters.
Discussion	Broadly discussed about Blueprint and model question papers. The details of CIA, SEE both for theory and practical courses explained by the chairman in detail and emphasized the need of CIA in practical too to give focused learning through field visit and documentation of the field visit in the form of filed visit register, which is going to be evaluated in CIA
Resolutions	Members satisfied with the recommendation and the details of Model papers and blue print and details of QP setters across the state from other universities and approved the same.

KRISHNA UNIVERSITY: MACHILIPATNAM
B.Sc Aquaculture (Honours) I and II SEMESER SYLLABUS
COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Basic Principles and Practices of Aquaculture	3	3
			Basic Principles and Practices of Aquaculture-Practical	2	1
		2	Biology of Finfish & Shellfish	3	3
			Biology of Finfish & Shellfish - Practical	2	1
	II	3	Freshwater Aquaculture	3	3
			Freshwater Aquaculture - Practical	2	1
		4	Brackish water Aquaculture and Mariculture	3	3
			Brackish water Aquaculture and Mariculture - Practical	2	1

KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER EXAMINATIONS
BLUE PRINT FOR THEORY QUESTION PAPERS

EXAMINATIONS	MAX. MARKS
Internal	30
External	70

KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER END EXAMINATIONS
BLUE PRINT FOR THEORY QUESTION PAPERS

UNIT NO	SECTION-A SHORT ANSWER QUESTIONS & MARKS		SECTION-B ESSAY TYPE QUESTIONS& MARKS WEIGHTAGE		TOTAL WEIGHTAGE OF THE UNIT	REMARKS
	No of Questions	Marks	No of Questions	Marks		
1	1	4	2	20	24	
2	1	4	2	20	24	
3	1	4	2	20	24	
4	1	4	2	20	24	
5	1	4	2	20	24	
	3 Questions Across the 5 Units only one each	12			12	
	5 out of 8 questions to be answered	32	5 out of 10 questions to be answered	100	132	70/132= 53% Choice. out of 132 Marks 70 Marks to be answered

KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER EXAMINATIONS
BLUE PRINT FOR PRACTICAL QUESTION PAPERS

EXAMINATIONS	MAX. MARKS	MARKS ALLOTMENT
Practical-Internal	15	Major-7, Minor-5 Field notes-3
Practical-External	35	Major-10, Minor-5 Spotter/Experiment-5 Record-5, Viva Voce-5

KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
B.Sc.
SEMESTER END EXAMINATION
BLUEPRINT OF QUESTION PAPER

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1.
2.
3.
4.
5.
6.
7.
8.

SECTION-B

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a).

(OR)

(b).

10 (a)

(OR)

(b)

11 (a)

(OR)

(b)

12 (a)

(OR)

(b)

13 (a)

(OR)

(b)

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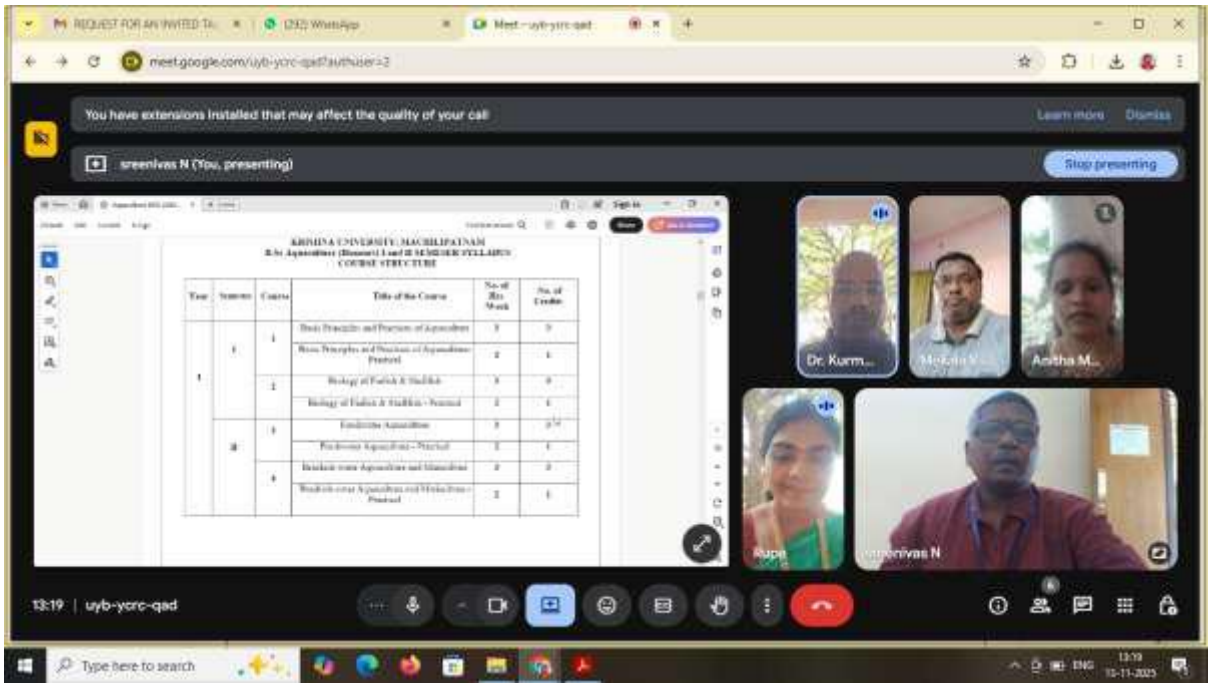
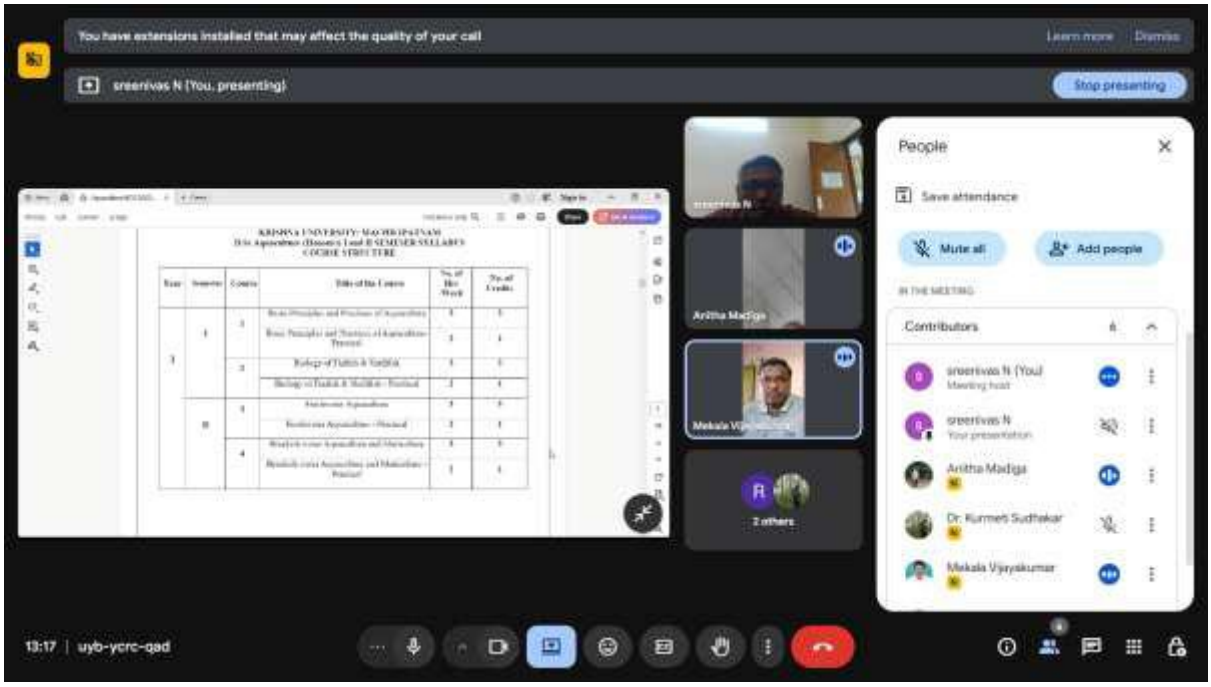
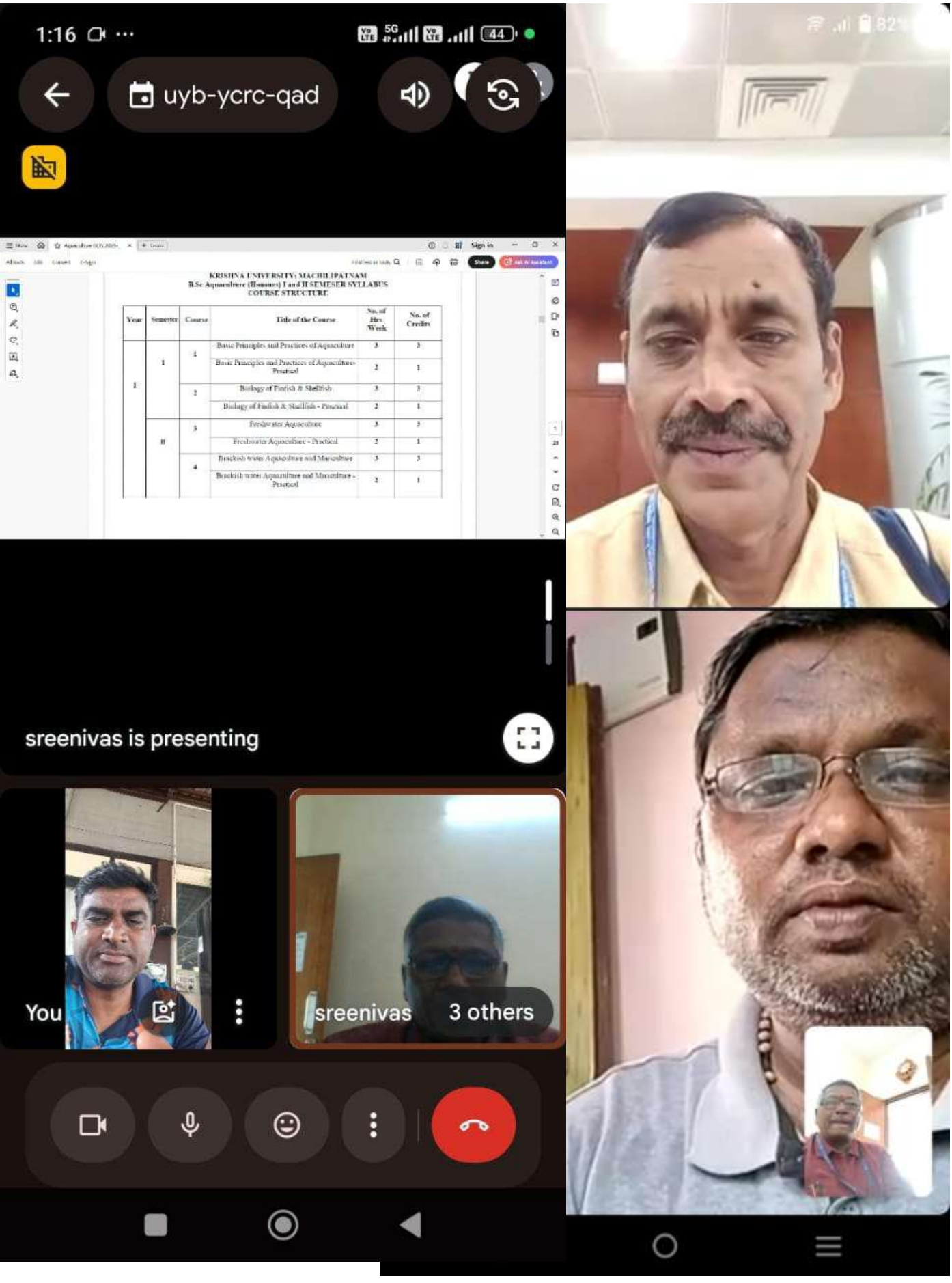
B.Sc Aquaculture Honours Syllabus BOS on 13-11-2025





B.Sc Aquaculture Honours Syllabus BOS on 13-11-2025



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Syllabus for 4-Year UG Honours in B.Sc. (Aquaculture) as Major in consonance with Curriculum framework w.e.f. AY 2025-26

B.Sc Aquaculture (Honours)

SEMESTERS I & II SYLLABUS

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
I	I	1	Basic Principles and Practices of Aquaculture	3	3
			Basic Principles and Practices of Aquaculture-Practical	2	1
		2	Biology of Finfish & Shellfish	3	3
			Biology of Finfish & Shellfish - Practical	2	1
	II	3	Freshwater Aquaculture	3	3
			Freshwater Aquaculture - Practical	2	1
		4	Brackish water Aquaculture and Mariculture	3	3
			Brackish water Aquaculture and Mariculture - Practical	2	1

M. Vijayalakshmi D. Rupasri M. Anitha

SEMESTER-I

COURSE 1: BASIC PRINCIPLES AND PRACTICES OF AQUACULTURE

Theory **Credits: 3** **3 hrs/week**

COURSE OBJECTIVES:

- To study the significance, history, present status of aquaculture in world, India and AP
- To gain knowledge on various types of aquaculture systems and practices
- To learn the design and construction principles of aqua farms and hatcheries.
- To understand the significance of water and soil quality parameters in aquaculture ponds.
- To study the methods of eradication of aquatic weeds, insects, unwanted fishes and algal blooms in culture ponds.
- To improve technical skills in water analysis, identification of pond biota and gain hands-on and field experience by visiting aqua farms.

LEARNING OUTCOMES:

By the completion of the course, student will be able to –

- Understand the scope and status of aquaculture with related schemes and its significance.
- Differentiate various aquaculture systems and culture practices, and their significance.
- Explain design and construction principles of aqua farms and hatcheries.
- Analyse the physico-chemical and biological parameters of water and soil in aquaculture ponds and maintain their optimum levels for better production.
- Implement proper liming and fertilization techniques for maintaining pond health.
- Apply proper pond culture management practices for high yielding profitable culture.

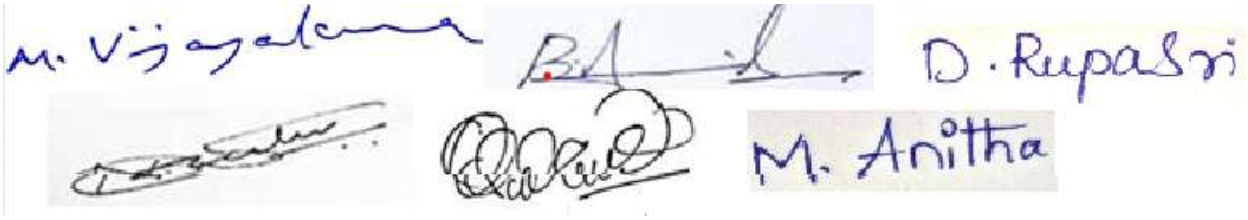
SYLLABUS:

UNIT-I: Introduction

1.1. Definition, Significance and History of Aquaculture.
1.2. Concept of Blue Revolution and Pradhan Mantri Matsya SampadaYojana (PMMSY)
1.3. Present status of Aquaculture at global, India and Andhra Pradesh level
1.4. Aquaculture versus Agriculture; Present day needs with special reference to A.P.

UNIT-II: Aquaculture Systems and Practices

2.1. Types of aquaculture: Freshwater aquaculture, Brackish water aquaculture and Mariculture
2.2. Culture Systems: Ponds, Raceways, Cages, Pens, Rafts, Water Recirculating Systems, Bio-floc technology and 3C system



2.3. Culture practices: Traditional, Extensive, Modified Extensive, Semi-Intensive, Intensive and Super Intensive systems of fish and shrimp

2.4. Culture methods: Monoculture, Poly culture, Mono-sex culture and Integrated fish farming.

UNIT-III: **Design and Construction of Aqua Farms**

3.1. Functional classification of ponds – head pond, hatchery, nursery, rearing, production, stocking and quarantine ponds

3.2. Criteria for the selection of site for freshwater and brackish water pond farms

3.3. Design and construction of an ideal fish and shrimp farms.

3.4. Design and construction of fish and shrimp hatcheries.

UNIT-IV: Pond Culture Management-I

4.1. Water quality in freshwater fish ponds: Significance of physico-chemical (temperature, transparency, turbidity, light, pH, DO, CO_2, orthophspahates, NH_3, NO_2) and biological (plankton and benthos) characteristics and their management at optimal levels in ponds.

4.2. Water quality in shrimp culture ponds: Significance of physico-chemical and biological characteristics and their management at optimal levels in ponds.

4.3. Significance of soil characteristics and their optimal levels for culture

4.4. Liming and fertilization: Lime and Fertilizers (organic manures and chemical Fertilizers) - Types and need of their application in ponds

UNIT-V: Pond Culture Management-II

5.1. Common aquatic weeds- advantages and disadvantages and their control in culture ponds

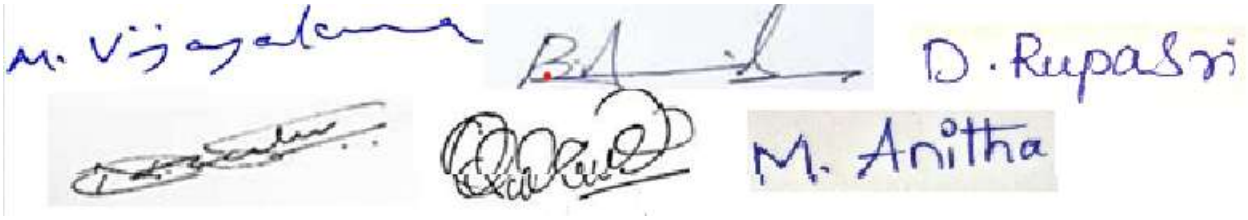
5.2. Aquatic insects: Disadvantages of insects and their control

5.3. Unwanted fishes: Common weed and predatory fishes - Disadvantages and their control.

5.4. Algal blooms: Bloom forming algae and their control

REFERENCE BOOKS:

1. Jhingran VG 1998. *Fish and Fisheries of India*. Hindustan Publishing Corporation, New Delhi
2. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
3. Pillay TVR & Dill MA. 1979. *Advances in Aquaculture*. Fishing News Books Ltd., London
4. Stickney RR 1979. *Principles of Warm Water Aquaculture*. John Wiley & Sons Inc.1981
5. Boyd CE 1982. *Water Quality Management for Pond Fish Culture*. Elsivier Scientific Publ.
6. Bose AN et.al, 1991. *Costal Aquaculture Engineering*. Oxford & IBH Publishing Company.



SEMESTER-I

COURSE 1: BASIC PRINCIPLES AND PRACTICES OF AQUACULTURE

Practical **Credits: 1** **2 hrs/week**

1. Estimation of Dissolved Oxygen in pond water.
2. Estimation of total alkalinity, Bicarbonates and Carbonates in water samples.
3. Estimation of total hardness of water sample.
4. Estimation of Ammonia in water.
5. Study of beneficial and harmful algal species.
6. Collection, identification and isolation of zooplankton and phytoplankton.
7. Collection and study of aquatic weeds, aquatic insects, weed, predatory and larvivorous fishes.
8. Field visit to hatchery, nursery, rearing and stocking ponds of aqua farms.

M. Vijayalakshmi D. Rupasri M. Anitha

KRISHNA UNIVERSITY
B. Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- I
MODEL QUESTION PAPER COURSE: 1
BASIC PRINCIPLES AND PRACTICES OF AQUACULTURE

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1. Pradhan Mantri Matsya SampadaYojana (PMMSY)
2. 3C system - culture
3. Characteristics of Ideal Pond
4. Importance of liming in Pond preparation
5. Control of aquatic weeds
6. Polyculture
7. Predatory fish control
8. Characteristics of plankton in the pond

SECTION-B

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a). Describe the concept of Blue revolution, with a note on its importance.

(OR)

(b). Write an essay on the current status of Aquaculture in India

10 (a) Describe i) Cage Culture ii) Bio floc Technology

(OR)

(b) Write notes on i) Extensive Culture ii) Super Intensive Culture

11 (a) Explain the Criteria for the selection of site for freshwater pond farm.

(OR)

(b) Write an essay on the design of a shrimp hatchery

12 (a) Write an essay physico- chemical parameter of water for a fresh water culture pond.

(OR)

(b) Write an essay on Significance of soil characteristics and their optimal levels for aquaculture

13 (a) Write an essay disadvantage of aquatic insects and a note on their control.

(OR)

(b) Explain formation of algal blooms. Add a note on their control.

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M. Vijayalakshmi D. Rupasri M. Anitha

KRISHNA UNIVERSITY
B.Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- I
PRACTICAL MODEL QUESTION PAPER COURSE: 1
BASIC PRINCIPLES AND PRACTICES OF AQUACULTURE
Laboratory course

External
Model Paper

Time: 2 Hrs **Max. Marks:35**

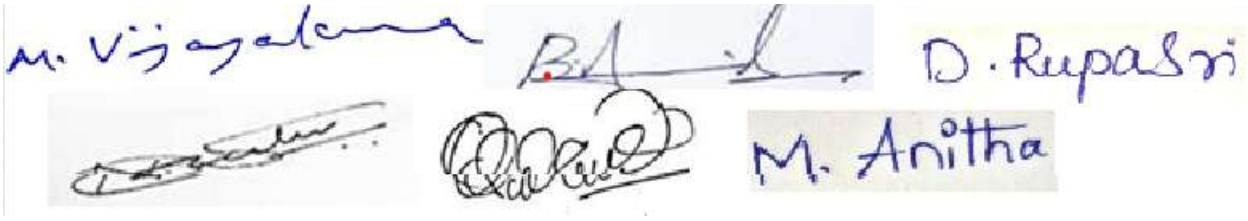
1. Major: Estimation of Dissolved Oxygen in pond water.	15 Marks
2. Algae/ Zooplankton/ Phytoplankton: identification notes	05 Marks
3. Aquatic weed/ Aquatic insect Identification notes	05 Marks
4. Filed visit Book	05 Marks
5. Record & Viva Voce (03+02)	05 Marks
Total	**35 Marks**

Internal

CIA	**15 Marks**

Total	**50 Marks**

SEMESTER-I



COURSE 2: BIOLOGY OF FINFISH & SHELLFISH

Theory **Credits: 3** **3 hrs/week**

COURSE OBJECTIVES:

- To understand the classification, morphology and digestive system of fish and shrimp.
- To study the structure and functioning of respiratory, circulatory and endocrine systems of fish and shrimp.
- To explore the excretory, sensory, and reproductive systems in fish and shrimp.
- To understand feeding, methods of determination of age and growth in fish and shrimp.
- To study breeding biology, parental care and developmental stages in fish and shrimp.

LEARNING OUTCOMES:

By the completion of the course student will be able to –

- Identify and describe general features and digestive system of fish and shrimp.
- Explain gill structure,mechanism of respiration and gaseous exchange and endocrine glands
- Compare circulatory physiology in fish (closed) and shrimp (open).
- Gain knowledge on endocrine glands and their significance in fish and shrimp.
- Describe excretory,sensory and reproductive systems in fish and shrimp.
- Provide suitable type of feeding for fish and shrimp in culture ponds.
- Apply different methods (scales, otoliths, skeletal parts) for age and growth determination.
- Outline breeding activity and larval development in fish and shrimp

SYLLABUS:

UNIT-I: General characters, Classification, External Morphology and Digestive System

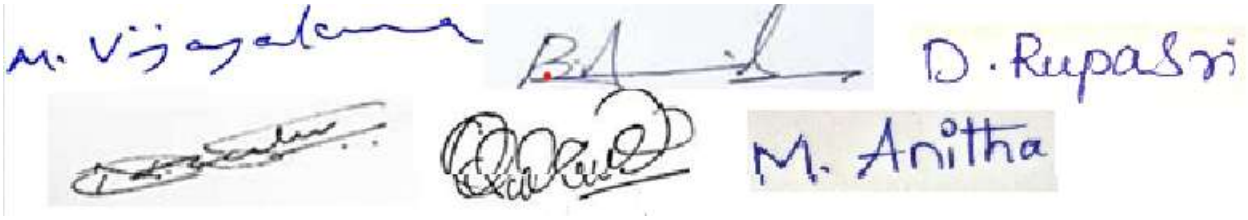
1.1. General characters of fishes and crustaceans
1.2. Classification of fish and crustaceans up to classes
1.3. External morphology of teleost fish and shrimp
1.4. Digestive system of fish and shrimp.

UNIT-II: Respiratory, Circulatory and Endocrine systems

2.1. Structure of gills, Mechanism of Respiration and gaseous exchange in fish and shrimp
2.2. Structure of heart in fishes
2.3. Physiology of Circulation in fish and Shrimp
2.4. Endocrine glands and their role in fish and shrimp.

UNIT-III: Excretory, Sensory and Reproductive Systems

3.1. Structure and function of kidneys in fishes.



3.2. Excretory organs in shrimp.
3.3. Sensory organs in fish and shrimp.
3.4. Reproductive structure in Fishes and Shrimp

UNIT-IV: Feeding and Growth

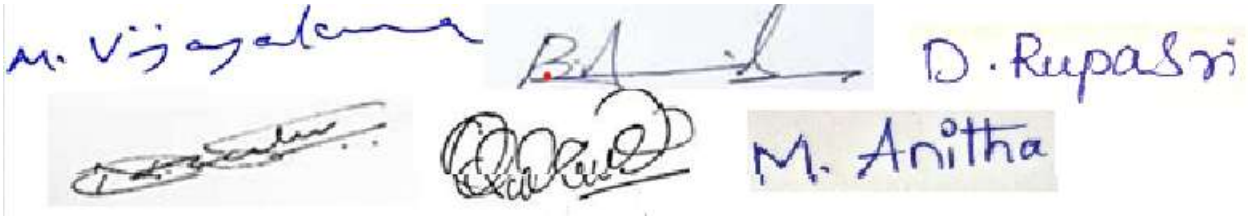
4.1. Natural food and feeding habits of commercially important fishes and shrimp.
4.2. Methods of determination of age and growth in fishes - scale method, otolith method, skeletal parts as age indicators
4.3. Factors affecting growth in fish and shrimp.
4.4. Molting and molting stages in shrimp.

UNIT-V: Reproductive and Developmental Biology

5.1. Breeding in fishes - breeding places and breeding habits
5.2. Parental care in fishes
5.3. Life cycle of carp and shrimp.
5.4. Larval forms of prawn and shrimp.

REFERENCE BOOKS:

1. Lagler KF, Bardach, JE, Miller, RR, Passino DRM. 2005. *Ichthyology*, John Wiley & Sons.
2. Nikolsky GV. 1963. *Ecology of Fishes*, Academic Press.
3. Hoar WS and Randall DJ. 1970. *Fish Physiology*, Vol. I-IX, AP.
4. Bond E. Carl. 1979. *Biology of Fishes*, Saunders.
5. Norman JR and Greenwood PH 1975. *A History of Fishes*, Halsted Press.
6. Moyle PB and Joseph J. Cech. *Fishes: An Introduction to Ichthyology*, Prentice Hall.
7. Bone Q et al., 1995. *Biology of fishes*, Blackie academic & professional, LONDON.
8. Barnes RD. *Invertebrates Zoology,* III edition, W.B. Saunders Co., Philadelphia.
9. Saxena AB 1996. *Life of Crustaceans*. Anmol Publications Pvt.Ltd., New Delh
10. Barrington EJW. 1971. *Invertebrates: Structure and Function*. ELBS.
11. Tandon KK & Johal MS 1996. *Age and Growth in Indian Freshwater Fishes*. Narendra Publishing House, New Delhi.
12. Raymond T et al., 1990. *Crustacean Sexual Biology*, Columbia University Press, New York
13. Guiland J.A (ed) 1984. *Penaeid shrimps- Their Biology and Management*.
14. Barrington FJW 1971. *Invertebrates: Structure and Function*. ELBS
15. Parker TJ & Haswell WA1992. *The text book of Zoology*, Vol I. Invertebrates (eds. Marshal AJ & WD Williams). ELBS & Mc Millan & Co.



SEMESTER-I

COURSE 2: BIOLOGY OF FIN FISH & SHELLFISH

Practical **Credits: 1** **2 hrs/week**

1. External morphology of fish and shrimp.
2. Digestive system of herbivorous, carnivorous and predatory fishes, and in shrimp.
3. Gut content analysis in fish and shrimp
4. Mouth parts and appendages of cultivable prawn and shrimp.
5. Endocrine glands and its significance in fish and shrimp.
6. Study of eggs of fish, shrimp and prawn.
7. Study of maturity stages and fecundity in fish and shellfish
8. Life cycles of carp and shrimp.
9. Observation of crustacean larvae
10. Study of nest building and brooding of fishes

M. Vijayalakshmi D. Rupasri M. Anitha

KRISHNA UNIVERSITY
B. Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- I
MODEL QUESTION PAPER COURSE: 2
BIOLOGY OF FINFISH & SHELLFISH

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1. Scales of Fishes
2. Gaseous exchange in Shrimp
3. Gaseous exchange in Shrimp
4. Internal ear of Fish
5. Compound eye of Shrimp
6. Moulting stages in shrimp
7. Breeding habits of Fish
8. Factors affecting the growth of shrimp

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a). Describe the concept of Blue revolution, with a note on its importance.
(OR)
(b). Write an essay on the current status of Aquaculture in India

10 (a) Describe Structure of Heart in fish
(OR)
(b) Write an essay on the neurosecretory system of shrimp

11 (a) Explain the Excretory system in fish.
(OR)
(b) Write an essay on the reproductive structures of shrimp

12 (a) Write an essay age determination of fish by scale method.
(OR)
(b) Write an essay on feeding habits of commercially important fish

13 (a) Write an essay on Parental care in fishes.
(OR)
(b) Explain the life cycle of shrimp.

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M. Vijayalakshmi D. Rupasri M. Anitha

KRISHNA UNIVERSITY
B.Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- I
PRACTICAL MODEL QUESTION PAPER COURSE: 2
BIOLOGY OF FINFISH & SHELLFISH
Laboratory course

External Examination
Model Paper

Time: 2 Hrs **Max. Marks: 35**

1. Major: Gut Content analysis of Fish .	15 Marks
2. Minor: Mouth parts of Shrimp	05 marks
3. Fish Egg / Shrimp Egg Identification	05 Marks
4. Crustacean Larve/ Maturity stages of Fish	05 Marks
5. Record & Viva Voce (03+02)	05 Marks
Total	**35 Marks**

Internal Examination

CIA /Internal	**15 Marks**

Total	**50 Marks**

M. Vijayalakshmi D. Rupasri M. Anitha

SEMESTER-II

COURSE 3: FRESHWATER AQUACULTURE

Theory **Credits: 3** **3 hrs/week**

COURSE OBJECTIVES:

- To understand the status and prospects of freshwater aquaculture in world, India and AP.
- To know the criteria for the selection of species for culture and major cultivable species.
- To study the bundh and induced breeding techniques, and types of hatcheries.
- To learn the nursery, rearing and production pond management of Indian major carps.
- To know the culture of exotic and air-breathing fishes and their role in aquaculture
- To understand the biology, seed production, and culture practices of freshwater prawns.
- To acquire knowledge on freshwater ornamental fishes and sewage-fed fish culture.

LEARNING OUTCOMES:

By the completion of the course student will be able to

- Explain the scope of freshwater aquaculture and water bodies suitable for culture.
- Select the species for culture and know the commercially important species of culture.
- Practice bundh and induced breeding of carps and hatchery management.
- Manage nursery, rearing and production ponds of Indian major carps
- Analyse the impact of exotic fishes, and culture of air-breathing fishes.
- Describe commercial prawn species, and their biology, seed production and culture.
- Fabricate and maintain aquaria and practice breeding and rearing of ornamental fishes.

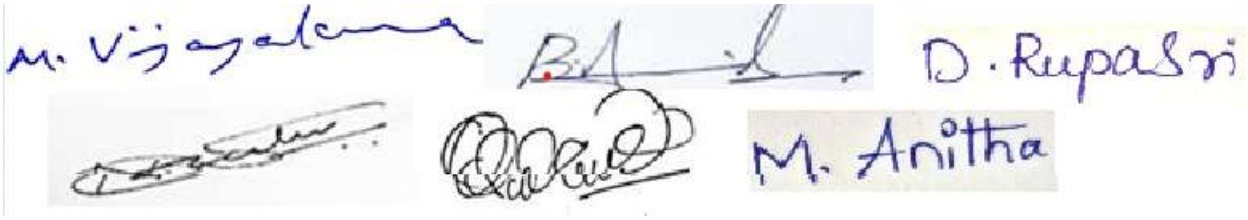
SYLLABUS:

UNIT-I: Introduction to Freshwater Aquaculture

1.1. Status, scope and prospects of freshwater aquaculture in the world, India and AP
1.2. Freshwater bodies suitable for culture in India – ponds, swamps, reservoirs and flood plain wetlands or beels.
1.3. Criteria for the selection of species for culture.
1.4. Major cultivable freshwater fish for aquaculture and their commercial importance.

UNIT-II: **Carp Culture**

2.1. Bundh breeding of Indian major carp
2.2. Induced breeding of Indian major car.



2.3. Types of hatcheries – traditional, chinese and jar hatcheries.

2.4. Preparation and Management of Indian major carp culture ponds.

UNIT-III: **Culture of Exotic and Air-breathing fishes**

3.1. Exotic fishes introduced into India and their impact on indigenous fishes

3.2. Culture of *Tilapia* and *Pangasius*.

3.3. Recent developments in the culture of murrels, magur and koi.

3.4. Advantages and constraints in the culture of air-breathing fishes.

UNIT-IV: **Culture of freshwater prawns**

4.1. Fresh water prawns of India - commercial value

4.2. *Macrobrachium rosenbergii* and *M. malcolmsonii* – biology and seed production.

4.3. Preparation and management of freshwater prawn culture ponds.

4.4. Morphotypes and harvesting techniques of prawns.

UNIT-V: **Ornamental and sewage-fed fish culture**

5.1. Common freshwater ornamental fishes.

5.2. Fabrication, setting up and maintenance of an aquarium.

5.3. Breeding and rearing of freshwater ornamental fishes.

5.4. Sewage-fed fish culture

REFERENCE BOOKS:

1. Jhingran VG 1998. *Fish and Fisheries of India*. Hindustan Publishing Corporation, New Delhi
2. MPEDA: *Handbooks on culture of carp, shrimp, etc*.
3. Pillay TVR. 1990. *Aquaculture- Principles and Practices.* Fishing News Books Ltd., London.
4. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
5. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
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8. Srivatsava 1993. *Fresh water aquaculture in India*, Oxford-IBH, New Delhi
9. Rath RK. 2000. *Freshwater Aquaculture*. Scientific Publ.
10. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn.* Daya Publ. House.
11. Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
12. Marcel H 1972. *Text book of fish culture*. Oxford fishing news books.

M. Vijayalakshmi D. Rupasri

M. Anitha

SEMESTER-II

COURSE 3: FRESHWATER AQUACULTURE

Practical **Credits: 1** **2 hrs/week**

1. Identification of important cultivable carps.
2. Identification of exotic fishes.
3. Identification of important cultivable air-breathing fishes
4. Identification of important cultivable freshwater prawns.
5. Identification of different life history stages of fish.
6. Identification of different life history stages of freshwater prawn.
7. Identification of Phytoplankton and Zooplankton (any 5 each).
8. Pituitary gland – structure, collection, preparation of pituitary extract, dosage and injection for induced breeding of carp.
9. Morphotypes of prawn
10. Identification of important freshwater ornamental fishes
11. Fabrication, setting up and maintenance of an aquarium.
12. Field visit to fish hatchery.
13. Field visit to fish farm /culture ponds.

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M. Anitha

KRISHNA UNIVERSITY
B. Sc., Honours AQUACULTURE: MAJOR
SEMESTER- II
MODEL QUESTION PAPER COURSE: 3
FRESH WATER AQUACULTURE

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1. Characteristics of Ponds for freshwater culture
2. *Catla catla*
3. Bundh breeding
4. *Tilapia*
5. Advantages in Culture of Air breathing fishes
6. Commercial value of freshwater prawns
7. Gold fish
8. Sewage-fed fish culture

SECTION-B

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a). Describe the status of freshwater aquaculture in India.

(OR)

(b). Write an essay any four major cultivable freshwater fishes and their commercial importance.

10 (a) Describe Induced breeding in major carps

(OR)

(b) Write an essay on the jar hatchery

11 (a) Explain the impact of exotic fishes on indigenous fishes.

(OR)

(b) Write an essay on the recent developments in the culture of murrels,

12 (a) Write an essay on the biology of *Macrobrachium rosenbergii*.

(OR)

(b) Write an essay on harvesting techniques of prawn

13 (a) Write an essay on setting up and maintenance of an aquarium

(OR)

(b) Explain breeding in freshwater ornamental fish.

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KRISHNA UNIVERSITY
B.Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- II
PRACTICAL MODEL QUESTION PAPER COURSE: 3
FRESH WATER AQUACULTURE
Laboratory course

External Examination
Model Paper

Time: 2 Hrs **Max. Marks: 35**

1. Major: Explain the procedure of Preparation of pituitary extract, dosage and injection for induced breeding of carp . 15 Marks

2. Field visit book 05 Marks

3. Major carp /Air breathing fish / Freshwater prawn /- Identification characters 05 Marks

4. Fresh water ornamental fish- Identification characters 05 Marks

8. Record & Viva Voce (03+02) 05 Marks

Total **35 Marks**

Internal Examination

CIA **15 Marks**

Grand Total **50 Marks**

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SEMESTER-II

COURSE 4: BRACKISH WATER AQUACULTURE AND MARICULTURE

Theory **Credits: 3** **3 hrs/week**

COURSE OBJECTIVES:

- To understand the status and prospects of brackish water aquaculture and mariculture in India and AP.
- To know the brackish water resources (water bodies and species) for culture in India
- To study the breeding, hatchery techniques, seed management, and culture of shrimps
- To learn breeding and culture techniques of brackish water fishes.
- To acquire knowledge on the culture of mud crabs and marine ornamental fishes
- To study the culture methods of edible and pearl oysters and seaweeds.

LEARNING OUTCOMES:

By the completion of the course student will be able to

- Understand the scope and prospects of brackish water aquaculture and mariculture.
- Know various resources supporting brackish water aquaculture.
- Acquire knowledge on shrimp breeding, seed management and culture practices to improve productivity and sustainability in shrimp farming.
- Gain practical understanding of rearing and culture potentials of brackish water fishes.
- Culture the mud crabs and maintain marine aquaria.
- Understand the culture of edible oysters and techniques of pearl production and artificial pearl production prospects in India.
- Explain the commercially important seaweed species and their culture methods.

SYLLABUS:

UNIT-I: Introduction

1.1. Status, scope and prospects of brackish water aquaculture and mariculture in India and AP
1.2. Brackish water as a medium for aquaculture, ecological factors – Abiotic and biotic factors.
1.3. Brackish water resources for culture in India –Bheries, lagoons (Chilka lake, Pulicat Lake, Vembanad Lake), paddy/pokkali fields and coastal ponds.
1.4 Major cultivable species for brackish water aquaculture and their commercial importance.

UNIT-II: Culture of shrimps

2.1. Breeding and hatchery management of a typical penaeid shrimp (*Penaeus monodon / Litopenaeus vannamei*).

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2.2. Transportation of shrimp seed and nursery management
2.3. Pond preparation and management of *P. mondon* or *L. vannamei* culture ponds.
2.4. Biofloc technology (BFT) in shrimp culture – Benefits and management practices.

UNIT-III: Culture of brackish water fishes

3.1. Breeding and culture of Milk fish, *Chanos chanos*
3.2. Breeding and culture of Asian sea bass, *Lates calcarifer*
3.3. Breeding and culture of Grey mullet, *Mugil cephalus*

UNIT-IV: Culture of crabs and ornamental fishes

4.1. Culture of mud crab, *Scylla serrata* – Biology and culture techniques.
4.2. Common marine ornamental fishes.
4.3. Setting up and maintenance of marine aquarium.
4.4. Breeding and rearing of marine ornamental fishes.

UNIT-V: Culture of oysters and seaweeds

5.1. Cultivable species of edible oysters and pearl oysters
5.2. Culture techniques for farming edible oysters.
5.3. Method of artificial pearl production.
5.4. Major commercial seaweed species; Methods of seaweed culture.

REFERENCE BOOKS:

1. Jhingran VG. 1991. *Fish and Fisheries of India*. Hindustan Publ. Corporation, India.
2. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
3. MPEDA: *Handbooks on culture of carp, shrimp, etc*.
4. Pillay TVR. 1990. *Aquaculture-Principles and Practices.*Fishing News Books Ltd., London.
5. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
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SEMESTER-II

COURSE 4: BRACKISH WATER AQUACULTURE AND MARICULTURE

Practical **Credits: 1** **2 hrs/week**

1. Identification of cultivable brackish water fish and shrimp (any 3 each)
2. Identification of crabs, and edible & pearl oysters of commercial importance (any 2 each)
3. Identification of different live feed organisms for shrimp larvae (any 4)
4. Identification of larval stages of shrimp.
5. Demonstration of eye stalk ablation in *Penaeus monodon*.
6. Identification and mounting of appendages of shrimp.
7. Field visit to shrimp hatchery.
8. Field visit to shrimp culture ponds / farm.

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KRISHNA UNIVERSITY
B. Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- II
MODEL QUESTION PAPER COURSE: 4
BRACKISH WATER AQUACULTURE AND MARICULTURE

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1. Commercial importance of brackish water cultivable species
2. Prospects of brackish water culture in Andhra Pradesh
3. Benefits of Bio floc technology
4. Transportation of shrimp seed
5. Milk fish characteristics
6. Clown fish
7. Seaweed importance
8. Importance of artificial pearls

SECTION-B

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a). Describe Brackish water as a medium for aquaculture.

(OR)

(b). Write an essay on the Brackish water resources for culture in India

10 (a) Describe hatchery management of *Litopenaeus vannamei*.

(OR)

(b) Write an essay on Pond preparation and management of *P. mondon*

11 (a) Explain culture of Sea bass *Lates calcarifer*.

(OR)

(b) Write an essay on breeding in grey mullet *Mugil cephalus*

12 (a) Write an essay culture technique of *Scylla serrata*.

(OR)

(b) Write an essay setting up and maintenance of marine aquarium

13 (a) Write an essay on Cultivable Peral oyster Species.

(OR)

(b) Explain Culture techniques of edible oysters.

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B.Sc ., Honours AQUACULTURE: MAJOR
SEMESTER- II
PRACTICAL MODEL QUESTION PAPER COURSE: 4
BRACKISH WATER AQUACULTURE AND MARICULTURE
Laboratory course

External Examination
Model Paper

Time: 3 Hrs **Max. Marks: 35**

1. Major: Eye stalk ablation in *Penaeus monodon*. 15 Marks
2. Brackish water fish. / Shrimp/Crab Identification characters 05 marks
3. Edible oyster/Pearl oyster/. Live feed for shrimp larva Identification characters 05 Marks
4. Filed visit book 05 Marks
5. Record & Viva Voce (03+02) 05 Marks

Total 35 Marks

Internal Examinations

CIA **15 Marks**

Grand Total (Internal & External) **50 Marks**

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KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER EXAMINATIONS
BLUE PRINT FOR THEORY QUESTION PAPERS

EXAMINATIONS	MAX. MARKS
Internal	30
External	70

KRISHNA UNIVERSITY
B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER END EXAMINATIONS
BLUE PRINT FOR THEORY QUESTION PAPERS

UNIT NO	SECTION-A SHORT ANSWER QUESTIONS & MARKS WEIGHTAGE		SECTION-B ESSAY TYPE QUESTIONS& MARKS WEIGHTAGE		TOTAL WEIGHTAGE OF THE UNIT	REMARKS
	No of Questions	Marks	No of Questions	Marks		
1	1	4	2	20	24	
2	1	4	2	20	24	
3	1	4	2	20	24	
4	1	4	2	20	24	
5	1	4	2	20	24	
	3 Questions Across the 5 Units only one each from any	12			12	
	5 out of 8 questions to be answered	32	5 out of 10 questions to be answered	100	132	70/132= 53% Choice. out of 132 Marks 70 Marks to be answered

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B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
SEMESTER EXAMINATIONS
BLUE PRINT FOR PRACTICAL QUESTION PAPERS

EXAMINATIONS	MAX. MARKS	MARKS ALLOTMENT
Practical-Internal	15	Major-7, Minor-5 Field notes-3
Practical-External	35	Major-10, Minor-5 Spotter/Experiment-5 Record-5, Viva Voce-5

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B.Sc. AQUACULTURE (Honours): MAJOR/MINOR
B.Sc.
SEMESTER END EXAMINATION
BLUEPRINT OF QUESTION PAPER

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

SECTION-A

Answer any FIVE questions **5×4 = 20M**

1.
2.
3.
4.
5.
6.
7.
8.

SECTION-B

Answer ALL questions Draw diagrams wherever necessary **5x10M = 50M**

9 (a).

(OR)

(b).

10 (a)

(OR)

(b)

11 (a)

(OR)

(b)

12 (a)

(OR)

(b)

13 (a)

(OR)

(b)

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