SRR & CVR GOVERNMENT DEGREE COLLEGE (AUTONOMOUS)

VIJAYAWADA

ज्ञान-विज्ञान विमुक्तये

UGC

University Grants Commission

Resolutions

for

B. Voc Aquaculture Technology

SEMESTER-III and IV

SYLLABUS AND MODEL QUESTION PAPERS

(AS *PER CBCS AND SEMESTER SYSTEM*)

(W.E.F.2021-22)

Minutes of the meeting of the Monitoring Committee in the Subject of B.Voc Aquaculture Technology

The monitoring Committee for B.Voc Courses constituted vide the Proceedings of The Principal, SRR & CVR Government Degree College (A) Vijayawada, dated-15-11-2021, Rc. No. SRR-UG – Com/2M/BoS – 2020-21, met on 17.12.2021 for the ratification of **B.Voc Aquaculture Technology course** syllabus of the subjects that are already approved in their respective departmental BoS for Semester III & IV **AY 2021-22** under the chairmanship of Dr C.Bramhaiah, Lecturer in Commerce, B. Voc Course Coordinator.

The following monitoring Committee members attended the meeting online https://us02web.zoom.us/j/7897418897?pwd=eHB3VndKeVhPL2gwRi9JQUduQ2RMZz09

1. **Dr C.Bramhaiah** **(Chairman)**
   Lecturer in Commerce
   SRR & CVR GDC(A)
   Vijayawada

2. **Dr. D Ramasekhar Reddy** **(University Nominee)**
   Controller of Examinations
   Krishna University
   Machilipatnam

3. **Smt N.Suneetha** **(Faculty member)**
   Lecturer in Zoology
   SRR & CVR GDC (A), VIJAYAWADA

4. **Dr.G.Vani** **(Subject Expert)**
   Lecturer in Zoology
   DRG GDC
   Tadepalligudem

3. **Sri. B. Appala Naidu** **(Industrial Expert)**
   Assistant Project Manager – Tilapia Fish Project
   Rajiv Gandhi Centre for Aquaculture (RGCA)
   Manikonda

AGENDA

1. To ratify the syllabus of various subjects that are approved in their respective BOS meetings for B. Voc Aquaculture Technology course.
2. To ratify the Blue print of various subjects that are approved in their respective BOS meetings for B. Voc Aquaculture Technology course.
3. To ratify the Question papers of various subjects that are approved in their respective BOS meetings for B. Voc Aquaculture Technology course.
4. To approve the credits for various subjects in B. Voc Aquaculture Technology course.
5. To approve the evaluation pattern for B. Voc Aquaculture Technology course.

PROCEEDINGS OF THE PRINCIPAL, SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA

Present : Dr.K. Bhagya Lakshmi, M.Sc., M.Phil, Ph.D.

RC.No: SRR-UG-Com/2M/BoS-2020-21 **Date: 15/11/2021**

Sub: *SRR & CVR Government Degree College(A), Vijayawada- Constitution of Board of Studies (BoS) for UG Programme – Department of Commerce for a period of Two years for the Academic years 2021-23-Orders issued -Reg.*

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As continuous flow of implementation of Quality enhancement in Teaching Learning Process and modifying curriculum under CBCS with Learning Outcomes-based Curriculum Framework (LOCF) for Courses in UG Programmes, with the following faculty members, the Boards of Studies has been constituted for Department of **B.Voc** for a period of two academic years from AY -2021-22.

S.No	Name of the Faculty member	Address	Designation in BoS
1	Dr. C Bramhaiah	Lecturer in Commerce, SRR & CVR GDC (A), Vijayawada	Chairman
2	Smt. T. Deepthi	Lecturer in Commerce, SRR & CVR GDC (A), Vijayawada	Member
3	Smt. N.Sunitha	Lecturer in Zoology, SRR & CVR GDC (A), Vijayawada	Member
4	Sri. G.V.Swaroop Singh	Lecturer in Chemistry, SRR & CVR GDC (A), Vijayawada	Member
5	Dr.K. Lakshmana Rao	Lecturer-in-charge Department of Commerce P.R. Govt. College (A), Kakinada., East Godavari Dt	Subject Expect
6	Dr.G.Vani	Lecturer in Zoology DRG Govt.Degree College, Tadepalligudem	Subject Expert
7	Dr.K.Rayapa Reddy	Lecturer in Chemistry Andhra Loyola college (A) Vijayawada	Subject Expert
8	Sri.B Appala Naidu	Assistant project Manager-Tilapai Fish Project Rajiv Gandi Centre for Aquaculture (RGCA) Manikonda, Vijayawada	Industry Representative

- ✓ Copy to the above Individuals.
- ✓ Copy to file

PRINCIPAL
SRR & CVR GOVT. DEGREE COLLEGE
(Autonomus)
Machavaram, VIJAYAWADA-520 004

Resolutions:

1. Resolved to approve the syllabus of subjects - **Skill components** -Aquaculture paper VII, VIII, IX,X,XI,XII **General Components**-English, Life skill, Zoology and Chemistry that were approved in their respective BoS meetings for B. Voc Aquaculture Technology course.
2. Resolved to ratify the Blue print of various subjects that are approved in their respective BOS meetings for B. Voc Aquaculture Technology course.
3. Resolved to approve the Model Question papers of various subjects that are approved in their respective BOS meetings for B. Voc Aquaculture Technology course.
4. Resolved to approve the credits of various subjects in B. Voc Aquaculture Technology course.
5. Resolved to approve the evaluation pattern for B. Voc Aquaculture Technology course.
6. Resolved to approve the division of 100 marks into two components as Internal and External for Skill components - Aquaculture Paper; General components – Zoology and Chemistry.
7. Resolved to approve the division of marks for (Internal) CIA as 40 marks and (External) SEE as 60 marks with the suggested blue print and model paper.
8. External 60 Marks: Section-A consisting 20 Marks, Short Answer questions (Any 5 from given 10), Section-B consisting 40 Marks , Essay Questions (Any 5 with internal choice from given 10)
9. Internal 40 Marks. To evaluate Internal Assessment as follows:- Average of two Internal exams of 10 marks -10 marks, Assignments (two) -10 marks, Project -10 marks, Seminar- 05 marks, Attendance-05 marks .
10. The pass mark is 40% i.e., 24 out of 60 for External and 16 out of 40 for Internal.
11. Resolved to approve and divide the 50 marks into two components for Practicals , External 25 Marks and Internal 25 marks
12. The minimum pass mark is 40% i.e., 10 out of 25 for External and Internal each
13. Resolved to approve the evaluation of General components- English and Life skill subject's papers for 50 mark, which is done at the end of the semester.
14. There is no CIA for these courses. Only SEE is conducted for 2 hours for 50 marks. The Question Paper consists of 10 Essay questions and student is required to write any 5 questions: 5X 10 = Total 50 Marks.

Members Presented

S.No	Name of the person	Designation in BoS	Signature
1.	**Dr.C.Brahmaiah** Lecturer in Commerce SRR & CVR Govt.Degree College(A), Vijayawada	Chairman of BoS	
2.	**Dr. D Ramasekhar Reddy** Controller of Examinations Krishna University Machilipatnam	University Representative	Attended online
3.	**Dr.M.Vijaya Kumar** Lecturer in Zoology SRR & CVR GDC (A), VIJAYAWADA	In charge of the Department & Controller of Examinations)	
4	**Smt N.Suneetha** Lecturer in Zoology SRR & CVR GDC (A), VIJAYAWADA	B.Voc. Member	
5	**Sri.GV.Swaroop Singh** Lecturer in Chemistry SRR & CVR GDC (A), VIJAYAWADA	B.Voc. Member	
6.	**Dr.G.Vani** Lecturer in Zoology DRG GDC Tadepalligudem	Subject Expect	Attended online
7	**Dr.K.Rayapa Raddy** Lecturer in Chemistry Andhra Layola College (A) Vijayawada	Subject Expect	Attended online
8.	**Sri. B. Appala Naidu** Assistant Project Manager - Tilapia Fish Project Rajiv Gandhi Centre for Aquaculture (RGCA) Manikonda	Industry Representative	Attended online

9.	**Smt.A.L.K.Krupavaram** Lecturer in Zoology SRR & CVR GDC (A), VIJAYAWADA	Member	A.L.K.Krupavaram
10.	**Smt.B. Vedavathi** Lecturer in Zoology SRR & CVR GDC (A), VIJAYAWADA	Member	B.Ved

PROGRAMME: THREE-YEAR

B. Voc Aquaculture Technology

The syllabus for B. Voc. Aquaculture Technology is framed at undergraduate level using the Choice Based Credit system. The main objective of framing this syllabus is to give the students a holistic understanding of the subject giving substantial weight age to the Skill Components and General component useful for Aquaculture. The syllabus has also been framed in such a way that the basic skills of subject are taught to the students and may continue higher studies in post graduation and/or secure a job after graduation.

PROGRAMME OUTCOMES :

On completion of their degree, students will have developed a comprehensive and well-founded knowledge in aquaculture and a range of transferable professional skills. Graduates of the course are expected to be able to:

1 Demonstrate a sound understanding of the biology of aquaculture organisms and of breeding, genetics, nutrition and water quality issues relevant to aquaculture
2 Design aquaculture systems and solve engineering issues in aquaculture
3 Employ knowledge of health and safety issues in aquaculture ventures
4 Employ scientific techniques, practical skills and business management strategies to improve aquatic resource management
5 Understand and interpret critical scientific and ethical issues in aquaculture
6 Employ scientific methodologies such as experimental design, quantitative skills, and the critical analysis of data
7 Communicate and present information clearly and fluently in both written and spoken forms
8 Interact effectively as part of a team in order to work towards a common outcome
9 Reason critically and logically and make independent judgments
10 Engage effectively with information and communication technologies
11 Demonstrate research skills appropriate for further study and employment
12 Appreciate the need for continuing professional development.

LEARNING OUTCOMES

1. Student will learn the knowledge on the crafts and gears
2. Mechanism involved in the operation of the fishing gear will be learnt by the student.
3. Tools for the identification of fishery resources will be learnt by the student.
4. Knowledge on heredity determination will be learnt.
5. Principles of Biotechnology and its applications in the aquaculture will be learnt
6. Knowledge on the ornamental fish breeding will be learnt by the student.
7. Management practices of ornamental fishes will be learnt.
8. Able to gain knowledge on the aquarium maintenance and accessories.
9. Hatchery management strategies will be learnt by the students
10. Knowledge on the Fish live feeds culture will be learnt by the students.
11. To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
12. Acquiring in-depth knowledge on various aspects of genetics involved in sex determination, human karyo typing and mutations of chromosomes resulting in various disorders
13. Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
14. Understand the principles and forces of evolution of life on earth,
15. To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
16. To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes

PROCEEDINGS OF THE PRINCIPAL, SRR & CVR GOVERNMENT DEGREE COLLEGE (A), *VIJAYAWADA*

Present : **Dr.K. Bhagya Lakshmi,** M.Sc., M.Phil, Ph.D.

RC.No: SRR-UG-Com/2M/BoS-2020-21 **Date: 15/11/2021**

Sub: *SRR & CVR Government Degree College(A), Vijayawada- Constitution of Board of Studies (BoS) for UG Programme – Department of Commerce- for a period of Two years -for the Academic years 2021-23-Orders issued –Reg.*

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✓ Copy to the above individuals.

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15.11.2021

PRINCIPAL
SRR & CVR GOVT. DEGREE COLLEGE
(Autonomus)
Machavaram, VIJAYAWADA - 520 004

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Syllabus and Title of Papers

	SEMESTER-I					
	GENERAL COMPONENTS					
No.	**TITLE**	**Credits**	**Hours Week**	**Internal marks**	**External marks**	**Total**
1	English (Communication & soft skills)	2	2	-	50	50
2	Computers (Basics of Computer Applications)	2	2	-	50	50
3	Chemistry	3+1	3+2	40	60	100
4	Zoology	3+1	3+2	40	60	100
	TOTAL	12	14			
	SKILL COMPONENTS					
5	Biology of Fin Fish &Shell Fish	4+1=5	4+2	40	60	100
6	Basic Principles of Aquaculture	4+1=5	4+2	40	60	100
7	Fresh water and Brackish water Aquaculture	4+1=5	4+2	40	60	100
8	Field Work/Project	3	3	40	60	100
	TOTAL	18	21			
	GRAND TOTAL	30				

I B. Voc Aquaculture Technology

SEMESTER-II

Syllabus and Title of Papers

	GENERAL COMPONENTS					
No.	**TITLE**	**Credits**	**Hours Week**	**Internal marks**	**External marks**	**Total**
1	English (Communication & soft skills)	2	2	-	50	50
2	Computers (Information and Communication Technology)	2	2	-	50	50
3	Chemistry	3+1	3+2	40	60	100
4	Zoology	3+1	3+2	40	60	100
	TOTAL	12	14			
	SKILL COMPONENTS					
5	Capture Fishery	4+1=5	4+2	40	60	100
6	Fish Nutrition and Feed Technology	4+1=5	4+2	40	60	100
7	Fish Health Management	4+1=5	4+2	40	60	100
8	Field Work / Project	3	3	40	60	100
	TOTAL	18	21			
	GRAND TOTAL	30				

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Syllabus and Title of Papers

SEMESTER – III						
	GENERAL COMPONENTS					
No	Title	Credits	Hours/week	Internal Marks	External Marks	Total
1	English- A course in conversational skills	2	2	-	50	50
2	Life skill- Environmental Education	2	2	-	50	50
3	Chemistry –Paper 3 -Theory	3	3	40	60	100
	Chemistry –Paper 3 - Practical	1	2	25	25	50
4	Zoology –paper 3 –Theory	3	3	40	60	100
	Zoology –paper 3 - Practical	1	2	25	25	50
	Total	12	14			
SKILL COMPONENTS						
5	Hatchery Technology in Aquatic Organisms –Paper 7 – Theory	4	4	40	60	100
	Hatchery Technology in Aquatic Organisms- Paper 7 - Practical	1	2	25	25	50
6	Fishing methods - Paper 8- Theory	4	4	40	60	100
	Fishing methods- Paper 8- Practical	1	2	25	25	50
7	Fisheries extension, economics & marketing - Paper 9- Theory	4	4	40	60	100
	Fisheries extension, economics & marketing- Paper 9 –Project	1	2	25	25	50
8	Field work/Project	3	4	40	60	100
	Total	18	22			
	Grand Total	30				

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Syllabus and Title of Papers

SEMESTER – IV						
	GENERAL COMPONENTS					
No	Title	Credits	Hours/week	Internal Marks	External Marks	Total
1	Chemistry paper-4 – Theory	3	3	40	60	100
	Chemistry paper-4 – Practical	1	2	25	25	50
2	Chemistry paper-5- Theory	3	3	40	60	100
	Chemistry paper-5 – Practical	1	2	25	25	50
3	Zoology –Paper 4 – Theory	3	3	40	60	100
	Zoology –Paper 4 – Practical	1	2	25	25	50
	Total	12	15			
SKILL COMPONENTS						
5	Fish genetics and aquaculture biotechnology - Paper 10 – Theory	4	4	40	60	100
	Fish genetics and aquaculture biotechnology - Paper 10- Practical	1	2	25	25	50
6	Ornamental Fish Culture – Paper 11-Theory	4	4	40	60	100
	Ornamental Fish Culture – Paper 11-Practical	1	2	25	25	50
7	Larval nutrition and culture of fish food organisms - Paper 12-Theory	4	4	40	60	100
	Larval nutrition and culture of fish food organisms - Paper 12-Practical	1	2	25	25	50
8	Field work/Project	3	3	40	60	100
	Total	18	21			
	Grand Total	30				

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Syllabus and Title of Papers

SEMESTER – V						
	GENERAL COMPONENTS					
No	Title	Credits	Hours/week	Internal Marks	External Marks	Total
1	Chemistry –Paper 6 – Theory	3	3	40	60	100
2	Chemistry –Paper 6 - Practical	1	2	25	25	50
3	Zoology –Paper 5 –Theory	3	3	40	60	100
	Zoology –Paper 5 – Practical	1	2	25	25	50
4	Zoology –Paper 6 – Theory	3	3	40	60	100
	Zoology –Paper 6 -Practical -2	1	2	25	25	50
	Total	12	15			
SKILL COMPONENTS						
5	Paper 13-Theory	4	4	40	60	100
	Paper 13- Practical	1	2	25	25	50
6	Paper 14 –Theory	4	4	40	60	100
	Paper 14 –Practical	1	2	25	25	50
7	Paper 15 – Theory	4	4	40	60	100
	Paper 15 -Practical	1	2	25	25	50
8	Field work/Project	3	3	40	60	100
	Total	18	21			
	Grand Total	30				

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Syllabus and Title of Papers

SEMESTER – VI						
	GENERAL COMPONENTS					
No	Title	Credits	Hours/week	Internal Marks	External Marks	Total
1	Chemistry paper-7 – Theory	3	3	40	60	100
	Chemistry paper-7 – Practical	1	2	25	25	50
2	Zoology paper-7 - Theory	3	3	40	60	100
	Zoology paper-7 – Practical	1	2	25	25	50
	Total	8	10			
SKILL COMPONENTS						
5	Paper 16 – Theory	4	4	40	60	100
	Paper 16– Practical	1	2	25	25	50
6	Paper 17 –Theory	4	4	40	60	100
	Paper 17 – Practical	1	2	25	25	50
8	Internship/Project/Fieldwork	12	2/3 months			400
	Total	22				
	Grand Total	30				

S.R.R. & C.V.R.GOVT DEGREECOLLEGE (Autonomous),Vijayawada.
B.Voc Programmes
II Year:: III Semester
Paper: **A Course in Conversational Skills**

SYLLABUS

Learning Outcomes

By the end of the course the learner will be able to:

- Speak fluently in English
- Participate confidently in any social interaction
- Face any professional discourse
- Demonstrate critical thinking
- Enhance conversational skills by observing the professional interviews

I. UNIT

Speech Skills :1. Tryst with Destiny — Jawaharlal Nehru
:2. Greetings
:3. Introductions
:4..Requests

II. UNIT

Interview Skills :1.A Leader Should Know How to Manage Failure - Dr. Abdul Kalam/ India Knowledge at Wharton
:2. Asking and Giving Information
:3.Agreeing and Disagreeing
:4. Dialogue Building

III. UNIT

Speech Skills :1.You've Got to Find What You Love — Steve Jobs
:2. Debates
:3. Role Play
:4. Dialogue Building

S.R.R.&C.V.R.GOVT DEGREE COLLEGE(Autonomous),Vijayawada.
B.Voc Programmes
II Year:: III Semester
Paper: A Course in Conversational Skills
BLUEPRINT

Time: 2hrs (120 min) **Max marks:50**

SECTION - A (Total Marks: 5x4=20M)

Answer ANY FIVE questions. Each answer carries 4 marks. (The questions should test each conversational skills prescribed for the study)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

SECTION - B (Total Marks: 3X10=30M)

Answer ALL the questions. Each answer carries 10 marks. (Internal choice from each text prescribed for the study)

11. a. _____
(or)
b._____
12.a._____
(or)
b._____
13. a._____
(or)
b._____

S.R.R.&C.V.R.GOVTDEGREECOLLEGE(Autonomous),Vijayawada.
B.Voc Programmes
II Year:: III Semester
Paper: **A Course in Conversational Skills**
MODEL PAPER

Time: 2hrs (120 min) Max marks: 50

SECTION – A (Total Marks: 5x4=20M)

Answer ANY FIVE questions.

Each answer carries 4 marks. The questions should test each conversational skills prescribed for the study)

1. Write suitable greetings for the following occasions:

    a. When your friend gets the first rank.

    b. When somebody fails to get through the interview.

    c. When your friend is ill.

    d. Your sister's birthday.

2. You are attending an interview. Introduce yourself to the interview board.
3. Answer the following:

    a. Make a polite request to a stranger in showing the way to the museum.

    b. Request your friend to shut the window.

    c. Request your sister to fetch a glass of water.

    d. Make a request to your cousin send an e-mail.

4. Make enquiries for the following:

    a. I suggest you to join my college. (Form an informal question)

    b. Ask the receptionist if the manager is in the office. (Make a formal enquiry)

    c. Ask your classmate the distance between your college and hostel. (Form an informal question)

    d. A teacher finds out the strength of the class from his/her colleague. (Make a formal enquiry)

5. Match the sentences (a-e) with the correct reactions (1-5).

a. Can I have a glass of water?	1. Well, all right. If it is a local call.
b. Is it OK if I make a phone call?	2. Oh, sorry, I said we only have $50 tickets left.

c. Could you say that again, please? 3. Of course. There is a bottle in the fridge?

d. Can I speak to you for a moment? 4. Why not? You can borrow some if you want.

e. Do you mind if I look at your CDs. 5. Yes of course. Please tell me.

6. Rohit calls up Rajat to make a plan for the weekend. Complete the dialogue between Rohit and Rajat by filling in the gaps.

Rohit : (i)..... this weekend?
Rajat : I don't have any special plan.
Rohit : How do you like the idea **(ii).....** the zoo?
Rajat : That sounds good, But I **(iii).....**my parent's permission.
Rohit : I'll come to your house this evening and request your parents to allow you to join me to see the zoo.
Rajat : Ok.
Rohit : (iv)..... in the evening?
Rajat : Yes. They will be at home.
Rohit : Then I'll surely come.

7. Write a possible conversation between a receptionist and you about booking a room in a hotel with at least 3 turns each.
8. What is a debate? How many stages are identified in a debate? What are they?
9. What is a role play? How do role plays help us in developing language skills?
10. Prepare a debate on "Should education be privatized entirely?"

SECTION - B (Total Marks: 3x10=30M)

Answer ALL the questions. Each question carries 10 marks. . (Internal choice from each text prescribed for the study)

11. a. How is India's history summed up in Nehru's speech?
(or)
b. What was the ambition of Nehru in "Tryst with Destiny"?
12. a. Why do Dr.Kalam share his ideas on 'managing failure' with Knowledge@Wharton?
(or)
b. In which fields did Dr.Kalam observe remarkable progress? Discuss.
13. a. Sum up the aspects of Steve Jobs' speech?
(or)
b. What should one do to find what he/she loves according to Steve Jobs?

LIFE SKILL

ENVIRONMENTAL EDUCATION

(Total hours of Teaching – 30 Hrs. @ 02 Hrs. per Week)

Course objective:

A Generic Course intended to create awareness that the life of human beings is an integral part of environment and to inculcate the skills required to protect environment from all sides.

Learning outcomes: On completion of this course the students will be able to …..

1. Understand the nature, components of an ecosystem and that humans are an integral part of nature.
2. Realize the importance of environment, the goods and services of a healthy biodiversity, dependence of humans on environment.
3. Evaluate the ways and ill effects of destruction of environment, population explosion on ecosystems and global problems consequent to anthropogenic activities.
4. Discuss the laws/ acts made by government to prevent pollution, to protect biodiversity and environment as a whole.
5. Acquaint with international agreements and national movements, and realize citizen's role in protecting environment and nature.

Unit 1: Environment and Natural Resources 06 Hrs.

1. Multidisciplinary nature of environmental education; scope and importance.
2. Man as an integral product and part of the Nature.
3. A brief account of land, forest and water resources in India and their importance.
4. Biodiversity : Definition; importance of Biodiversity - ecological,consumptive, productive, social, ethical and moral, aesthetic, and option value. 5. Levels of Biodiversity: genetic, species and ecosystem diversity.

Unit-2: Environmental degradation and impacts 10Hrs

1. Human population growth and its impacts on environment; land use change, land degradation, soil erosion and desertification.
2. Use and over-exploitation of surface and ground water, construction of dams, floods, conflicts over water (within India).
3. Deforestation: Causes and effects due to expansion of agriculture, firewood, mining, forest fires and building of new habitats.
4. Non-renewable energy resources, their utilization and influences.
5. A brief account of air, water, soil and noise pollutions; Biological, industrial and solid wastes in urban areas. Human health and economic risks.
6. Green house effect - global warming; ocean acidification, ozone layer depletion, acid rains and impacts on human communities and agriculture.
7. Threats to biodiversity: Natural calamities, habitat destruction and fragmentation, over exploitation, hunting and poaching, introduction of exotic species, pollution, predator and pest control.

Unit 3: Conservation of Environment 10 Hrs

1. Concept of sustainability and sustainable development with judicious use of land, water and forest resources; afforestation.
2. Control measures for various types of pollution; use of renewable and alternate sources of energy.
3. Solid waste management: Control measures of urban and industrial waste.
4. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
5. Environment Laws: Environment Protection Act; Act; Wildlife Protection Act; Forest Conservation Act.
6. International agreements: Montreal and Kyoto protocols; Environmental movements: Bishnois of Rajasthan, Chipko, Silent valley.

Suggested activities to learner: (4 hours)

1. Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc
2. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural site.
3. Study of common plants, insects, birds and basic principles of identification.
4. Study of simple ecosystems-forest, tank, pond, lake, mangroves etc.
5. Case study of a Forest ecosystem or a pond ecosystem.

Suggested text book :

- Erach Barucha (2004) Text book of Environmental Studies for Undergraduate courses¬ (Prepared for University Grants Commmission) Universities Press.
- PurnimaSmarath (2018) Environmental studies Kalyani Publishers, Ludhiana

Reference books :

- Odum, E.P., Odum, H.T.& Andrews, J. (1971) Fundamentals of Ecology. Philadelphia: Saunders.
- Pepper, I.L., Gerba, C.P.&Brusseau, M.L. (2011). Environmental and Pollution Science. Academic Press. Raven, P.H., Hassenzahl, D.M.& Berg, L.R. (2012) Environment. 8th edition. John Wiley & Sons.
- Singh, J.S., Singh, S.P. and Gupta, S.R. (2014) Ecology, Environmental Science andConservation. S. Chand Publishing, New Delhi.
- Sengupta, R. (2003) Ecology and economics: An approach to sustainable development.OUP.
- Wilson, E. O. (2006) The Creation: An appeal to save life on earth. New York: Norton.
- Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll (2006) Principles of¬ Conservation Biology. Sunderland: Sinauer Associates,

Model question paper for theory examination at the end of III Semester
Life Skill Course / ENVIRONMENTAL SCIENCE

Max. Time: 2 Hrs. Max. Marks: 50

Section -A (Total: 4x5=20 Marks)

(Answer any four questions. Each answer carries 5 marks
(Total 8 questions. At least 1 question should be given from each Unit)

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

Section- B (Total: 3x10 = 30 Marks)
(Answer any three questions. Each answer carries 10 marks
(Total five questions. At least 1 question should be given from each Unit)

1.
2.
3.
4.
5.

MODEL PAPER

Section -A **(Total: 4x5—20 Marks)**

Answer any four questions. Each answer carries 3 marks

1. What are the causes of water pollution
2. What is the significance Of the Montreal Prolocol
3. Discuss some measures of energy conservation.
4. How are human activities causing damage to the environment?
5. What is meant by Integrated Solid waste management?
6. What is global warming?
7. How does growth in population affect global consumption of energy
8. Write a short note on environmental laws

Section- B **(Total: 3x10 = 30 Marks)**

Answer any three questions. Each answer carries 10 marks

1. What are some causes for the loss of biodiversity
2. Write in detail about natural resources and their importance
3. How can noise pollution and air pollution be controlled
4. Explain the concept of Sustainable Development.
5. Write an essay about Renewable sources of energy.

CHEMISTRY

SEMESTER-III

Course- III (Inorganic Organic & Physical Chemistry) 30hrs (3hrs/w)

Course outcomes:

At the end of the course, the student will be able to:

1. Understand the concepts of Hydrocarbons, Alcohols and Phenols, Carbonyl Compounds, Carboxylic Acids and Active Methylene Compounds.
2. Understand the fundamental concepts of Spectroscopy and applying them for interpretation.

ORGANIC CHEMISTRY 22h

UNIT – I

1. *Chemistry of Halogenated Hydrocarbons:* *4h*

Alkyl halides: Methods of preparation and properties, nucleophilic substitution reactions– SN^1, SN^2 and mechanisms. Williamson's synthesis.

Aryl halides: Preparation (including preparation from diazonium salts) and properties, nucleophilic aromatic substitution; SNAr, Benzyne mechanism.

2. *Alcohols &Phenol* *4h*

Alcohols: Preparation, properties and relative reactivity of 1°, 2°, 3° alcohols, Bouvaelt Blanc Reduction; Oxidation of diols by periodic acid and lead tetraacetate, Pinacol- Pinacolone rearrangement;

Phenols: Preparation and properties; Acidity and factors effecting it, Reimer–Tiemann and Kolbe's–Schmidt Reactions, Fries and Claisen rearrangements. (Without Mechanism)

UNIT-II

Carbonyl Compounds **8h**

Structure, reactivity, preparation and properties;

Nucleophilic additions, Nucleophilic addition-elimination reactions with ammonia derivatives.

Mechanisms of Aldol and Benzoin condensation.

Claisen-Schmidt, Perkin, Cannizzaro, haloform reaction and Baeyer Villiger oxidation, α- Substitution reactions, oxidations and reductions (Clemmensen, wolf -kishner) without Mechanisms

Addition reactions of α, β-unsaturated carbonyl compounds: Michael addition.(Without Mechanism)

Active methylene compounds: Keto-enol tautomerism. Preparation and synthetic applications of diethyl malonate and ethylacetoacetate.

UNIT-III

Carboxylic Acids and their Derivatives **6h**

General methods of preparation, physical properties and reactions of monocarboxylic acids, effect of substituents on acidic strength.

Preparation and reactions of acid chlorides, anhydrides, esters and amides; Comparative study ofnucleophilicsubstitution at acylgroup-Mechanism ofacidicandalkalinehydrolysis of esters.

Claisen condensation, Reformatsky reactions and Curtius rearrangement (without Mechanism)

Esterification (mechanism).

Degradation of carboxylic acids by Huns-Diecker reaction, decarboxylation by Schimdt reaction, Halogenation by Hell- Volhard- Zelinsky reaction.

SPECTROSCOPY 8 h

UNIT-IV

Molecular Spectroscopy: 18h

Interaction of electromagneticradiation with molecules and various types of spectra;

Rotation spectroscopy: Selection rules, intensities of spectral lines, determination of bond lengths of diatomic and linear triatomic molecules,

Vibrational spectroscopy: Force constant, vibrational degrees of freedom for polyatomic molecules, modes of vibration. Selection rules for vibrational transitions, Fundamental frequencies, overtones.

Electronic spectroscopy: Types of electronic transitions in molecules, effect of conjugation. Concept of chromophore, bathochromic and hypsochromic shifts. Beer- Lambert's law and its limitations.

Nuclear Magnetic Resonance (NMR) spectroscopy: Equivalent and non-equivalent protons. Chemicalshift, NMRsplitting ofsignals- spin-spincoupling, couplingconstants.

UNIT-V *8h*

Application of Spectroscopy to Simple Organic Molecules

Application of visible, ultraviolet and Infrared spectroscopy in organic molecules. Woodward rules for calculating λ_{max} of conjugated dienes and α, β – unsaturated compounds.

Infrared radiation and types of molecular vibrations, functional group and fingerprint region.

IR spectra of alkanes, alkenes and simple alcohols (inter and intramolecular hydrogen bonding), aldehydes, ketones, carboxylic acids and their derivatives (effect of substitution on >C=O stretchingabsorptions).

External Assessment for Theory: 60 Marks

Internal Assessment for Theory

Internal (mid Test average)	Assignments	Seminar	Project/ Group Discussion	Total
10M	10M	10 M	10M	40M

Co-curricular activities and Assessment Methods

Continuous Evaluation: Monitoring the progress of student's learning by Class Tests, Work sheets and Quizzes Presentations, Projects, Assignments and Group Discussions, enhances the critical thinking skills and personality.

Semester End Examinations: Critical indicator of students learning, and teaching methods adopted by teachers throughout the semester.

List of Reference Books

1. A Text Book of Organic Chemistry by Bahl and Arun bahl
2. A Text Book of Organic chemistry by I L Finar Vol I
3. Organic chemistry by Bruice
4. Organic chemistry by Clayden
5. Spectroscopy by William Kemp
6. Organic Spectroscopy by J. R. Dyer
7. Elementary organic spectroscopy by Y.R. Sharma
8. Spectroscopy by P.S. Kalsi
9. Spectrometric Identification of Organic Compounds by Robert M Silverstein, Francis X Webster.
10. Mann, F.G. & Saunders, B.C. Practical Organic Chemistry, Pearson Education (2009)
11. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. & Tatchell, A.R. Practical Organic Chemistry, 5th Ed. Pearson (2012)
12. Ahluwalia, V.K. & Aggarwal, R. Comprehensive Practical Organic Chemistry: Preparation and Quantitative Analysis, University Press (2000).

LABORATORY COURSE -III

30hrs (2 h / w)

Practical Course-III Organic Qualitative analysis and IR Spectral Analysis
50 M

(At the end of Semester- III)

Course outcomes:

At the end of the course, the student will be able to;

i. Analyze the given organic compound by systematic procedure
ii. Understand the chemical reactions of organic compound byexperimental procedure
iii. Correlate the theoretical and experimental knowledge of organic reactions.
iv. Interpret IR spectra of simple functional groups.

Organic Qualitative analysis **40 M**

Analysis of an organic compound through systematic qualitative procedure for functional group identification.

Phenols, Aldehydes, Ketones, Carboxylic acids, Aromatic primary amines, amides and simple sugars.

IR Spectral Analysis **10M**

IR Spectral Analysis of the following functional groups with examples

a) Hydroxyl groups b) Carbonyl groups c)Amino groups d)Aromaticgroups

Scheme of valuation

Course-III Practical- Organic Qualitative analysis and IR Spectral Analysis

I. Internal practical examination: 25M

S.No.	Scheme	Marks
i.	Record	10 M
ii.	Viva-voce	10M
iii.	Field visit	05M
	Total	25M

***II.* External practical examination: 25M**

Organic Compound analysis

S.No.	Scheme	Marks
1	Physical state, colour and solubility	3M
2	Ignition Test	1M
3	Litmus test	1M
4	Detection of Extra Elements	3M
5	Functional Group detection	6M
	Test with 2,4 D.N.P	1M
	Test with NeutralFeCl3	1M
	Test with NaHCO3	1M
	Test with Molisch Reagent	1M
	Test with Copper Sulphate	1M
	Test with NaoH	1M
6	Any one Confirmatory Test	4M
7	Report	2M
8	Interpretation of IR Spectrum	5 M
	Total	25M

BLUE PRINT

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-III

CHEMISTRY COURSE-III: ORGANIC CHEMISTRY & SPECTROSCOPY

S.No	Units	Name of the chapter	8M	4M
		ORGANIC CHEMISTRY		
1	Unit-I	Chemistry of halogenated hydrocarbons	1	2
		Alcohols and Phenols	1	
2	Unit- II	Carbonyl Compounds	2	2
3	Unit-III	Carboxylic acids and derivatives	2	2
		SPECTROSCOPY		
4	Unit-IV	Molecular Spectroscopy	2	2
5	Unit-V	Applications of spectroscopy	2	2

MODEL PAPER

SECOND YEAR B.Voc. DEGREE EXAMINATION

SEMESTER-III

CHEMISTRY COURSE-III: ORGANIC CHEMISTRY & SPECTROSCOPY

Time: 3 hours Maximum Marks: 60

PART- A 5 X 4 = 20

Marks

Answer any **FIVE** of the following questions. Each question carries **FOUR** marks

1. Explain the mechanism for Pinacol-Pinacolone rearrangement.
2. What do you understand by Waldeninversion.
3. Discuss the mechanism for Bayer-villiger oxidation reaction.
4. Write a note on Aldol condensationreaction.
5. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
6. Write the mechanism for Claisen Condensation reaction.
7. Write the selection rules in rotational spectroscopy.
8. Explain types of electronic transitions in UV spectroscopy.
9. Givethe IR frequencyranges forhalide, alcohols, carbonyl group, carboxylic functional groups.
10. Calculate the λmax of 1,3- butadiene.

PART- B 5 X 8 = 40 Marks

Answer **ALL** the questions. Each carry **EIGHT** marks:

11. (a).Givethemechanism & stereochemistryof SN^1& SN^2 reactionsof alkylhalides with suitable example.

(or)

(b) Explain the following reactions

(i) Reimer-Tiemannreaction (ii) Friesrearrangement(iii) Kolbe- Schmidt (iv) Claisen Rearrangement .

12. (a). Discuss the following reactions.

(i) Perkin reaction. (ii) Cannizaro reaction

(iii) Wolf- Kishner Reduction (iv) Haloform reaction

(or)

(b). Write the preparation and anythree synthetic applications ofdiethyl malonate.

13. (a). Explain acid and base hydrolysis reaction of esters with mechanism.

(or)

(b). Explain (i)Curtius rearrangement (ii) Reformatsky reaction

(iii) HVZReaction (iv) Schmidt Reaction.

13. (a). (i) Write a note on vibrational degrees of freedom for polyatomic molecules.

(ii) Explain Beer-Lambert's law and itslimitations.

(or)

(b). (i) Define Bathochromic and Hypsochromic shifts.

(ii) Discuss Chemical Shift of NMR spectroscopy.

15. (a). Write Woodward-Fieser rules for calculating λmax for α, β – unsaturated carbonyl compounds .

(or)

(b). (i) What is Fingerprint region. Explain its significance with an example.

(i) Write IR spectral data for any one alcohol, aldehyde and ketone.

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II B. Voc Aquaculture Technology
Semester-III
PAPER – III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Periods: 30 **Max Marks: 100**

LEARNING OUTCOMES

1. To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
2. Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination, human karyo typing and mutations of chromosomes resulting in various disorders
3. Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins and the principles and forces of evolution of life on earth,\

Unit – I Cell Biology

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, mycoplasma
1.2 Electron microscopic structure of animal cell.
1.3 Plasma membrane –Models and transport functions of plasma membrane.

Unit – II Genetics - I

2. 1 Mendel's work on transmission of traits
2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance
2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics - II

3.1 Chromosomal Disorders (Autosomal and Allosomal)
3.2 Human Genetics – Karyotyping

UNIT IV: Molecular Biology

4.1 Central Dogma of Molecular Biology
4.2 Gene Expression in prokaryotes (Lac Operon)
4.3 Gene Expression in eukaryotes

Unit – V Evolution

5.1 Origin of life
5.2 Hardy-Weinberg Equilibrium
5.3 Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

Reference books

1. 'Lodish, Berk, Zipursky, Matsudaria, Baltimore, Darnell 'Molecular Cell Biology'
2. W.H.Freeman and company New York.
3. Cell Biology by De Roberti 'Developmental Biology - Scott. F. Gilbert.
4. 'Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
5. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
6. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to
7. Genetic Analysis. IX Edition. W. H. Freeman and Co. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
8. Molecular Biology by freifielder
9. 'Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing.

Suggested Co-Curricular Activities:

- Model on animal cell
- Photo album of scientists of cell biology
- Charts on plasma membrane models/ cell organelles
- Charts on number of chromosomes and their diseases
- Student seminars
- Quiz
- Draw geological time scale and highlight important events along the time line

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PAPER – III
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

PRACTICAL SYLLABUS

Periods: 24 **Max. Marks: 50**

I. Cytology
1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides

II. Genetics
1. Study of Mendelian inheritance using suitable examples
2. Problems on blood group inheritance and sex linked inheritance
3. Study of human karyotypes (Down's syndrome, Edwards, syndrome, Patau syndrome, Turner's syndrome and Klinefelter syndrome)

III. Evolution
1. Study of homology and analogy from suitable specimens and pictures
2. Study of Genetic Drift by using examples of Darwin's finches (pictures)
3. Visit to natural history museum and submission of report

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Semester-III
PAPER – III
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

……

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CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

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II B. Voc ZOOLOGY PRACTICAL MARKS ALLOTMENT
Semester-III
PAPER – III
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Practical's – External:

Time: 2 hrs.

Total Marks: 25

1. Preparation of temporary slide : 6 marks
2. Identification and write characters : 6 marks
3. Identification (2) – slides/pictures : 5 marks (2x2 1/2)
4. Record : 5 marks
5. Viva voce : 3 marks

Practical's – Internal : **Total Marks: 25**

1. Assessment including viva voce : 6 marks
2. Record : 6 marks
3. Field note book : 5 marks
4. Project : 8 marks

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PAPER – III
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION
Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

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CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION
MODEL QUESTION PAPER

Time – 3 Hours **Max. marks - 60**

SECTION –A

Answer any FIVE of the following **5x4=20**
Draw labelled diagrams wherever necessary

1. Virus
2. Micellar model
3. Multiple alleles
4. Haemophilia
5. Downs syndrome
6. Karyotyping
7. Lac operan
8. Transcription
9. Hardy Weinberg equilibrium
10. Genetic drift

SECTION –B

Answer the following **5x8=40**

11. Describe the ultra structure of an animal cell

Or

Describe the structure of Plasma membrane with reference to fluid mosaic model.

12. Write an essay on Mendels work on transmission of traits

Or

Explain the X-linked inheritance

13. Explain the chromosomal disorders

Or

Describe the process of Karyotyping

14. Write an essay on central dogma of molecular biology

Or

Explain the gene expression in eukaryotes

15. Write an essay on origin of life

Or

Write an essay on isolating mechanisms

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Semester-III
SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Periods: 60 **Max. Marks: 100**

OBJECTIVES:	LEARNINGOUTCOME
To understand the current methodology and various techniques of commercial seed production. To develop basic knowledge on the spawning, larval rearing and feeding of the commercially important species. Hatchery management strategies.	Knowledge on the biology and biological cycle of the brackish water & marine cultivable species will be learnt. Knowledge on the brackish water culture practices will be learnt by the student. Knowledge on the Mari culture will be learnt by the student.

UNIT1: Carp Hatchery

1.1. Hatchery management-seed production of carps.
1.2. Hypophysation of Indian major carps and exotic carps, history of hypophysation.
1.3 Pituitary gland Collection and preservation of gland. Other ovulating agents.
Brood stock management, sexing, dosage for injection, mechanism of ovulation.

UNIT2: Carp Production System and Seed production of other Fishes

1. Transport of fish seed and brood fishes. Causes of mortality during transport, techniques of transport, open and closed systems, methods of transportation, use of anaesthetics.
2. Bundh breeding, types of bundh breeding techniques. Problems of bundh breeding.

UNIT3: Seed Production of Crustaceans and Molluscs

1. Seed production and nursery rearing of *Penaeus indicus, Penaeus monodon* and *Macrobrachium rosenbergii.*

2. Hatchery operations of pearl oysters, crabs, lobster.

UNIT4: Hatchery Management and Design of shrimp hatcheries

1. Site selection
2. Operation and management of maturation section.

UNIT4: Hatchery Management and Design of shrimp hatcheries

1. Operation and management of larval section.
2. Operation and management of post larval section
3. Live feed culture system, Mechanical and biological filter

InternalEvalution

- Assignments
- Seminars
- Quiz
- FieldTrips

Suggested ReadingCorereading

1. Chodar SL Hypophysation in Indian Major Carps
2. CMFRI Spl. Bul. Hatchery Operation of Penaied Shrimps
3. Venkataraman GS The Cultivation of Algae
4. MPEDA Sea Fishes
5. CMFRI sp Bul Artificial Reefs and Sea Farming Techniques

SupplementaryReading

1. Jhingran VG Fish and Fisheries of India
2. Raymond EG Plankton and Productivity of Oceans
3. Boney AD Phytoplankton

AdvancedReading

1. Pillay, TVR and Kutty MN, Principles and Practices of Aquaculture
2. Harvey BJ and Hoar WS, Principle and Practice of Induced Fish Breeding
3. Woyanarovich E and Horrath L., The Artificial Propagation of Warm, Water Fishes- Manual for Extension.

Other Reference Books:

1. Pillay,T.V.R.&M.A.Dill.AdvancesinAquaculture.FishingNews(Books)Ltd.,England,1979.
2. Stickney,R.R. Principles of Warm water Aquaculture.JohnWiley&SonsInc.,1979.
3. Hepher, B.&Y.Prugim. Commercial FishFarming.JohnWiley&SonsInc.,1981.
4. Boyd, C.E. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company, 1982.
5. Jhingran,V.G.FishandFisheriesofIndia.HindustanPublishingCorporationIndia,1982
6. Turcker, C.S.(ed.).ChannelCatfishCulture.Elsevier,1985.
7. Bose, A.N.et.Al. Coastal Aquaculture Engineering. Oxford & IBH PublishingCompanyPvt.Ltd.,1991

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SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Periods: 24 **Max. Marks: 50**

PRACTICAL SYLLABUS

I. Identification of **phyto planktons**

A. Diatoms
1. *Coscinodiscus* sp.
2. *Chaetoceros* sp.
3. *Biddulphia* sp.
4. *Skeletonema* sp.
5. *Leptocylindrus* sp.
6. *Pleurosigma* sp.
7. *Thalassionema* sp.
8. *Thalassiothix* sp.
9. *Asterionella* sp.
10. *Amphora* sp.

B. Dinoflagellates
1. *Ceratium* sp.
2. *Protoperidinium* sp.
3. *Dinophysis* sp.

C. Blue Green Algae(BGA)
1. *Trichodesmium* sp.
2. *Spirulena* sp.
3. *Nostoc* sp.
4. *Anabena* sp.

II. Identification of **zooplankton**
1. Copepods
2. Amphipods
3. Luciferans
4. Ephasids
5. Mysids
6. Zoea larvae
7. Megalopa larvae
8. Pteropods
9. Ostracoda
10. Cladocerans

III. Biology and Identification of fresh **water prawns(Scampi)**
1. *Macobrachium rosenbergii*
2. *M. malcolmsonii*

IV. Biology and Identification of **shrimps (Marine/Brackish water)**

1. *Penaeus monodon*
2. *P.indicus*
3. *Litopenaeus vannamei*

V. Biology and Identification of **crabs**

1. *Scylla serrata*
2. *S. oceanica*
3. *S. caribdis*

VI. Dissections

A. Mounting of the prawn appendages
B. Digestive system of prawn
C. Nervous system of prawn
D. Eyestalk ablation in Prawn

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SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
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UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-III
SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two : 10 marks
2. Project : 10 marks
2. Assignments (5) : 5x2=10marks
3. Seminar : 5 marks
4. Viva vove : 5marks

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Semester-III
PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) **5×4=20**

Section –B

Essay Questions 11 to 15
(With internal choice) **5×8=40**

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Semester-III
SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Time: 3hrs. **Marks: 60**

MODEL QUESTION PAPER

SECTION-A

Answer any FIVE of the following **5x4=20**
Draw labelled diagrams wherever necessary

1. Ovulating agents
2. Seed production of carps
3. Closed carp seed transportation
4. Techniques of transportation of seed
5. Transport of breeders
6. Seed production of molluscs
7. Quarantine management
8. Mechanical filters
9. Seed production of P.monodon
10. Management of Larval section

SECTION-B

Answer all the questions **5x8=40**
Draw labelled diagrams wherever necessary

11.Give an account of Hypophysation technique in Indian major carps.

Or

Write an essay on hatchery management of carps

12.Explain the brood stock management in Indian major carps.

Or

What is the Bundh breeding ? Explain the types of bundh breeding and their problems.

13. Give an account on shrimp seed production.

Or

Describe the hatchery operations of Pearl oyster

14.Write an essay on site selection of shrimp hatcheries

Or

Explain the quarantine and disease management in hatcheries.

15.Describe the operation and management of larval section

Or

write an essay on mechanical and biological filters

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Semester-III
SKILL PAPER – VII
HATCHERY TECHNOLOGY IN AQUATIC ORGANISMS

Practical's – External:

Time: 3 hrs. **Total Marks: 25**

1. Identification of given sample : 6 marks
2. Identification of given sample : 6 marks
3. Identification (2) : 5 marks (2x2 1/2)
4. Record : 5 marks
5. Viva voce : 3 marks

Practical's – Internal : **Total Marks: 25**

1. Assessment including viva voce : 6 marks
2. Record : 6 marks
3. Field note book : 5 marks
4. Project : 8 marks

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Semester-III

SKILL PAPER – VIII
FISHING METHODS

Periods: 60 **Max. Marks: 100**

OBJECTIVES:	LEARNINGOUTCOME
To develop basic knowledge about various crafts To understand operation of various fishing gears To create awareness about fish finding devices.	➢ Student will learn the knowledge on the crafts. ➢ Mechanism involved in theoperation of the fishing gear will be learnt by the student. ➢ Tools for the identification of fishery resources will be learnt by the student.

UNIT1: Inland Fishing Crafts and Gears

1. Introduction, Different types of fishing crafts and gears in India; Crafts-Rafts, Boats; Gears-Trap net, Hand net, Dragnet, fixed net and miscellaneous types.
2.Boat building materials-wood, steel, FRP, ferro-cement, aluminum etc.

UNIT 2: Marine Fishing Crafts and Gears

1. Introduction, Crafts-crafts of the east coast and west coast. Gears-Fixed nets, Trawl nets, shore seines, drift nets, cast nets, trap nets, dip nets (scoop nets), long line and hooks.
2.Factors affecting the design of fishing gears and fish catching methods. Fishing accessories.
3.Introduction to netting materials - natural and synthetic fishing gear materials. Yarn numbering systems.

UNIT3: Active Fishing Gears: Passive and Traditional Fishing Gears

3.1. Active fishing gears- 1. Fishing hooks: Parts of hooks, Numbering of hooks, Artificial baits or jigs, Trolling lines; 2. Seining: Trawls, Surrounding net, Lift net
3.2. Passive gears- 1. Gill net; 2. Fish traps, Traps, Pots; 3. Hooks and lines (passively operated), Bottom set line, Drift long line, Demersal long line, Drifting long line

UNIT 4: Unconventional Fishing methods

4.1 Destructive and Prohibited fishing practices
4.2 fishing methods like electrical fishing, poisoning and use of dynamites.
4.3. Light fishing; Angling (line fishing) poisoning and use of dynamites.

UNIT5: Fish Finding Devices and Conservation.

5.1.Introductory information on echo -sounder, sonar, net sonde, global positioning systems, remote sensing.
5.2 Potential fishing zones (EEZ) Turtle Exclusion Devices (TED) - By-catch Reduction Devices (BRD).

Suggested reading

Core reading

1. Boopendranath, M.R., Meenakumari, B., Joseph, J., Sankar, T.V., Pravin, P., and Edwin,L.(Eds.) 2002, Riverine and Reservoir Fisheries of India, Society of Fisheries Technologists (India),Cochin.
2. Brandt. A. v. (1984) Fish catching methods of the world. Fishing News Books Ltd., London: 432 p. George V.C. (1971) An account of the inland fishing gears and methods of India. Spl.Bull.No.1.CIFT Hameed, M.S. and Boopendranath,M.R.(2000)ModernFishingGearTechnology,DayaPublishingHouse, Delhi:186 p.
3. Klust, G. (1982) Netting materials for fishing gear, FAO Fishing Manual, Fishing News Books(Ltd)., Farnham, 192p.
4. Sainsbury, J.C.(1986)Commercial fishing methods-An introduction to vessels and gear. Fishing News Books, Oxford: 208pp
5. Sreekrishna, Y. and ShenoyL. (2001) Fishing gear and craft technology, Indian Council of Agricultural Research, New Delhi.

Supplementary & Advanced reading

1. Gulland,J.A.1974,Guidelines for Fishery Management,IOFCDev.74-36FAORomeFAO (1997) Fisheries management.
2. FAO Technical Guide lines for Responsible Fisheries. No. Fishery Resources Division and Fishery Policy and Planning Division, FAO. Rome: 82p.
3. FAO (1995) Code of Conduct for Responsible Fisheries, FAO, Rome: 41p.
4. FAO (1997) Inland fisheries. FAO Technical Guidelines for Responsible Fisheries. No. 6FisheriesDepartment, FAO, Rome: 36 p.

Other Reference Books:

1. Jhingran, V.G. 1993. Fish and fisheries of India. Hindustan Publishing Corporation (India), New Delhi.
2. Ricker, W.E. 1984. Methods for assessment of fish production in freshwaters. Black well Publications.
3. Srivastava, C.B.L., 1985. Textbook of Fishery Science and Indian Fisheries. Kutub Mahal Publications, Allahabad.
4. S.S.Khanna. An introduction to fishes Kurian, C.V. and Sebastian, V.O. 1986. Prawns and prawn fishery of India. Hindustan Publishing Corporation (India), New Delhi.
5. Yadav, B.N.Fish and Fisheries. Daya Publishing House.

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Semester-III
SKILL PAPER – VIII
FISHING METHODS

Periods: 24 **Max. Marks: 50**

PRACTICAL SYLLABUS

Fishing Crafts and Gears in Lakes of India

1. **Fishing crafts**
   i. Dingi
   ii. Coracle
   iii. Dhoni
   iv. Plank built boats
   v. Thermocol raft
2. **Fishing gears**
   i. Hook and line
   ii. Box trap
   iii. Tubular trap
   iv. Bag net
   v. Hand lift net
   vi. Cast net
   vii. Drag Net
   viii. Gill net
3. **Crafts and Boats:**
   A. Marine Fishing Crafts:

   Crafts used on the East Coasts: (1) Catamaran, (2) Masula Boat, (3) Tuticorin Boats or Fishing Luggers

   Crafts used on West Coasts: (1) Dugout Canoes (2) Plank-Built Canoes , (3) Outrigger Canoes

   B. Inland Fishing Crafts :

   1. Plank-Built Boat
   2. Kulnawa

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SKILL PAPER – VIII
FISHING METHODS

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
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Semester-III
SKILL PAPER – VIII FISHING METHODS

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva vove	: 5marks

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Semester-III
PAPER – VIII FISHING METHODS

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

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Semester-III
SKILL PAPER – VIII FISHING METHODS

Practical's – External:

Time: 3 hrs. **Total Marks: 25**

1. Identification of given sample : 6 marks
2. Identification of given sample : 6 marks
3. Identification (2) : 5 marks (2x2 1/2)
4. Record : 5 marks
5. Viva voce : 3 marks

Practical's – Internal : **Total Marks: 25**

1. Assessment including viva voce : 6 marks
2. Record : 6 marks
3. Field note book : 5 marks
4. Project : 8 marks

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Semester-III
SKILL PAPER – VIII FISHING METHODS

MODEL QUESTION PAPER

Time: 3 hrs. **Max. Marks: 60**

SECTION – A

Answer any FIVE of the following **5x4 = 20**
Draw diagrams wherever necessary

1. Mechanized boat
2. Seasoning of Wood
3. Fishing accessories
4. Modern fishing gears
5. Fish traps
6. Fishing hooks
7. Electrical fishing
8. Prohibited fishing practices
9. By-catch reduction devices
10. Remote sensing

SECTION – B

Answer all the questions **5x8=40**
Draw labelled diagrams wherever necessary

11. Give an account of the different types of fishing crafts in India? Explain the traditional methods.

Or

Write an essay on merits and demerits of wood as a boat building material

12. Write an essay on crafts of the East coast

Or

What is netting material? Explain the natural and synthetic fishing gear materials.

13. Explain the design and operation of active fishing gears

Or

Write an account of active fishing gears

14. Ennumerate the destructive fishing practices

Or

Explain the impact of using dynamites in fishing

15. What is the conservation? Explain the potential fishery zones.

Or

Write an essay on fish finding devices

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II B. Voc Aquaculture Technology
Semester-III
SKILL PAPER – IX
FISHERIES EXTENSION, ECONOMICS & MARKETING

Periods: 60 **Max. Marks: 100**

OBJECTIVES:	LEARNING OUT COME
To develop basic knowledge about various crafts To understand operation of various fishing gears To create awareness about fish finding devices.	➢ Student will learn the knowledge on the crafts. ➢ Mechanism involved in the operation of the fishing gear will be learnt by the student. ➢ Tools for the identification of fishery resources will be learnt by the student.

UNIT – 1 INTRODUCTION
Meaning and scope of economics with reference to fisheries
Basic concepts of economics – goods, services, wants and utility, demand and supply, value price, market demand and individual demand, elasticity of demand, law of diminishing marginal utility
Theory of production, production function in fisheries
Various factors influencing the fishery product's price
UNIT – I1 FISHERIES MARKETING
2-1 Basic marketing functions, consumer behaviour and demand, fishery market survey and test marketing a product
2-2 Fish marketing – prices and price determination of fishes
2-3 Marketing institutions- primary(producer fishermen, fishermen cooperatives, and fisheries corporations) and secondary (merchant/agent/speculative middlemen)
2-4 Methods of economic analysis of business organizations
2-5 Preparation of project and project appraisal
UNIT-III FISHERIES ECONOMICS
3-1 Aquaculture economics- application of economics principles to aquaculture operations
3-2 Various inputs and production function. Assumptions of production function in aquaculture analysis, least cost combination of inputs, laws of variable proportions
3-3 Cost and earnings of aquaculture systems – carp culture, shrimp farming systems, hatcheries, Cost and earnings of fishing units and freezing plants
3-4 Socio-economic conditions of fishermen in Andhra Pradesh, Role of Matsyafed and NABARD in uplifting fishermen's conditions, fishermen cooperatives
3-5 Contribution of fisheries to the national economy
UNIT-IV FISHERIES EXTENSION
4-1 Fisheries extension – scope and objectives, principles and features of fisheries extension education 4-2 Fisheries extension methods and rural development
4-3 Adoption and diffusion of innovations
UNIT-V TRANSFER OF TECHNOLOGY
5-1 ICAR programs – salient features of ORP, NDS, LLP, IRDP, ITDA, KVK, FFDA, FCS, FTI, TRYSEM

5-2 Training – meaning, training vs. education and teaching
5-3 DAATT centres and their role in tot programs, video conferencing, education of farmers through print and electronic media

PRESCRIBED BOOK(S):

1. Adivi Reddy sv 1997. An introduction to extension education. Oxford & IBH Co.Pvt. Ltd. New Delhi
2. Jayaraman R 1996. Fisheries Economics. Tamilnadu Veterinary and Animal Science University. Tuticorn
3. Subba Rao N 1986. Economics of Fisheries. Daya publishing house, Delhi

REFERENCES:

1. Dewwett KK and Varma JD 1993. Elementary economic theory. S.chand, New Delhi
2. Korakandy R 1996. Economics of Fisheries Mangement. Daya Publishing House, Delhi
3. Tripathi SD 1992. Aquaculture Economics. Asian Fisheries Society, Mangalore.

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Semester-III
SKILL PAPER – IX
FISHERIES EXTENSION, ECONOMICS & MARKETING

Periods: 24 **Max. Marks: 50**

PRACTICAL: Project work/on-job training at industry

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Semester-III
SKILL PAPER – IX
FISHERIES EXTENSION, ECONOMICS & MARKETING

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

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Semester-III
SKILL PAPER – IX
FISHERIES EXTENSION, ECONOMICS AND MARKETING

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

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Semester-III
PAPER – IX
FISHERIES EXTENSION, ECONOMICS AND MARKETING

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

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Semester-III
SKILL PAPER – IX
FISHERIES EXTENSION, ECONOMICS & MARKETING

Time: 3 hrs **Max Marks: 60**

Model Question Paper

SECTION-A

I. Answer any FIVE of the following **5x4=20**

Draw labeled diagram wherever necessary

1. Value price
2. Market demand and individual demand
3. Fishery market survey
4. Fisheries cooperation
5. Role of NABARD in fisheries
6. Contribution of fisheries to the national economy
7. Rural development by fisheries extension
8. Barriers of diffusion of fisheries innovations
9. Lab to land programme
10. Education of farmers through electronic media

SECTION-B

II. Answer all the following **5x8=40**

Draw labelled diagram wherever necessary

11. a. Explain various factors influencing the fishery products price.

(or)

b. Describe the theory of production in relation to fisheries

12. a. Describe price determination of fishes in market.

(or)

b. Explain basic marketing functions of fish.

13. a. Explain cost and earning of shrimp farming systems.

(or)

b. Explain the role of Matsyafed in uplifting fishermen's condition.

14. a. Explain scope and objectives of fisheries extension education.

(or)

b. Explain fisheries extension methods

15. a. Describe the salient features of FFDA

(or)

b. Explain the role DAATT centers and their role in TOT programs.

SEMESTER – IV

CHEMISTRY

Course IV : (INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY) 30hrs (3h / w)

Course outcomes:

At the end of the course, the student will be able:

1. To learn the laws of absorption of light energy by molecules and the subsequent photochemical reactions.
2. To understand the preparation, properties and reactions of Nitrogen compounds and some multifunctional group organic molecules (Carbohydrates, Amino acids)
3. To co-relate the basic concepts of thermodynamics to Chemical reactions

UNIT - I

Organometallic Compounds **3h**

Definition and classification of organometallic Compounds on the basis of bond type,
Metal carbonyls: 18 electron rule, electron count of mononuclear, polynuclear and substituted metal carbonyls of 3d-series. General methods of preparation of mono and binuclear carbonyls of 3dseries. P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MO diagram of CO can be referred to for synergic effect to IR frequencies).

UNIT – II

Carbohydrates **3h**

Occurrence, classification and their biological importance, Monosaccharides: Constitution and absolute configuration of glucose , epimers and anomers, mutarotation, determination of ringsize of glucose, Haworth projections and conformational structures; Interconversions of aldoses and ketoses; Killiani-Fischersynthesis and Ruffsdegradation;

UNIT- III

Amino acids **3h**

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples,

classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Heterocyclic Compounds *3h*

Introduction and definition: Simple five membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds, Paul-Knorr synthesis. Properties: Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

UNIT- IV

1. **Nitro hydrocarbons** **3h**

Nomenclature and classification-nitro hydrocarbons, structure-Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reaction with HONO (Nitrous acid), Nef reaction and Mannich reaction leading to Micheal addition.

2. *Amines:* *5h*

Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary amines using Hinsberg's method. Discussion of the following reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann-Bromamide reaction, Carbylamine reaction.

UNIT- V

Photochemistry **2h**

Difference between thermal and photochemical processes, Laws of photochemistry- Grothus-Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield- Photochemical reaction mechanism- hydrogen- chlorine

Thermodynamics *6 h*

The first law of thermodynamics-statement, definition of internal energy and enthalpy,

Heat capacities and their relationship, Joule-Thomson effect- coefficient, Temperature dependence of enthalpy of formation- Kirchcoff's equation, Second law of thermodynamics Different Statements of the law, Carnot cycle and its efficiency.

Co-curricular activities and Assessment Methods Continuous

Evaluation: Monitoring the progress of student's learning Class Tests, Work sheets and Quizzes Presentations, Projects and Assignments and Group Discussions: Enhances critical thinking skills and personality.

Semester-end Examination: critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

List of Reference Books

1. Concise coordination chemistry by Gopalan and Ramalingam
2. Coordination Chemistry by Basalo and Johnson
3. Organic Chemistry by G.Mareloudan, Purdue Univ
4. Text book of physical chemistry by S Glasstone
5. Concise Inorganic Chemistry by J.D.Lee
6. Advanced Inorganic Chemistry Vol-Iby Satyaprakash, Tuli, Basu and Madan
7. A Text Book of Organic Chemistry by Bahl and Arunbahl
8. A Text Book of Organic chemistry by I L Finar Vol I
9. A Text Book of Organic chemistry by I L Finar Vol II
10. Advanced physical chemistry by Gurudeep Raj.

SEMESTER - IV

Course IV **LABORATORY COURSE** **30**hrs (2 h / w)

Practical-Course–IV:: Conductometric and Potentiometric Titrimetry

At the end of the course, the student will be able to;

1. Use glassware, equipment and chemicals and follow experimental procedures in thelaboratory.
2. Apply concepts of electrochemistry in experiments
3. Familiar with electro analytical methods and techniques in analytical chemistry

Conductometric and Potentiometric Titrimetry *50 M*

1. **Conductometrictitration**- Determinationofconcentrationof HClsolutionusing standard NaOH solution
2. **Conductometric titration**- Determination of concentration of CH_3COOH Solution using standard NaOH solution.
3. **Conductometric titration**- Determination of concentration of CH_3COOH and HCl ina mixture using standard NaOHsolution
4. **Potentiometric titration**- Determination of Fe (II) using standard $K_2Cr_2O_7$ solution.

Scheme of valuation

Practical Paper – IV :: Physical Chemistry

I. Internal practical examination: 25M

S.No.	Content	Marks
1	Record	10 M
2	Viva-voce	10M
3	Field visit	05M
	Total	25M

II. External Practical Examination: 25M

Physical Chemistry

S.No.	Content	Marks
1	Procedure	2M
2	Formula	2M
3	Tables	4M
4	For an error upto 1%	12M
	For an error between 1% to 2%	10M
	For an error above 2%	7M
5	Calculation	3M
6	Result	2M
	Total	25M

BLUE PRINT

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – THEORY

S.No	Units	Name of the chapter	8M	4M
1	Unit-I	Organometallics	2	2
2	Unit- II	Carbohydrates	2	2
3	Unit-III	Amino acids	1	1
		Heterocyclic Compounds	1	1
4	Unit-IV	Nitro hydro carbons	1	1
		Amines	1	1
5	Unit-V	Photo Chemistry	1	1
		Thermodynamics	1	1

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV

CHEMISTRY COURSE -IV: INORGANIC, ORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum Marks: 60

PART- A 5 X 4 = 20 Marks

Answer any **FIVE** of the following questions. Each question carries **FOUR** marks

1. Describe the 18-electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. Discuss the P-acceptor behaviour of carbon monoxide.
3. What are epimers and anomers. Give examples.
4. Write a note on Ruffdegradation.
5. Discuss about iso electric point and zwitter ion.
6. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
7. Explain Tautomerism shown by nitro alkanes
8. Discuss the basic nature ofamines.
9. Write the differences between thermal and photochemical reactions.
10. Derive heat capacities and derive $C_p - C_v = R$

PART- B 5 X 8 = 40 Marks

Answer **ALL** the questions. Each question carries **EIGHT** marks

11. (a).What areorganometallic compounds? Discuss their Classification on the basis oftype of bonds with examples.

(or)

(b). Discuss the general methods of preparations of mono & bi-nuclear carbonylsof 3d series.

12. (a). Discuss the constitution, configuration and ring size of glucose. Draw theHaworth and Conformational structure of glucose.

(or)

(b). (i) Explain Ruff's degradation. (ii) Explain Kiliani- Fischer synthesis.

13. (a). What are amino acids? Write any three general methods of preparation of amino acids.

(or)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole

14. Write the mechanism for thefollowing.

a. (i) Nef reaction (ii) Mannichreaction

(or)

(b). (i) Explain Hinsberg separation of amines.

(i) Discuss Hoffmann -Bromamide reaction with mechanism.

15.(a). Whatisquantumyield? Explainthephotochemicalcombinationof Hydrogen Chlorine.

(or)

(b). Explain Carnot Cycle and derive an expression for calculation of Efficiency of Carnot Cycle.

SEMESTER - IV

Course-V (INORGANIC & PHYSICAL CHEMISTRY) 30 hrs (3 h / w)

Course outcomes: At the end of the course, the student will be able to;

- Understand the concepts of bonding in Coordination compounds.
- Learn the factors effecting stability of complexes.
- Calculate the EMF and rates of chemical reactions.

INORGANIC CHEMISTRY *14h*

UNIT –I

Coordination Chemistry **6 h**

IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical series.

UNIT –II

Inorganic Reaction Mechanism: **2h**

Labile and inert complexes, ligand substitution reactions - SN^1 and SN^2, Substitution reactions in square planar complexes, Trans-effect, theories of trans effect and its applications

Stability of metal complexes: *2h*

Thermodynamic stability and kinetic stability, factors affecting the stability of metal complexes, chelate effect, determination of composition of complex by Job's method.

Bioinorganic Chemistry: *4h*

Metal ions present in biological systems, classification of elements according to their action inbiologicalsystem. Toxicityof metal ions (Hg, Pb, Cd and As), Hemoglobin, Myoglobin.

PHYSICAL CHEMISTRY *16h*

UNIT-III

Phase rule **4h**

Concept of phase, components, degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system.

UNIT-IV

Electrochemistry **6h**

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method

Determination of EMF of a cell, Nernst equation.

UNIT-V

Chemical Kinetics: **6 h**

Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first order reactions (both for equal and unequal concentrations of reactants). Half–life of a reaction.Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. Comparison of the two theories (qualitative treatment only).

List of Reference Books

- Text book of physical chemistry by S Glasstone
- Concise Inorganic Chemistry by J.D.Lee
- Advanced Inorganic Chemistry Vol-Iby Satyaprakash, Tuli, Basu and Madan
- Advanced physical chemistry by Gurudeep Raj
- Principles of physical chemistry by Prutton and Marron
- Advanced physical chemistry by Bahl and Tuli
- Inorganic Chemistry by J.E.Huheey

- Basic Inorganic Chemistry by Cotton and Wilkinson
- A textbook of qualitative inorganic analysis by A.I. Vogel
- Atkins,P.W. & Paula,J.de Atkin's Physical Chemistry Ed., Oxford University
- Castellan, G.W. Physical Chemistry 4th Ed. Narosa (2004).
- Mortimer ,R. G., Physical Chemistry 3rd Ed. Elsevier: NOIDA, UP(2009).
- Barrow,G.M. Physical Chemistry

Co-curricular activities and Assessment Methods

- **Continuous Evaluation:** Monitoring theprogress of student's learning Class Tests, Work sheets, quizzes, Presentations, Projects,Assignments and Group Discussions: Enhances critical thinking skills andpersonality.
- **Semester-end Examination:** critical indicator of student's learning and teaching methods adopted by teachers throughout the semester.

- **Theory - Evaluation : 100 M**

Internal Assessment - 40M

Internal (mid Test average)	Assignments	Seminar	Project	Total
10M	**10M**	**10 M**	**10M**	**40M**

- **External Assessment – 60M**

LABORATORY COURSE -V 30hrs (2 h / w)

Practical Course-V Organic preparations

Course outcomes:

On the completion of the course, the student will be able to do the following**:**

1. How to handle glassware, equipment, chemicals and follow experimental procedures in laboratory
2. How to calculate limiting reagent, theoretical yield, and percentage yield
3. How to dispose chemicals in a safe and responsible manner
4. How to perform common laboratory techniques including reflux, distillation, vacuum filtration.
5. How to create and carry out work up and separation procedures
6. How to critically evaluate data the collected to determine the identity, purity, and percentyield of products and to summarize findings in writing in a clear and concise manner.

Organic preparations: 50M

1. Acetylation of one of the following compounds:

- amines (aniline, o-, m-, ptoluidines and o-, m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:
    i. Using conventional method.
    ii. Using green approach

2. Benzolyationofoneofthefollowingamines(aniline, o-, m-, p- toluidinesando-, m-, p-anisidine)
3. Nitration of any one of the following:
    i. Acetanilide/nitrobenzene by conventionalmethod
    ii. Salicylic acid by green approach (using ceric ammonium nitrate).

Scheme of valuation

Practical Paper – V :: Organic Preparations

I. Internal practical examination: 25M

S.No.	Content	Marks
1	Record	10 M
2	Viva-voce	10M
3	Field visit	05M
	Total	25M

II. External Practical Examination: 25M

Physical Chemistry

S.No.	Content	Marks
1	Formula with balanced equation	5M
2	Procedure	15M
3	Calculation of Yield	3M
4	Result	2M
	Total	25M

BLUE PRINT

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV:: CHEMISTRY COURSE-V:

INORGANIC AND PHYSICAL CHEMISTRY

S.No	Units	Name of the chapter	8M	4M
1	Unit-I	Coordination Compounds	2	2
2	Unit- II	Inorganic Reaction Mechanism	1	1
		Stability of metal complexes and Bio- inorganic Chemistry	1	1
3	Unit-III	Phase Rule	2	2
4	Unit-IV	Electro Chemistry	2	2
5	Unit-V	Chemical Kinetics	2	2

MODEL PAPER

SECOND YEAR B.Sc., DEGREE EXAMINATION

SEMESTER-IV - CHEMISTRY COURSE V: INORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours Maximum marks: 60

PART- A 5 X 4 = 20 Marks

Answer any **FIVE** of the following questions. Each question carries **FOUR** marks.

1. Write note on Spectrochemical Series.
2. Write the postulates of Valency Bond Theory.
3. Explain Labile & inertcomplexes.
4. Explain Job's method for determination of composition of complex.
5. Explain Thermodynamic derivation of Gibb's phase rule.
6. Write a short note on Phase diagram of Water System.
7. Explain Specific and Equivalentconductance.
8. Write note on Nernst Equation.
9. Write note on Order and Molecularity of a reaction.
10. What is Half-life of areaction.

PART- B 5 X 8= 40Marks

Answer **ALL** the questions. Each questions carries **EIGHT** marks.

11. (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.

(or)

(b). DefineCFSE. Explainthefactorseffectingthemagnitudeofcrystalfield splitting energy.

12. (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.

(or)

(b). Write the structure and biological functions of Haemoglobin and Myoglobin.

13. (a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.

(or)

(b). Explain phase diagram for NaCl-water system.

14. (a). Define Transport number. Write experimental method for the determination of transport number by Hittorfmethod.

(or)

(b). Explain Kohlrausch Law and its applications.

15. (a). Explain Activation energy and its calculation from Arrhenius equation.

(or)

(b). Explain Collision theory and Activated complex theoryof bimolecular reactions.

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc ZOOLOGY
SEMESTER-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Teaching Hours – 30 **Max. Marks - 100**

LEARNING OUTCOMES:

- To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
- To instill the concept of hormonal regulation of physiology, metabolism and reproduction in animals
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes

UNIT I - Animal Physiology - I

1.1 Elementary Process of digestion
1.2 Respiration - transport of oxygen and CO2
1.3 Circulation - Structure and functioning of heart, Cardiac cycle
1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism

UN IT II - Animal Physiology - II

2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibres
2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction
2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas

UNIT III - Cellular Metabolism – I (Biomolecules)

3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose
3.2 Proteins - Classification of proteins. General properties of amino acids
3.3 Lipids - Classification of lipids

UNIT IV - Cellular Metabolism – II

4.1 Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain
4.2 Lipid Metabolism – β-oxidation of palmitic acid
4.3 Protein metabolism - Transamination, Deamination and Urea Cycle

UNIT – V Embryology

5.1 Gametogenesis
5.2 Fertilization
5.3 Types of eggs

Suggested Co-curricular activities:

- Chart on cardiac cycle, human kidney structure
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Charts on types of eggs and types of cleavages
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc

Reference books

1. Eckert H. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman & Company.
2. Floray E. An Introduction to General and Comparative Animal Physiology.
3. W.B.Saunders
4. 'Chordate Embryology' by S. Chand
5. 'Developmental Biology - Scott. F. Gilbert.
6. 'Developmental Genetics – G.S. Miglani.
7. 'Developmental Biology by Balinksy
8. Developmental Biology by Gerard Karp
9. Chordate embryology by Varma and Agarwal
10. Embryology by V.B. Rastogi

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II B. Voc ZOOLOGY
Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY
PRACTICAL SYLLABUS

Teaching Hours – 24 **Max. Marks - 50**

I. ANIMAL PHYSIOLOGY
1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Study of activity of salivary amylase under optimum conditions
3. T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
4. Differential count of human blood

II. CELLULAR METABOLISM
1. Estimation of total proteins in given solutions by Lowry's method.
2. Estimation of total carbohydrate by Anthrone method.
3. Qualitative tests for identification of ammonia, urea and uric acid

III. EMBRYOLOGY
1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Construction of fate map of frog blastula

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Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

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II B. Voc ZOOLOGY THEORY
Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

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II B. Voc ZOOLOGY PRACTICAL MARKS ALLOTMENT
Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Practical's – External:

Time: 2 hrs.

Total Marks: 25

1. Major experiment	: 8 marks
2. Minor experiment	: 4 marks
3. Identification (2) – slides/pictures	: 5 marks (2x2 1/2)
4. Record	: 5 marks
5. Viva voce	: 3 marks

Practical's – Internal : **Total Marks: 25**

1. Assessment including viva voce	: 6 marks
2. Record	: 6 marks
3. Field note book	: 5 marks
4. Project	: 8 marks

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Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY
Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

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Semester-IV
PAPER – IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY
MODEL QUESTION PAPER

Time – 3 Hours **Max.marks - 60**

SECTION –A

Answer any FIVE of the following **5x4=20**

Draw labelled diagrams wherever necessary

1. Chloride shift
2. Valves in Heart
3. Synapse
4. Thyroid gland
5. Structure of glucose
6. Essential amino acids
7. Glycolysis
8. Deamination
9. Spermiogenesis
10. Types of eggs

SECTION –B

Answer the following **5x8=40**

11. Explain the transport of respiratory gases

Or

Describe the counter current mechanism.

12. Write an essay on endocrine function of adrenal gland and pancreas

Or

Describe the ultra structure of muscle

13. Classify the proteins and give examples of various classes

Or

Describe the important mono and disaccharides of physiological importance

14. Describe the process of β -oxidation of palmitic acid

Or

What is transamination? Give examples. Write a note on significance of transamination

15. Write an essay on Oogenesis

Or

Explain the process of fertilization

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B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Periods: 60 **Max. Marks: 100**

OBJECTIVES:	LEARNING OUTCOME
To provide basic idea about the principles of genetics and depict the hereditary mechanism in cultured species. To acquaint with the state of the art techniques in biotechnology as applied to aquaculture industry.	Student will learn the concept of Mendelian genetic principles Knowledge on heredity determination will be learnt. Principles of Biotechnology andits applications in the aquaculture will be learnt

Unit 1: Basic Genetics and Biotechnology

1.1. Introduction- Genetics, Mendel's law of inheritance, interaction of gene.

1.2. Supplementary and complementary genes.

1.3. Introduction to Biotechnology in Aquaculture.

Unit 2: Selection and Hybridization

2.1. Introduction-Hybridization of fish-Indian studies; Objectives of fish hybridization

2.2. Interspecific hybrids, Intergeneric hybrids among Indian carps.

2.3. Hybrid vigor, Inbreeding, cross-breeding and hybridization

Unit 3: Sex determination & Chromosome manipulation in fish and shell fishes

3.1. Practical application of genetics in aquaculture. Genetics of sex determination in fish.

3.2. Gonochorism, Hermaphroditism, Protandry, Protogyni, Environmental Influence of Sex Determination.

3.3. Induction of Gynogenesis and Androgenesis, Performance of Gynogens and Androgens, Monosex Populations.

Unit 4: Aquaculture Biotechnology

4.1. Recombinant DNA technology, determinants of DNA replication, cloning, vectors, transformation. Gene manipulation in fish , transgenic fish production.

4.2. Use of PCR for the detection of white spot syndrome in shrimp.

4.3. Cryopreservation technique in Aquaculture.

Unit 5: Marine Biotechnology

5.1. Introduction-Scope and the present status of marine biotechnology;

5.2. Industries Based on Marine Biotechnology

5.3. Use of probiotics and antibiotics in aquaculture operations.

Suggested reading

Core reading

1. Karinasagar I, Karunasagar I and Reily A. Aquaculture Biotechnology

2. Varun Mehta. Fisheries and Aquaculture biotechnology

3. Pandian TD, Kumar A and Prasad K. Aquaculture and Biotechnology

4. Lopes L.- Gene transfer in aquatic organisms

5. Singleton – Elementary Genetics

6. Gjedrem T- Genetics in aquaculture

7. Gupta,S.C. and Kapoor,V.K. Fundamentals of Applied Statistics.

8. Snedecor and Cochran,W.G. Statistical Methods.

Supplementary Reading

1. Sandhya Mitra- Genteics

2. Varma and Agarwal- Genetics

3. Rath RK- Freshwater Aquaculture

Advance Reading

1. NBFGR- Training manual for DNA finger printing

2. Gupta PK- Elements of Biotechnology

3. Padhi BR – Genetics and Aquaculture

Reference Text Books :

1. Hepher, B. and Y. Pruginin. Commercial fish farming. John Wiley & Sons Inc., 1981.

2. Jhingran, V.G. Fish and Fisheries of India, 1982.

3. Bhattacharya, S. Hormones in Pisciculture. Biology Education. Vol.9, No.1, pp.31-41, 1992.

4. Subramonium, T. Endocrine regulation of reproduction and molting in crustacean and its importance in shrimp aquaculture development.

5. Summer School Manuals of CIFE. Recent Developments in Biotechnology. CIFE, 1998.

6. Genetics and Biotechnological tools in Aquaculture and Fisheries, CIFE, 1998.

7. I.C.A.R. Biotechnology in Aquaculture – Training Manual. CIFA, Bhubaneswar, 1992.

8. Darnell. Molecular Cell Biology.

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Semester-IV
SKILL PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Periods: 24 **Max. Marks: 50**

PRACTICAL SYLLABUS

1. Problems on Mendelian inheritance.
2. Mitotic and meiotic chromosomes preparation.
3. Demonstration of protocol of androgenesis, gynogenesis and polyploidy.
4. Cryopreservation protocols, Quality evaluation of fish milt.
5. Isolation and quantification of Fish and Prawn DNA
6. Electrophoresis
7. ELISA
8. Immunofluorescence
9. DNA Hybridisation
10. Bioprocessing of organic wastes
11. Practicals on genebank sequence database.
12. PCR

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Semester-IV
SKILL PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
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Semester-IV
SKILL PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

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SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
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B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-III
PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – X
FISH GENETICS AND AQUACULTURE BIOTECHNOLOGY

Time: 3 Hours **Maximum: 60 Marks**

MODEL PAPER

SECTION-A

Answer any FIVE of the following **5×5=25M**
Draw diagrams wherever necessary

1. Mendel's laws of inheritance
2. Complementary genes
3. Inbreeding depression
4. Intergeneric hybrids
5. Vectors
6. Probiotics
7. Cryopreservation
8. Gynogenesis
9. Hermaphroditism
10. Cloning

SECTION-B

Answer all the questions **5×10=50M**

11. Role of biotechnology in aquaculture

OR

Write briefly about supplementary and complimentary genes

12. Hybridization techniques in fishes

OR

Intergeneric hybrids in IMC

13. Gynogenesis

OR

Genetics of sex determination in aquaculture

14. Gene manipulation in fishes

OR

Define PCR? Explain the role of PCR in WSSV in shrimp

15. Present status of marine biotechnology in aquaculture

OR

Explain briefly about industries based on marine biotechnology

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II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – XI
ORNAMENTAL FISH CULTURE

Periods: 60 **Max. Marks: 100**

OBJECTIVES	LEARNING OUTCOME
To give overview on the potential ornamental fishes and their breeding habits. To develop idea about the various management practices for breeding and rearing of ornamental fishes To have a basic understanding of aquarium setting and aquarium accessories involved.	Knowledge on the ornamental fish breeding will be learnt by the student. Management practices of ornamental fishes will be learnt. Able to gain knowledge on the aquarium maintenance and accessories.

Unit 1: Introduction

1.1. Introduction to aquarium, ornamental fishes and Equipment and accessories- Aerators, filters and lighting.

1.2. World aquarium trade and present status. Design and construction of public fresh water and marine aquaria and oceanarium.

1.3. Water quality management in aquarium fishes, Biofilters in aquarium

Unit 2: Aquarium Management

2.1. Setting up of aquarium – under gravel filter, pebbles, plants, drift wood, ornamental objects and selection of fishes, Quarantine measures.

2.2. Aquarium maintenance and water quality. Control of snail and algal growth.

2.3. Handling, care and transportation of fish. Temperature acclimation, oxygen packing.

2.4. Food and feeding-Source of feed, different types of food for aquarium fish, monitoring and adjusting.

Unit 3: Freshwater Ornamental Fishes

3.1. Species of ornamental fishes; their taxonomy and biology- Live bearers, Gold fish and koi, Gourami, Barbs and Tetras, angel fish, cichlids.

3.2. Setting up the tank-Choosing the tank, lighting and heating, filtration and aeration, choosing plants, preparing the tank.

3.3. Reproduction-General principles, Vitellin sack, Reproduction strategies, Egg-laying.

Unit 4: Marine Ornamental Fishes

4.1. Marine ornamental fishes – varieties and their habitat.

4.2. Setting up the tank-lighting considerations, siting and substrate, heating and filtration, preparing the tank.

4.3. Reproduction and breeding- Breeding of marine ornamental fishes (clown fishes).

4.4. Other ornamental organisms – Sponges, anemones, Crustaceans, mollusks, annelids, Echinoderms.

Unit 5: Nutrition and Disease

5.1. Nutritional requirements of aquarium fishes. Different kinds of feeds. Culture of fish food organisms; Preparation of dry feeds; feeding methods.

5.2. Use of pigments for colour enhancement. Larval feeds and feeding.

5.3. Common parasites infecting ornamental fishes. Bacterial, viral, fungal diseases of ornamental fishes and their control and prophylaxis.

Suggested reading

Core reading

1. Biswas. S.P., J.N.Das, U.K.Sarkar and Lakra W.S. 2007 Ornamental fishes of North East India An Atlas : NBFGR
2. Marine Aquarium keeping : The Sciences, Animals and Art. John Wiley & Sons, New York
3. Ramachandran.A, Breeding, Farming and Management of Fishes, CUSAT
4. Madhusoodanakurup etal – Ornamental Fish - Breeding, Farming and Trade CUSAT.
5. Jhingran,V.G. Fish and Fisheries of India.
6. Bijukumar,A. Rearing of Aquarium Fishes.
7. Rath,A.K. Freshwater Aquaculture,
8. Santhanam, et.al. a Manual of Freshwater Aquaculture.

Supplementary Reading :

1. Murthi.V.S. 2002 Marine ornamental Fishes of Lakshadweep CMFRI, Special publication 72

Advanced Reading

1. Butting.B., Holthus, P.S. Dalding,S. 2003, Marine Aquarium Industry and conservation.
2. Oliver, K 2003. World trade in ornamental species
3. Marine Ornamental species; collection,……. and Conservation
4. Fish Disease and Disorders, CAB international, Oxford.

Other Reference Books:

1. Bardach, et. Al. Aquaculture – The Farming and Husbandry of Freshwater and Marine Organisms. John Wiley & Sons, NY, 1972.
2. Stickney, R.R. Principles of Water Aquaculture. John Wiley & Sons, NY, 1979.
3. Chondar, C.L. Hypophysation of Indian major carps. Satish Book Enterprise, Agra, 1980.
4. Jhingran, V.G. Fish and fisheries of India. Hindustan Publ. Corporation (India), 1982.
5. Santhanam, R. et. Al. A Manual of Freshwater Aquaculture. Oxford & IBH Publishing Co. Pvt. Ltd., 1987.

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – XI
ORNAMENTAL FISH CULTURE

PRACTICAL SYLLABUS

Total Hours:24 **Max. Marks: 50**

1. Identification of common Fresh water and marine aquarium fishes (10 Nos.)
2. Construction of aquarium
3. Setting up of aquarium (maintained by students can be evaluated after one month)
4. Water quality management in aquariums
5. Aquarium plants and décor materials
6. Air pump and biological filter
7. Breeding of live bearers-Guppy
8. Breeding of egg layers- gold fishes
9. Breeding of bubble nest builder- Gourami

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Semester-IV
SKILL PAPER – XI
ORNAMENTAL FISH CULTURE

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
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Semester-IV
SKILL PAPER – XI
ORNAMENTAL FISH CULTURE

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

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SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
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II B. Voc Aquaculture Technology
Semester-III
PAPER – XI
ORNAMENTAL FISH CULTURE

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – XI
ORNAMENTAL FISH CULTURE
MODEL PAPER

Time: 3 Hours **Maximum: 60 Marks**

SECTION-A

Answer any FIVE of the following **5×4=20M**

1. Aerators
2. Oceanarium
3. Gravel filters
4. Types of food for aquarium fish
5. Live bearers
6. Filtration and aeration
7. Preparing the tank
8. Clown fishes
9. Prophylaxis
10. Importance of ornamental fishes

SECTION-B

Answer all the following **5×10=50M**

11.Water quality management in aquarium fishes.

OR

Design and construction of public fresh water aquaria.

12. Set up the aquaria with quarantine measure.

OR

Maintenance of Aquaria with control of snail and algal growth.

13. Explain briefly taxonomy and biology of ornamental fishes.

OR

General principles of reproduction in ornamental fishes.

14. Breeding of marine ornamental fishes.

OR

Explain habit and habitat of different types of marine ornamental fishes.

15. Give notes on bacterial disease and causative organisms and prophylaxis.

OR

Importance of pigments in ornamental fishes.

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SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

Teaching Hours -60 **Max.Marks-100**

OBJECTIVES:	LEARNING OUTCOME
To provide a basic understanding about fish live feeds. Provide the knowledge on the Fish live feeds culture. Providing the basic knowledge on the Artemia and alternative fish live feeds culture.	Student will learn the significance of the fish live feeds. Knowledge on the Fish live feeds culture will be learnt by the students. Knowledge on the Artemia and alternative fish live feeds culture will be learned.

Unit 1: Live Feeds
Different live feeds and their nutritional value. Manipulation of pond for natural feed production. Candidate species of phytoplankton and zooplankton for fish and shell fish culture – diatoms, micro algae, nano planktons, Artemia, copepods, cladocera and rotifers.

Unit 2: Culture of Phytoplankton
2.1 Methods of collection and preservation; maintenance of pure culture of Phytoplankton.
2.2 Mass culture. Culture of important microalgae, Chaetoceros, Tetraselmis, Skeletonema, Spirulina and Chlorella.

Unit 3: Culture of Zooplankton
3.1. Methods of collection and preservation; maintenance and rearing of Rotifers, Cladocerans, Copepods, and insect larvae. Mass culture of zooplankton.
3.2. Harvest, storage and feeding.

Unit 4: Artemia culture
4.1 Different strains of Artemia. Artemia culture. Cyst production. Enrichment of Artemia cyst and larvae.
4.2 Decapsulation of Artemia cysts. Hatching, storage and feeding.

Unit 5: Alternative live feeds and Periphyton culture
5.1. Culture methods of Infusoria, Chironomids, polychaetes.
5.2. Nutritional qualities of alternative live feeds.
5.3. Applications Importance of periphyton in aquaculture.

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Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

PRACTICAL SYLLABUS

Max. Marks: 50

A. Dinoflagellates

1. Ceratium sp.
2. Protoperidinium sp.
3. Dinophysis sp.

B. Blue Green Algae (BGA)

1. Trichodesmium sp.
2. Spirulena sp.
3. Nostoc sp.
4. Anabena sp.

C. Identification of zooplankton

1. Copepods
2. Amphipods
3. Luciferans
4. Ephasids
5. Mysids
6. Zoea larvae
7. Megalopa larvae
8. Pteropods
9. Ostracoda
10. Cladocerans

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Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

Question Paper Blue Print

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS 60 Marks

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOREACH QUESTION	TOTAL MARKS
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UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 X 4 = 20
2. Essay Questions : 5 X 8 = 40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
II B. Voc Aquaculture Technology
Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

Theory- Internal **Total Marks: 40**

1. Internals (2) Best of Two	: 10 marks
2. Project	: 10 marks
2. Assignments (5)	: 5x2=10marks
3. Seminar	: 5 marks
4. Viva voce	: 5marks

……

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II B. Voc Aquaculture Technology
Semester-III
PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

Theory- External **Total Marks: 60**

Section –A

Short Answer questions
1 to 10 (Any 5 from given 10) 5×4=20

Section –B

Essay Questions 11 to 15
(With internal choice) 5×8=40

SRR & CVR GOVERNMENT DEGREE COLLEGE (A), VIJAYAWADA
DEPARTMENT OF ZOOLOGY
B Voc., COURSE IN AQUACULTURE TECHNOLOGY (w. e. f – 2021-22)
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Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

MODEL PAPER

Time: 3 Hours **Maximum: 60 Marks**

SECTION-A

ANSWER ANY FIVE OF THE QUESTIONS **5×5=25M**

1. Artemia salina
2. Phytoplankton
3. Rotifers
4. Mysis larva
5. Periphyton
6. Feed additives
7. Micro Algae
8. Polychaete culture
9. Spirulina
10. Harvest of Zooplankton

SECTION-B

ANSWER ALL THE FOLLOWING **5×10=50M**

1. Write an essay on Different live feeds and their nutritional value

OR

Write about the important species of plankton in fish culture?

2. Explain the Methods of collection and preservation of phytoplankton?

OR

Write an essay on Culture of important microalgae?

3. Write about the Methods of collection and preservation of zooplankton?

OR

Write about the Mass culture of zooplankton?

4. Describe the culture of Artemia?

Or

Write an essay on Decapsulation of Artemia cysts?

5. Explain about the Applications Importance of periphyton in aquaculture?

Or

Describe the Nutritional qualities of alternative live feeds.

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Semester-IV
SKILL PAPER – XII
LARVAL NUTRITION AND CULTURE OF FISH FOOD ORGANISMS

Practical's – External:

Time: 2 hrs. **Total Marks: 25**

1. Identification of given sample	: 6 marks
2. Identification of given sample	: 6 marks
3. Identification (2)	: 5 marks (2x2 1/2)
4. Record	: 5 marks
5. Viva voce	: 3 marks

Practical's – Internal : **Total Marks: 25**

1. Assessment including viva voce	: 6 marks
2. Record	: 6 marks
3. Field note book	: 5 marks
4. Project	: 8 marks

SRR & CVR GOVERNMENT DEGREE COLLEGE
(AUTONOMOUS)

MACHAVARAM, VIJAYAWADA-520004

DEPARTMENT OF ZOOLOGY

Minutes of
Up gradation of Syllabus Meeting
(Board of Studies in Zoology)

(2021-22)

Dated: 02/12/2021

Courses

II B.Sc-BZC (Zoology): Semester III & IV (w.e.f-2021-22)
Skill Development Course: **Poultry Farming** (In semester III)
(As per APSCHE and CBCS Pattern Semester System)

III B.Sc-BZC, EATZC (Zoology & Aquaculture): Semester V & VI

Subjects:
ZOOLOGY & AQUACULTURE TECHNOLOGY

SYLLABUS, BLUE PRINT & MODEL QUESTION PAPERS

S.R.R. & C.V.R. GOVT. DEGREE COLLEGE

Autonomous & ISO900: 2015 Certified Institution,
NIRF -2020 ranked 101-150 band and NIRF - 2019: 151-200 rank band Institution
NAAC accredited with 'B+' Grade
Machavaram, VIJAYAWADA - 520 004. Krishna District.
Cell : 9440630271 Ph : 0866-2430060, Fax : 0866-2441092, www.srrcvr.org, srrandcvr@gmail.com

MINUTES OF UP GRADATION OF SYLLABUS MEETING (BOARD OF STUDIES IN ZOOLOGY)

The meeting of the Board of Studies in the subject of **ZOOLOGY** was held on **02nd December 2021** in the **Zoology Department** of the college for the up gradation of the syllabus for II **B.Sc BZC Zoology subject syllabus for Semester III & IV and Skill Development Course- Poultry Farming in semester III as per the new syllabus proposed by APSCHE with CBCS pattern and semester system, III.B.Sc BZC, EATZC Zoology and Aquaculture Technology subjects syllabus for Semester V & VI** under the chairmanship of Dr. M.Vijaya Kumar, Head of the Zoology Department.

The following members attended the meeting:

1. **Dr. M.VIJAYA KUMAR** **(In-charge of the Department & Chairman, BOS)**
   Lecturer in Zoology
   SRR & CVR GDC (A)
   Vijayawada

2. **Dr.J.NAVEENA LAVANYA LATHA** **(University Nominee)**
   Krishna University
   Machilipatnam

3. **Dr. N. ANKAMMA** **(Subject Expert)**
   Associate Professor,
   Department of Zoology,
   Govt. College for Women (Autonomous),
   Guntur.A.P

4. **Dr.G.VANI** **(Subject Expert)**
   Lecturer in Zoology,
   DRG Government Degree College
   Tadepalligudem.
   West Godavari District. A.P

5. **Sri. B.APPALA NAIDU** **(Industrial Expert)**

   Assistant Project Manager-Tilapia Fish Project

   Rajiv Gandhi centre for Aquaculture (RGCA)

   Manikonda

6. **N.SUNEETHA** **(Faculty Member)**

   Lecturer in Zoology

   SRR & CVR GDC (A),

   Vijayawada

7. **A.L.K.KRUPAVARM** **(Faculty Member)**

   Lecturer in Zoology

   SRR & CVR GDC (A),

   Vijayawada

8. **B.VADAVATHI** **(Faculty Member)**

   Lecturer in Zoology

   SRR & CVR GDC (A),

   Vijayawada

S.R.R. & C.V.R. GOVT. DEGREE COLLEGE

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The following members attended the meeting:

1. **Dr. M.VIJAYA KUMAR** **(In-charge of the Department & Chairman, BOS)**
   Lecturer in Zoology
   SRR & CVR GDC (A)
   Vijayawada

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SRR & CVR GDC (A),
Vijayawada

(Faculty Member)

8. **B.VADAVATHI**
Lecturer in Zoology
SRR & CVR GDC (A),
Vijayawada

(Faculty Member)

AGENDA

1. Approval of the Syllabus, Model Question paper, Blue Print of the following
   A. II B.Sc-BZC (Zoology): Semester III & IV (w.e.f-2021-22)
   B. *Skill Development Course:* **Poultry Farming** (In semester III)
   (As per APSCHE and CBCS Pattern Semester System)
   C. III B.Sc-BZC, EATZC (Zoology & Aquaculture): Semester V & VI
2. Approval of the stipulated Credits, Work Load, Internal Marks breakup etc...
3. Approval of Online Examination pattern in case COVID 19 doesn't subside at the time of Examinations (MCQs Pattern).

The Chairperson of the Board of Studies welcomed the members and initiated discussion on the Agenda. He apprised the members about the guidelines of the UGC, APSCHE, Krishna University and the CCE regarding the framing of syllabus and the recommended evaluation ratio for internal and external examinations. The members discussed in detail the various aspects presented before them and unanimously resolved the following:

The members of the BOS resolved

RESOLUTIONS

1. Resolved to approve the syllabus for II.B.Sc BZC Zoology subject for Semester III & IV as per the new syllabus proposed by APSCHE and CBCS Pattern Semester System with effect from 2021-22.
2. Resolved to approve the syllabus for first year Skill Development Course- Paper Title- Poultry farming in semester III as per the new syllabus APSCHE and CBCS Pattern Semester System with effect from 2021-22.
3. Resolved to adopt the same syllabus as approved in the previous BOS for III B.Sc-BZC and EATZC Zoology and Aquaculture Technology subjects for Semester V and VI
4. Resolved to conduct project work at field/industry/training Centre for Paper V and Paper VI in aquaculture subject for EATZC instead of practical.
5. Resolved to award assignment 10 marks for Paper V and Paper VI in aquaculture subject if the student attends any five online aquaculture related webinars and produce the E-certificate and write up of the webinars.
6. Resolved to approve the Model Question paper, Blue Print and Question Bank for the above approved syllabus.

7. Resolved to approve Online Examination pattern in case COVID 19 doesn't subside at the time of Examinations (MCQs Pattern).
8. Resolved to approve the duration of the Examination for 3 hours.
9. Resolved to approve the division of marks for internal and external examination along with the suggested blue print and model paper.
10. Resolved to approve the division of 100 marks into two components for Theory, External 60 Marks as Section-A consisting 20 Marks with Short Answer questions (Any 5 from given 10), Section-B consisting 40Marks with Essay Questions (Any 5 with internal choice from given 10)
11. Resolved to approve the division of Internal 40Marks to evaluate Internal Assessment as Two Internal exams for 10 marks, Two Assignments for 10 marks, Project work for 10 marks, Seminar for 10 marks for Total of 40 marks
12. The pass mark is 40% i.e., 24 out of 60 for External and 16 out of 40 for Internal.
13. Resolved to approve the division of 50 marks into two components for Practicals, External 25 Marks as Major Experiment for 8 marks, Minor experiment for 4 marks, Identification for spotters for 8 marks, Viva voce for 5 marks.
14. Resolved to approve the division of Internal 25 Marks as Assessment for 10 marks, Record for 10 marks, Field note book for 5 marks
15. The pass mark is 40% i.e., 10 out of 25 for each External and Internal.
16. Resolved to approve the skill development course evaluation for 50 marks at the end of the semester III The pass mark to be 40% i,e., 20marks out of 50 marks.
17. Resolved to conduct Bridge Course for one week to the newly joined first year students.
18. Resolved to use Virtual class room, ICT, Computer/Internet assisted learning for students regularly for teaching learning process.
19. Resolved to conduct student centric activities like Quiz, Group discussion etc
20. Resolved to arrange Field trips Surveys, Society outreach programmes etc.
21. Resolved to conduct Guest Lectures, Student Seminars, Study Projects etc
22. Resolved to give Assignments in the form of Critical, Innovative, Text book and Internet based.
23. Resolved to use Learning Management System LMS developed by CCE, AP

24. Resolved to advise the entire Faculty to apply for financial assistance to conduct Seminars/Workshops/Conferences /MRP's, etc.,

25. Resolved to approve the list of paper setters and examiners submitted by the department

26. Resolved to approve certificate course in vermicomposting.

Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY SYLLABUS

(w.e.f. 2020-21) (Revised in April, 2020)

SEMESTER III

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

HOURS: 60 **Max. Marks: 100**

Course Outcomes:

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell Biology, Animal Biotechnology and Evolution and by the completion of the course the graduate shall able to –

CO1 To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.

CO2 Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.

CO3 To understandthe history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals

CO4 Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders

CO5 Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.

CO6 Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

Learning Objectives

- To understand the origin of cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities
- To provide the history and basic concepts of heredity, variations and gene interaction
- To enable the students distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance.
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To provide knowledge on origin of life, theories and forces of evolution
- To understand the role of variations and mutations in evolution of organisms

Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY SYLLABUS

(w.e.f. 2020-21) (Revised in April, 2020)

SEMESTER III

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

HOURS: 60 **Max. Marks: 100**

Unit – I Cell Biology

1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
1.2 Electron microscopic structure of animal cell.
1.3 Plasma membrane –Models and transport functions of plasma membrane.
.4Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes
1.5 Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes
(Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin, Structure and Functions with suitable diagrams**)**
2. Need not study cellular respiration under mitochondrial functions)

Unit – II Genetics - I

2. 1 Mendel‟s work on transmission of traits
2. 2 Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes
2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance
2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination)
2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics - II

3.1 Mutations & Mutagenesis
3.2 Chromosomal Disorders (Autosomal and Allosomal)
3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)
3.4 Basics on Genomics and Proteomics

UNIT IV: Molecular Biology

4.1 Central Dogma of Molecular Biology
4.2 Basic concepts of -
a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)
c. Translation – Initiation, Elongation and Termination
4.3 Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes
Additional input: Structure of DNA

Unit - V

5.1 Origin of life
5.2 Theories of Evolution: Lamarckism, Darwinism, Germ PlasmTheroy, Mutation Theory
5.3Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium
5.4Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grand parents
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Model of tRNA and translation mechanism
- Power point presentation of transcription or any other topic by students
- Draw geological time scale and highlight important events along the time line
- Chart on industrial melanism to teach directed selection, Darwin‟s finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

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2. Cell Biology by De Robertis
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9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
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11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introduction to Genetic Analysis. IX Edition. W. H. Freeman and Co.
12. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
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15. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
16. Campbell, N. A. and Reece J. B. (2011). Biology. IX Edition, Pearson, Benjamin, Cummings.
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Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

(w.e.f. 2020-21) (Revised in April, 2020)

SEMESTER III

ZOOLOGY PRACTICAL SYLLABUS

PAPER - III

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Periods: 24 **Max. Marks: 50**

Learning Objectives:

- Acquainting and skill enhancement in the usage of laboratory microscope
- Hands-on experience of different phases of cell division by experimentation
- Develop skills on human karyotyping and identification of chromosomal disorders
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad geological history of origin & evolution of animals

I. Cell Biology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides
3. Mounting of salivary gland chromosomes of *Chiranomous*

II. Genetics

1. Study of Mendelian inheritance using suitable examples and problems
2. Problems on blood group inheritance and sex linked inheritance
3. Study of human karyotypes (Down‟s syndrome, Edwards, syndrome, Patau syndrome, Turner‟s syndrome and Klinefelter syndrome)

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Study of Genetic Drift by using examples of Darwin‟s finches (pictures)
5. Visit to Natural History Museum and submission of report

REFERENCE BOOKS

1. Burns GW. 1972. *The Science of Genetics. An Introduction to Heredity.* Mac Millan Publ. Co.Inc.
2. Gardner EF. 1975. *Principles of Genetics.* John Wiley & Sons, Inc. New York.
3. Harth and Jones EW. 1998. *Genetics – Principles and Analysis.* Jones and BarHett Publ. Boston.
4. Levine L. 1969. *Biology of the Gene.* Toppan.
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SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC
ZOOLOGY SYLLABUS
(w.e.f. 2020-21) (Revised in April, 2020)
SEMESTER III
PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Zoology <u>Theory- Internal</u>		**Total Marks: 40**
1. Project	:	10 marks
2. Assignments (2)	:	5x2=10 marks
3. Internals (2) Average	:	10 marks
4. Seminar	:	10 marks

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II B.Sc BZC
ZOOLOGY SYLLABUS
(w.e.f. 2020-21) (Revised in April, 2020)
SEMESTER III
PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time: 3 Hours **Total Marks: 60**

Zoology <u>Theory- External</u>

Section –A

I. Short Answer questions 1 to 10 (Any 5 from given 10) 5x4=20

Section –B

II. Essay Questions 11 to 15 (With internal choice) 5x8=40

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc (B.Z.C) ZOOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER III

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Zoology Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major dissection demonstration only	:	8 marks
(Identification-2M; Diagram-3M; Labelling-3M)		
2. Mounting (2)/Minor dissection (1)	:	4 marks (2+2)
3.Identification (2)	:	5 marks (2x2 1/2)
4. Record	:	5 marks
5. Viva voce	:	3 marks

Zoology Practical's - Internal **Total Marks: 25**

1.Assessment including viva voce	:	6 marks
2.Record	:	6 marks
3. Field note book	:	5 marks
4. Project	:	8 marks

Question Paper Blue Print

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc (B.Z.C) ZOOLOGY THEORY

SEMESTER III

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Short Questions : 5 x 4 = 20

Questions numbers 1 to 10, Out of 10 Questions 5 has to be answered.

Section-B: Essay Questions : 5 x 8 = 40

Questions numbers 11 to 15, Internal Choice (either / or) and 5 Questions has to be answered.

Total : 60 Marks

Model Question Paper **Course code:**

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY

SEMESTER III

PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time: 3Hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x4=20**

1. Difference between Prokaryotic and Eukaryotic cell
2. Types of Chromosomes
3. Incomplete dominance
4. X-Linked Inheritance
5. Autosomal disorders
6. Factors influencing mutation
7. DNA transcription in Prokaryotes
8. Lac Operon
9. Genetic drift
10. Neo-Darwinism

SECTION-B

II. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x8=40**

11.a. Explain the structure and functions of Plasma membrane

OR

b. Write about the structure and functions of Mitochondria

12.a. Give a detailed account on Mendel's transmission of traits

OR

b. Describe the chromosomal sex determination

13.a. Write about the Autosomal and Allosomal disorders

OR

b. Give a detailed account on Genomics and Proteomics

14.a. Explain the Translation mechanism in Prokaryotic cells

OR

b. What is DNA Replication write about the semi conservative and semi discontinuous mechanism of DNA

15.a. Explain the Charles Darwin theory of Evolution.

OR

b. Describe the Isolation mechanisms

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SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

HOURS : 60 **Max. Marks: 100**

Course Outcomes:

This course will provide students with a deep knowledge in Physiology, Cellular metabolism and Molecular Biology and by the completion of the course the graduate shall able to –

CO1 Understand the functions of important animal physiological systems including digestion, cardio-respiratory and renal systems.

CO2 Understand the muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with a special knowledge of hormonal control of human reproduction.

CO3 Describe the structure, classification and chemistry of biomolecules and enzymes responsible for sustenance of life in living organisms

CO4 Develop broadunderstanding the basic metabolic activities pertaining to the catabolism and anabolism of various biomolecules

CO5 Describe the key events in early embryonic development starting from the formation of gametes upto gastrulation and formation of primary germ layers.

Learning Objectives

- To achieve a thorough understanding of various aspects of physiological systems and their functioning in animals.
- To instil the concept of hormonal regulation of physiology, metabolism and reproduction in animals.
- To understand the disorders associated with the deficiency of hormones
- To demonstrate a thorough knowledge of the intersection between the disciplines of Biology and Chemistry.
- To provide insightful knowledge on the structure and classification of carbohydrates, proteins, lipids and enzymes
- To demonstrate an understanding of fundamental biochemical principles such as the function of biomolecules, metabolic pathways and the regulation of biochemical processes
- To make students gain proficiency in laboratory techniques in biochemistry and orient them to apply the scientific method to the processes of experimentation and hypothesis testing.

Course code:

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY

SEMESTER IV

PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

HOURS: 60 (5X12) **Max. Marks: 100**

UNIT I Animal Physiology - I

1.1 Process of digestion and assimilation

1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO_2
(Note: Need not study cellular respiration here)

1.3 Circulation - Structure and functioning of heart, Cardiac cycle

1.4 Excretion - Structure and functions of kidney urine formation, counter currentMechanism

UN IT II Animal Physiology - II

2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers

2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction

2.3 Endocrine glands - Structure, functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas

2.4 Hormonal control of reproduction in a mammal

Additional input: Neurotransmitters

UNIT III Cellular Metabolism – I (Biomolecules)

3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose

3.2 Proteins - Classification of proteins. General properties of amino acids

3.3 Lipids - Classification of lipids

3.4 Enzymes: Classification and Mechanism of Action

UNITIV Cellular Metabolism – II

4.1 Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain, Glycogen metabolism, Gluconeogenesis

4.2

4.3 Lipid Metabolism – β-oxidation of palmitic acid

4.4 Protein metabolism - Transamination, Deamination and Urea Cycle

Unit – V Embryology

5.1 Gametogenesis

5.2 Fertilization

5.3 Types of eggs

5.4 Types of cleavages

5. 5 Development of Frog upto formation of primary germ layers

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Co-curricular activities (Suggested)

- Chart on cardiac cycle, human lung, kidney/nephron structure etc.
- Working model of human / any mammalian heart.
- Chart of sarcomere/location of endocrine glands in human body
- Chart affixing of photos of people suffering from hormonal disorders
- Student study projects such as identification of incidence of hormonal disorders in the local primary health centre, studying the reasons thereof and measures to curb or any other as the lecturer feels good in nurturing health awareness among students
- Chart on structures of biomolecules/types of amino acids (essential and non-essential)Chart preparation by students on Glycolysis / kreb"s cycle/urea cycle etc.
- Model of electron transport chain
- Preparation of models of different types of eggs in animals
- Chart on frog embryonic development, fate map of frog blastula, cleavage etc.

REFERENCE BOOKS

1. Eckert H. *Animal Physiology: Mechanisms and Adaptation.* W.H. Freeman & Company.
2. Floray E. *An Introduction to General and Comparative Animal Physiology.* W.B. Saunders Co., Philadelphia.
3. Goel KA and Satish KV. 1989. *A Text Book of Animal Physiology*, Rastogi Publications, Meerut, U.P.
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7. Developmental Biology by Balinksy
8. Developmental Biology by Gerard Karp
9. Chordate embryology by Varma and Agarwal
10. Embryology by V.B. Rastogi
11. Austen CR and Short RV. 1980. *Reproduction in Mammals.* Cambridge University Press.
12. Gilbert SF. 2006. *Developmental Biology,* 8th Edition. Sinauer Associates Inc., Publishers,Sunderland, USA.
13. Longo FJ. 1987. *Fertilization.* Chapman & Hall, London.
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15. Schatten H and Schatten G. 1989. *Molecular Biology of Fertilization.* Academic Press, New York.

Model Question Paper **Course code:**

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY

SEMESTER IV

PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Time: 3Hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x4=20**

1. Cardiac cycle
2. Nephron structure
3. Resting membrane potential
4. Pancreas
5. Glucose structure
6. Properties of amino acids
7. Types of eggs
8. Types of Cleavages
9. Transamination
10. Deamination

SECTION-B

II. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x8=40**

11.a. Explain the process of Digestion

OR

b. Describe the structure and functioning of the heart

12.a. Explain the ultrastructure of muscle and process of muscle contraction

OR

b. Explain the structure and functions of Pituitary gland

13.a. Explain the classification of carbohydrates

OR

b. Explain the classification of lipids

14.a. Explain beta oxidation of palmitic acid

OR

b. Explain electron transport chain

15.a. Explain development of frog up to formation of primary germ layers

OR

b. Explain the process of fertilization

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
II B.Sc BZC
ZOOLOGY PRACTICAL SYLLABUS
SEMESTER IV

PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY

Periods: 24 **Max. Marks: 50**

Learning Objectives:

- Identification of an organ system with histological structure
- Deducing human health based on the information of composition of blood cells
- Demonstration of enzyme activity *in vitro*
- Identification of various biomolecules of tissues by simple colorimetric methods and also quantitative methods
- Identification of different stages of earl embryonic development in animals

I. ANIMAL PHYSIOLOGY

1. Qualitative tests for identification of carbohydrates, proteins and fats
2. Study of activity of salivary amylase under optimum conditions
3. T.S. of duodenum, liver, lung, kidney, spinal cord, bone and cartilage
4. Differential count of human blood

II. CELLULAR METABOLISM

1. Estimation of total proteins in given solutions by Lowry‟s method.
2. Estimation of total carbohydrate by Anthrone method.
3. Qualitative tests for identification of ammonia, urea and uric acid
4. Protocol for Isolation of DNA in animal cells

III. EMBRYOLOGY

1. Study of T.S. of testis, ovary of a mammal
2. Study of different stages of cleavages (2, 4, 8 cell stages)
3. Construction of fate map of frog blastula

REFERENCE BOOKS:

- Harper‟s Illustrated Biochemistry
- Cell and molecular biology: Concepts & experiments. VI Ed. John Wiley &sons. Inc.
- Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- Laboratory techniques by Plummer

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

HOURS : 60 **Max. Marks: 100**

Course Outcomes:

This course will provide students with a deep knowledge in immunology, genetics, embryology and ecology and by the completion of the course the graduate shall able to –

CO1 To get knowledge of the organs of Immune system, types of immunity, cells and organs of immunity.

CO2 To describe immunological response as to how it is triggered (antigens) and regulated (antibodies)

CO3 Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.

CO4 Get familiar with the tools and techniques of animal biotechnology.

Learning Objectives

- To trace the history and development of immunology
- To provide students with a foundation in immunological processes
- To be able to compare and contrast the innate versus adaptive immune systems and humoral versus cell-mediated immune responses
- Understand the significance of the Major Histo compatibility Complex in terms ofimmune response and transplantation
- To provide knowledge on animal cell and tissue culture and their preservation
- To empower students with latest biotechnology techniques like stem cell technology, genetic engineering, hyridoma technology, transgenic technology and their application in medicine and industry for the benefit of living organisms
    - To explain *in vitro* fertilization, embryo transfer technology and other reproduction manipulation methodologies.
    - To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
    - To understand principles of animal culture, media preparation.

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II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

HOURS : 60 **Max. Marks: 100**

Unit – I **Immunology – I (Overview of Immune system)**

1.1 Introduction to basic concepts in Immunology
1.2 Innate and adaptive immunity, Vaccines and Immunization programme
1.3 Cells of immune system
1.4 Organs of immune system

Unit – II **Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)**

2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity
2.2 Antibodies: Structure of antibody, Classes and functions of antibodies
2.3 Structure and functions of major histo compatibility complexes
2.4 Exogenous and Endogenous pathways of antigen presentation and processing
2.5 Hypersensitivity – Classification and Types

Unit – III **Techniques**

2.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,
2.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures
2.3 Stem cells: Types of stem cells and applications
2.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit – IV **Applications of Animal Biotechnology**

3.1 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases andRecombinant DNA technology
3.2 Gene delivery: Microinjection, electroporation, biolistic method (gene gun),liposome and viral-mediated gene delivery
3.3 Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications
3.4 Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning

Unit - V

1.1. PCR: Basics of PCR.
4.2 DNA Sequencing: Sanger‟s method of DNA sequencing- traditional and automated sequencing (2 hrs)
4.3 Hybridization techniques: Southern, Northern and Western blotting
4.4 DNA fingerprinting: Procedure and applications
4.5 Applications in Industry and Agriculture: Fermentation: Different types of Fermentation and Downstream processing; Agriculture: Monoculture in fishes, polyploidy in fishes

Co-curricular activities (suggested)

- Organizing awareness on immunization importance in local village in association with NCC and NSS teams
- Charts on types of cells and organs of immune system
- Student study projects on aspects such as – identification of allergies among students (hypersensitivity), blood groups in the class (antigens and antibodies duly reported) etc., as per the creativity and vision of the lecturer and students
- Visit to research laboratory in any University as part of Zoological tour and exposure and/ or hands-on training on animal cell culture.
- Visit to biotechnological laboratory in University or any central/state institutes and create awareness on PCR, DNA finger printing and blot techniques or Visit to a fermentation industry or Visit to a local culture pond and submit report on culture of fishes etc.

REFERENCE BOOKS

1. Immunology by Ivan M. Riott
2. Immunology by Kubey
3. Sreekrishna V. 2005. *Biotechnology –I, Cell Biology and Genetics.* New Age International Publ.New Delhi, India.

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II B.Sc BZC
ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Periods: 24 **Max. Marks: 50**

Learning Objectives:

- Acquainting student with immunological techniques vis-à-vis theory taught in the class room
- Interconnect the theoretical and practical knowledge of immunity with the outer world for the development of a healthier life.
- Demonstrate basic laboratory skills necessary for Biotechnology research
- Promoting application of the lab techniques for taking up research in higher studies

I. IMMUNOLOGY

1. Demonstration of lymphoid organs (as per UGC guidelines)

2. Histological study of spleen, thymus and lymph nodes (through prepared slides)

3. Blood group determination

4. Demonstration of

    a. ELISA

    b. Immunoelectrophoresis

II. Animal biotechnology

1. DNA quantification using DPA Method.

2. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting

3. Separation, Purification of biological compounds by paper, Thin-layer and Column chromatography

4. Cleaning and sterilization of glass and plastic wares for cell culture.

5. Preparation of culture media.

REFERENCE BOOKS

1. Immunology Lab Biology 477 Lab Manual; Spring 2016 Dr. Julie Jameson
2. Practical Immunology A Laboratory Manual; **LAP LAMBERT Academic Publishing**
3. Manual of laboratory experiments in cell biology by Edward, G
4. Laboratory Techniques by Plummer

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II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

INTERNAL MARKS ALLOTMENT

Zoology Theory- Internal	**Total Marks: 40**
1. Project	: 10 marks
2. Assignments (2)	: 5x2=10 marks
3. Internals (2) Average	: 10 marks
4. Seminar	: 5 marks
5. Viva voce	: 5 marks

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

EXTERNAL MARKS ALLOTMENT

Time: 3 Hours **Total Marks: 60**

Zoology Theory- External

Section –A

I. Short Answer questions 1 to 10 (Any 5 from given 10) 5x4=20

Section –B

II. Essay Questions 11 to 15 (With internal choice) 5x8=40

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II B.Sc (B.Z.C) ZOOLOGY

SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

PRACTICAL MARKS ALLOTMENT

Zoology Practical's - External

Time: 3 hrs.		**Total Marks: 25**
1. Major dissection demonstration only (Identification-2M; Diagram-3M; Labelling-3M)	:	8 marks
2. Mounting (2)/Minor dissection (1)	:	4 marks (2+2)
3.Identification (2)	:	5 marks (2x2 1/2)
4. Record	:	5 marks
5. Viva voce	:	3 marks

Zoology Practical's – Internal		**Total Marks: 25**
1. Assessment including viva voce	:	6 marks
2. Record	:	6 marks
3. Field note book	:	5 marks
4. Project	:	8 marks

Question Paper Blue Print

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC
ZOOLOGY
SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Short Questions : 5 x 4 = 20
Questions numbers 1 to 10, Out of 10 Questions 5 has to be answered.

Section-B: Essay Questions : 5 x 8 = 40
Questions numbers 11 to 15, Internal Choice (either / or) and 5 Questions has to be answered.

Total : 60 Marks

Model Question Paper **Course code:**

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

II B.Sc BZC

ZOOLOGY

SEMESTER IV

PAPER– 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Time: 3Hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Epitopes
2. IgM structure
3. Functions of major histocompatibility complex
4. Types of cell lines
5. Applications of monoclonal antibodies
6. Superovulation
7. In vitro fertilization
8. Western blotting technique
9. Monoculture in fishes
10. Cryopreservation

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11.a. Describe in detail about innate immunity

OR

b. What are Lymphoid organs explain the importance of primary lymphoid organs

12.a. Explain the different of antigens

OR

b. Describe the structure and functions of major histocompatibility complex

13.a. Describe the different types of stem cells and its applications

OR

b. Write about the production and application of monoclonal antibodies

14.a. What do you understand by IVF in vitro fertilization? Explain the process.

OR

b. Give a detailed account on Recombinant DNA technology

15.a. Explain the DNA fingerprinting process and its applications

OR

b. Write about the steps involved in downstream process of fertilization

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SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
DEPARTMENT OF ZOOLOGY
SKILL DEVELOPMENT COURSES
ZOOLOGY STREAM
Syllabus of
POULRY FARMING
Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

Learning Outcomes:

By successful completion of the course, students will be able to;

1. Understand the field level structure and functioning of insurance sector and it's role in protecting the risks
2. Comprehend pertaining skills and their application for promoting insurance coverage
3. Prepare better for the Insurance Agent examination conducted by IRDA
4. Plan 'promoting insurance coverage practice' as one of the career options.

SYLLABUS:

Section I (Introduction to Poultry Farming): 10Hrs

1.1 General introduction to poultry farming -Definition of Poultry; Past and present scenario ofpoultry industry in India.
1.2 Principles of poultry housing. Poultry houses. Systems of poultry farming.
1.3 Management of chicks, growers and layers. Management of Broilers.
1.4 Preparation of project report for banking and insurance

Section II (Feed and Livestock Health Management): 10 Hrs

2.1 Poultry feed management – Principles of feeding, Nutrient requirements for different stagesoflayers and broilers. Feed formulation and Methods of feeding.
2.2 Poultry diseases – viral, bacterial, fungal and parasitic(two each); symptoms, control andmanagement; Vaccination programme.

Section III(Harvesting of Eggs and Sanitation): 10 Hrs

3.1 Selection, care and handling of hatching eggs. Egg testing.Methods of hatching.
3.2 Brooding andrearing. Sexing of chicks.
3.3 Farm and Water Hygiene, Recycling of poultry waste.

Co-curricular Activities Suggested: (4 hrs)

1. Group discussion& SWOT analysis
2. Visit to a poultry farm
3. Invited Lectures by Concerned officers of government or private farms
4. Cheap and Healthy Feed preparation by students based on government standards
5. Market study and Survey (Monitoring of daily price hike in poultry market and analysis)
6. Online SwayamMoocs course on poultry farming (see reference 9 below)

Reference books:

1. Sreenivasaiah., P. V., 2015. Textbook of Poultry Science. 1st Edition. Write & Print Publications, New Delhi
2. 2. Jull A. Morley, 2007. Successful Poultry Management. 2nd Edition. Biotech Books, New Delhi"
3. Hurd M. Louis, 2003. Modern Poultry Farming. 1st Edition. International Book Distributing Company, Lucknow."
4. Life and General Insurance Management, "
5. Financial services, Tata McGraw hill
6. http://www.asci-india.com/BooksPDF/Small%20Poultry%20Farmer.pdf
7. https://nsdcindia.org/sites/default/files/MC_AGR-Q4306_Small-poultry-farmer-.pdf
8. http://ecoursesonline.iasri.res.in/course/view.php?id=335
9. https://swayam.gov.in/nd2_nou19_ag09/preview

Model Question paper

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
DEPARTMENT OF ZOOLOGY
SKILL DEVELOPMENT COURSES
ZOOLOGY STREAM
POULTRY FARMING
QUESTION BANK

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

I. Answer any Five of the following questions. 5x10= 50M

1. Discuss briefly the present and future scenario of poultry farming industry in India.

2. Explain the principles of poultry housing in detail with examples.

3. Write an essay on management of chicks.

4. Write an essay on management of Broilers.

5. Write an essay on Viral and Bacterial diseases in poultry (Two each).

6. Discuss any two fungal and Parasitic diseases.

7. Explain the nutritional requirements for layers.

8. Write an essay on selection, care, handling and hatching of eggs.

9. Explain sexing of chicks.

10. Explain various methods of hatching in poultry.

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DEPARTMENT OF ZOOLOGY
SKILL DEVELOPMENT COURSES
ZOOLOGY STREAM
POULTRY FARMING
QUESTION BANK

Total 30 hrs (02h/wk), 02 Credits & Max 50 Marks

Essay questions

1. Discuss briefly the present and future scenario of poultry farming industry in India.
2. Explain the principles of poultry housing in detail with examples.
3. Write an essay on management of chicks.
4. Write an essay on management of Broilers.
5. Write an essay on Bacterial diseases in poultry .
6. Write an essay on management of Layers.
7. Write an essay on Viral diseases in poultry.
8. Write an essay on fungal diseases in poultry.
9. Write an essay on Parasitic diseases in poultry.
10. Explain nutritional requirement for layers.
11. Explain nutritional requirement for Broilers.
12. Write an essay on selection, care and handling of hatchery of eggs.
13. Explain various methods of hatching in poultry.
14. Explain recycling of poultry waste.
15. Explain sexing of chicks.
16. Write an essay on selection, care handling and hatching of eggs.

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III B.Sc BZC

ZOOLOGY SYLLABUS

SEMESTER-V

PAPER – V

ANIMAL BIOTECHNOLOGY

Periods: 60 **Max. Marks: 100**

Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors

Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

Cloning Vectors: Plasmid vectors:pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

Unit 2 Techniques of Recombinant DNA technology

Cloning: Use of linkers and adaptors

Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated delivery

PCR: Basics of PCR.

DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing

Hybridization techniques: Southern, Northern and Western blotting,

Genomic and cDNA libraries: Preparation and uses

UNIT 3 Animal Cell Technology

Cell culture media: Natural and Synthetic

Cell cultures: primary culture, secondary culture, continuous cell lines; Protocols for Primary Cell Culture; Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures.

Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

Stem cells: Types of stem cells, applications

Unit 4 Reproductive Technologies & Transgenic Animals

Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization , super ovulation, Embryo transfer, Embryo cloning

Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications

Unit 5 Applied Biotechnology

Industry: Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized; Downstream processing - Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

Agriculture: fisheries – monoculture in fishes, polyploidy in fishes; DNA fingerprinting

Additional Input: Prebiotics and Probiotics

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III B.Sc BZC

ZOOLOGY PRACTICAL SYLLABUS

SEMESTER-V

PAPER – V

ANIMAL BIOTECHNOLOGY

Periods: 24 **Max. Marks: 50**

Any SIX of the following:

1. Maintenance and storage of*E.coli* DH5 alpha cells.
2. Isolation of Plasmid DNA from *E.coli*
3. Preparation of genomic DNA from *E. coli*/animals/ human.
4. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).
5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.
6. Preparation for insertion and vector for ligation.
7. Performance of ligation reaction using T4 DNA ligase.
8. Preparation of competent cells
9. Transformation of *E. coli* with plasmid DNA using CaCl2,
10. Selection of transformants on X-gal and IPTG
11. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
12. Interpretation of sequencing gel electropherograms
13. Amplification of DNA by PCR
14. Packing and sterilization of glass and plastic wares for cell culture.
15. Preparation of culture media.

REFERENCE BOOKS

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
4. Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press
5. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
6. Brown TA. (2007). Genomes-3. Garland Science Publishers
7. Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.
8. Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994.BIOS Scientific Publishers Limited.
9. Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
11. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

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III B.Sc BZC

ZOOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER- V

ANIMAL BIOTECHNOLOGY

Zoology Theory- Internal		**Total Marks: 40**
1. Internals (2)	:	10 marks
2. Assignments (2)	:	5x2=10 marks
3. Project	:	10 marks
4. Seminar	:	5 marks
5. Attendance	:	5 marks

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III B.Sc BZC

ZOOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

ANIMAL BIOTECHNOLOGY

Zoology Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40

11 to 15

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III B.Sc BZC
ZOOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

ANIMAL BIOTECHNOLOGY

Zoology Practical's - External

Time: 3 hrs.		**Total Marks: 25**
1. Major experiment	:	8 marks
2. Minor experiment	:	6 marks
3. Identification	:	6 marks
4. Viva voce	:	5 marks

Zoology Practical's - Internal

		Total Marks: 25
1. Assessment	:	10 marks
2. Record	:	10 marks
3. Field note book	:	5 marks

Question Paper Blue Print

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III B.Sc BZC

ZOOLOGY THEORY

SEMESTER-V

PAPER – V

ANIMAL BIOTECHNOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

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III B.Sc BZC
ZOOLOGY
SEMESTER-V
PAPER – V
ANIMAL BIOTECHNOLOGY

Time: 2½hrs

Max Marks: 60

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. DNA polymerases. DNA పాలిమరేజస్
2. Cosmids కస్మిడ్స్
3. Electrophoration. ఎలక్ట్రోఫోరేషన్
4. PCR PCRపాలిమరేజ్ చైన్ రియాక్షన్
5. Organ culture. అంగవర్ధనము
6. Cryopreservation క్రయోప్రిజర్వేషన్
7. Super ovulation. సూపర్ అండోత్సర్గము
8. Embryo Cloning ఎంబ్రియో క్లోనింగ్
9. Centrifugation సెంట్రిఫ్యూగేషన్
10. DNA finger printing.DNA ఫింగర్ ప్రింటింగ్

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. (a) Explain different types of restriction enzymes used in genetic engineering.
జన్యు సాంకేతికశాస్త్రములో ఉపయోగపడు వివిధ రకాల రిస్ట్రిక్షన్ ఎంజైమ్స్ వివరించండి.

Or

(b) Write an essay on cloning vectors.
క్లోనింగ్ వాహకాలపై ఒక వ్యాసం రాయండి.

12. (a) Explain the preparation of genomic and c-DNA libraries.
జనోమిక్ లైబ్రరీ మరియు సి-డిఎన్ఎ లైబ్రరీ తయారీ విధానమును వివరించండి

Or

(b) Write an essay on Sanger's methods of DNA sequencing.
సాంగర్ విధానం ద్వారా DNA సీక్వెన్సింగ్ తయారుచేయు పద్ధతి గురించి ఒక వ్యాసం రాయండి.

13.(a) Give an account on production of MAb's and it's applications.

MAb యొకకఉతప తిత మరి ఉపయోగాలు

వి′వరించండి

Or

(b) Describe the different types of Stemcells and it's applications.

వివిధ రకాలైన మూలకణాలు మరియు వాటి ఉపయోగాలు వి′వరి′ంచండి

14. (a) What do you understand by (IVF) Invitro Fertilization. How it is done?

IVF అనగానేమి ? IVF జరుగు పద్ధతిం వివరించుమం?

Or

(b) What is transgenesis and explain it's application in animals?

ట్రాన్స్ జెనిసిస్ అంటే ఏమి? మరి వలనకలిగు ఉపయోజనలని వివరించిము

15. (a) Explain the steps involved in down stream processing of fermentation.

డౌన్ స్ట్రీమ్ పద్ధతిలో కిణ్వ ప్రక్రియ విధానమని వివరించండి

Or

(b) Explain monoculture and polypoidy in fishes.

చిప్పలలో మోనోకల్చర్ డిప్లాయిం వివరించండి.

మరి చి పలిప్పయి

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III B.Sc BZC
ZOOLOGY SYLLABUS
SEMESTER-V
PAPER – VI
ANIMALHUSBANDRY

Periods:60 **Max. Marks: 100**

UNIT – I :

General introduction to poultry farming. Principles of poultry housing. Poultry houses. Systems of poultry farming. Management of chicks, growers and layers. Management of Broilers.

UNIT – II:

Poultry feed management – Principles of feeding. Nutrient requirements for different stages of layers and broilers. Methods of feeding. Poultry diseases – viral, bacterial, fungal and parasitic (two each); symptoms, control and management.

UNIT – III:

Selection, care and handling of hatching eggs. Egg testing. Methods of hatching. Brooding and rearing. Sexing of chicks.

UNIT- IV:

Breeds of Dairy Cattle and Buffaloes – Definition of breed; Classification of Indian Cattle breeds, exotic breeds and Indian buffalo breeds. Systems of inbreeding and crossbreeding. Housing of dairy animals – Selection of site for dairy farm; systems of housing – loose, housing system. Conventional dairy barn. Cleaning and sanitation of dairy farm. Weaning of calf. Castration and dehorning. Deworming and Vaccination programme. Records to be maintained in a dairy farm.

UNIT - V:

Care and management of dairy animals - Care and management of calf, heifer, milk animal, dry and pregnant animal, bulls and bullocks.

Additional input : Piggery

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ZOOLOGY PRACTICAL SYLLABUS
SEMESTER-V
PAPER – VI
ANIMAL HUSBANDRY

Periods: 24 **Max. Marks: 50**

1. Study of various breeds of layers and broilers (photographs)
2. Identification of disease causing organisms in poultry birds (as per theory)
3. Study of the anatomy of a poultry bird by way of dissecting a bird. (Demonstration)
4. Study of various activities in a poultry farm (layers and broilers) and submission of a report.
5. Study of various breeds of cattle (photographs/microfilms)
6. Study of various activities carried out in a dairy farm and submission of a report.

REFERENCE BOOKS

1. TEXTBOOK OF ANIMAL HUSBANDRY by BANERJEE, G.C. Publisher oxford
2. Book on Animal Husbandry Gyan Deep Singh Publisher : Anmol Publishers
3. Paadiparisrama Ch. Ramesh Saritha Veterinary book publishers-Hyderabad, Vijayawada
4. Pasugana yagamanyam Dr. A. Venkata, Ramaiah Rithu nestham Publications
5. Animal Husbandry by Venkateswara Publications, Guntur
6. Kollaprisrama-Telugu Academy.

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III B.Sc

ZOOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

ANIMAL HUSBANDRY

Zoology Theory- Internal		**Total Marks: 40**
1. Internals (2)	:	10 marks
2. Assignments (2)	:	5x2=10 marks
3. Project	:	10 marks
4. Seminar	:	5 marks
5. Attendance	:	5 marks

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III B.Sc BZC & .

ZOOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

ANIMAL HUSBANDRY

Zoology Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40

11 to 15

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III B.Sc BZC
ZOOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

ANIMAL HUSBANDRY

Zoology Practical's - External

Time: 3 hrs.		**Total Marks : 25**
1. Major	:	8 marks
2. Minor	:	6 marks
3. Identification	:	6 marks
4. Viva voce	:	5 marks

Zoology Practical's - Internal

		Total Marks: 25
1. Assessment	:	10 marks
2. Record	:	10 marks
3. Field note book	:	5 marks

Question Paper Blue Print

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III B.Sc BZC

ZOOLOGY THEORY

SEMESTER-V

PAPER – VI

ANIMAL HUSBANDRY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc BZC
SEMESTER-V
PAPER – VI
ANIMAL HUSBANDRY

Time: 3hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Deep litter system డీపరి లిటరిరీ వR వస్
2. Management of layers గుడువిట్టిa రళరిళ యజమనిR పదతిలు
3. Poultry Feed management రళరిళ ణ యజమనిR o
4. Marek's disease మిరెకీరి వ్యిR ధి
5. Candle test కిప్పి తరి'త పరీ
6. Methods of Hatching హచంి పదతులు
7. Cleaning and Sanitation of Dairy Farms పాడరి' పరిమల పరత్ మరి శ రి'రింంటరి'షన్
8. Vaccination programme టీక కారిరR మరింం
9. Care and managementof milk animals పాలచి పశువుల మరి రి'రింర్రి' హణ్ సర్ంరణ్
10. Care and Management of Bulls and Bullocks రడలు మరి దుని పోతుల మరి సర్ంరణ్ రి'రింర్రి' హణ్

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Explain the different types of sheds in Poultry
పి్రలో వివిధ వి'వరి'రించిండి
రికల
షెడరి

(or)

b. Describe different methods of management of chicks
రడరిరి'లలో'రింరరిరీ హణ్ యొకకవివిధ పదతిలు వరి'వరి'రించరిండి

12. a. Describe Nutrient requirement for Layers and Broilers
యి'లరరిరి మరి' శ లయరరిరి యొకక పిaషక అవసర్రిరాలున వి'వరి'రించిండి

(or)

b. Write an essay on symptoms, control and management of any two viral and two bacterial diseases.
రళరిళ లో వచుర'రచెరిండు వరి రిల్ మరి' శ రచెరిండు రీటరి'యా వ్యిR ధిల లక్షణాలు, రి'రింయరింతరి మరి' శ రి'రింర్రి' హణ్ పై ఒక వ్యిR సరిరిం రాయిండి

13 a. Write an essay on different methods of hatching of eggs
గుడిల పిaదరి'గించే లు వివరయరిండి
వివిధ పదరిలు

(or)

b. Write an essay on sexing of chicks

రడిి'లలలో లి'ింంగి'ింంరాధ రి ణ్ పది ధతిలె పె యిR సర్ి ింం రాయిండి

14.a. What is animal breeding and explain methods of animal breeding
జంతు ఉపజననం అనగానేమి ? జంతు ఉపజనన పద్ధతులను గురించి వివరించండి

(or)

b. Describe housing of dairy animals
పాడి పశువుల గృహ నిర్మాణ విధానాలను వివరించండి

15.a. Write an essay on care and management of calf and Heifers
లేగదూడలు మరియు దున్నడల యొక్క సంరక్షణ మరియు నిర్వహణ పై ఒక వ్యాసం రాయండి,

(or)

b. Write an essay on management of pregnant animals.
గర్భం ధరించిన పశువులు నిర్వహణ పై ఒక వ్యాసం రాయండి.

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SEMESTER-VI

ZOOLOGY –SUBJECT ELECTIVE

PAPER – VII-A

IMMUNOLOGY

Periods: 60 **Max. Marks: 100**

Unit - I

Overview of Immune system

Introduction to basic concepts in Immunology

Innate and adaptive immunity

Cells and organs of Immune system

Cells of immune system

Organs of immune system

Unit - II

Antigens

Basic properties of antigens

B and T cell epitopes, haptens and adjuvants

Factors influencing immunogenicity

Unit - III

Antibodies

Structure of antibody

Classes and functions of antibodies

Monoclonal antibodies

Unit - IV

Working of Immune system

Structure and functions of major histocompatibility complexes

Exogenes and Endogenes pathways of antigen presentation and processing

Basic properties and functions of cytokines

Unit - V

Immune system in health and disease

Classification and brief description of various types of hyper sensitivities

Introduction to concepts of autoimmunity and immunodeficiency

Vaccines

General introduction to vaccines

Types of vaccines

*** ADDITIONAL INPUT:** Transplantation Immunology

Reference Books:

1. Richard A. Glodsby, Thomas J Kind, Barbara A. Osborne, Janis Kuby, Immunology, 5th ed, Freeman and Co. New York
2. Ivan Roitt, Immunology, 4th ed, Johanthan Brostoff, Moshy, London.
3. Kindt, T. J., Goldsby, R. A., Osborne, B. A., Kuby, J. (2006). VI Edition. Immunology. W.H. Freeman and Company.
4. Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition. Roitt's Essential Immunology, Blackwell Publishing. *

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III B.Sc BZC & ATZC
ZOOLOGY PRACTICAL SYLLABUS
SEMESTER-VI
PAPER – VII-A
IMMUNOLOGY

Periods: 24 **Max. Marks: 50**

1. Demonstration of lymphoid organs (as per UGC guidelines)

2. Histological study of spleen, thymus and lymph nodes (through prepared slides)

3. Blood group determination

4. Demonstration of

a. ELISA

b. Immunoelectrophoresis

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SEMESTER-VI
ZOOLOGY- SUBJECT ELECTIVE
PAPER – VII-A
IMMUNOLOGY

INTERNAL MARKS ALLOTMENT

Zoology Theory- Internal	**Total Marks: 40**
1. Internals (2) marks	: 10
2. Assignments (2) marks	: 5x2=10
3. Project marks	: 10
4. Seminar marks	: 5
5. Attendance	: 5 marks

EXTERNAL MARKS ALLOTMENT

Zoology Theory- External **Total Marks: 60**

Section –A

III. Short Answer questions (Any 5 from given 10) 1 to 10 — 5x4=20

Section –B

IV. Essay Questions (With internal choice) 11 to 15 — 5x8=40

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ZOOLOGY –ELECTIVE - PAPER – VII-A
IMMUNOLOGY

PRACTICAL MARKS ALLOTMENT

Zoology Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major experiment	:	8 marks
2. Minor experiment	:	6 marks
3. Identification	:	6 marks
4. Viva voce	:	5 marks

Zoology Practical's - Internal

Total Marks: 25

1. Assessment	:	10 marks
2. Record	:	10 marks
3. Field note book	:	5 marks

Question Paper Blue Print

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SEMESTER-VI
ZOOLOGY-SUBJECT ELECTIVE
PAPER – VII-A
IMMUNOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

3. Short Questions : 5 x 4 = 20
4. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

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SEMESTER-VI

ZOOLOGY-SUBJECT ELECTIVE

PAPER – VII-A

IMMUNOLOGY

Time: 3 hrs **Max Marks: 60**

SECTION-A

III. Answer any FIVE of the following
Draw labeled diagram wherever necessary
5x4=20

1. Phagocytosis రక్షకకణక్రియ
2. Passive Immunity ఆర్జిత రోగనిరోధకశక్తి
3. Haptens and adjuvants హాప్టన్లు మరియు ఎడ్జువెంట్లు
4. Interferon's ఇంటర్ఫెరాన్లు
5. Ig G structure. ఐ.జి.జి నిర్మాణం
6. Applications of M.C.A యం.సి.ఎ. అనువర్తనాలు
7. Functions of MHC ఎమ్.హెచ్.సి. విధులు
8. Action of cytokines. సైటోకైన్ల పనితీరు
9. Delayed hypersensitivity కణమధ్యవర్తిత్వ అధిసున్నితత్వం
10. RRACoombs ఆర్.ఆర్. ఎ. కూంబ్స్

SECTION-B

IV. Answer any FIVE of the following
Draw labeled diagram wherever necessary
5x8=40

11. (a) What is the difference between Innate and Adaptive immunity.

స్ిహజ మరి'ి రోగ ి'ింరోధక్ మధిR బి'ధలు వ్యయిండి
ఆరి'త్ (OR)

(b)Explain Primary group of immune system organs

ప్రథమ శ్రేణి ధ్రువీకరణ పత్రాలు గురించి తెలపండి

12. (a)Explain types of antigens

వివిధ రకాల ప్రతిజనకలు గురించి తెలుపండి

(OR)

(b)What are the properties of T-cell Epitopes

టి-కణాల ఎపిటోపిక్ ధర్మాలు గురించి వ్రాయండి

13. (a) Explain the structure of an typical antigen

సాధారణ యాంటిజెన్ యొక్క నిర్మాణం వివరించండి

(OR)

(b)What are the functions of Immunoglobulin's-Explain?

ఇమ్యునోగ్లోబులిన్ విధులు గురించి తెలుపండి

14. (a) Explain Endogene Pathway of antigen

ప్రతిరక్షక ఎండోజెన్ విధానం గురించి తెలుపండి

(OR)

(b)What are the functions of Cytokines-Explain?

సైటోకైన్ల విధులు గురించి తెలుపండి

15. (a) Explain types of hyper sensitivities

వివిధ రకాల అతి సున్నిత్వత గురించి తెలుపండి

(OR)

(b) Explain types of Vaccines.

వివిధ రకాల వ్యాధి నిరోధక టీకాల గురించి తెలుపండి

ZOOLOGY SYLLABUS FOR CLUSTER ELECTIVE –VIII-B:
SEMESTER-VI
AQUACULTURE

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III B.Sc BZC
SEMESTER-VI
ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-1
PRINCIPLES OF AQUACULTURE

Periods:60 **Max.Marks:100**

Unit – I

1.1 Introduction / Basics of Aquaculture

1.1.1 Definition, Significance and History of Aquaculture
1.1.2 Present status of Aquaculture – Global and National scenario
1.1.3 Major cultivable species for aquaculture: freshwater, brackish water and marine.
1.1.4 Criteria for the selection of species for culture

Unit – II

2.1 Types of Aquaculture

2.1.1 Freshwater, Brackishwater and Marine
2.1.2 Concept of Monoculture, Polyculture,Composite culture, Monosex culture and Integrated fish farming

2.2Culture systems

2.2.1 Ponds, Raceways, Cages, Pens, Rafts and water recirculating systems

2.3Culture practices

2.3.1Traditional, extensive, modified extensive, semi-intensive and intensive cultures of fish and shrimp.

ADDITIONAL INPUT: SONAR Navigation system

Unit – III

3.1 Design and construction of aquafarms

3.1.1 Criteria for the selection of site for freshwater and brackish water pond farms
3.1.2 Design and construction of fish and shrimp farms

3.2 Seed resources

3.2.1 Natural seed resources and Procurement of seed for stocking: Carp and shrimp

3.3 Nutrition and feeds

3.3.1 Nutritional requirements of a cultivable fish and shellfish
3.3.2 Natural food and Artificial feeds and their importance in fish and shrimp culture

Unit – IV

4.1Management of carp culture ponds

4.1.1 Culture of Indian major carps: Pre-stocking management – Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization; Stocking management – Stocking density and stocking; Post-stocking management – Feeding, water quality, growth and health care; and Harvesting ofponds

***4.2*Culture of giant freshwater prawn,** *Macrobrachium rosenbergii*

Unit – V

5.1Culture of shrimp (*Penaeus monodon* or *Litopenaeus vannamei*)
5.2 Culture of pearl oysters
5.3 Culture of seaweeds-species cultured, culture techniques, important by-products, prospects
5.4 Culture of ornamental fishes – Setting up and maintenance of aquarium; and breeding.

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SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE

- PAPER – VIII-B-1

PRINCIPLES OF AQUACULTURE

PRACTICALS

Periods : 24 **Max.Marks : 50**

Cultivable fishes

1. Identification and study of important cultivable and edible fishes - Any ten
2. Identification and study of important cultivable and edible crustaceans - Any five
3. Identification and study of common aquarium fishes – Any five
4. General description and recording biometric data of a given fish.

Diseases

1. Identification and study of fish and shrimp diseases - Using specimens / pictures
2. External examination of the diseased fish – diagnostic features and procedure.
3. Autopsy of fish – Examination of the internal organs.
4. Determination of dosages of chemicals and drugs for treating common diseases.

Pond Management

1. Water Quality -Determination of temperature, pH, salinity in the pond water sample; Estimation of dissolved oxygen, free carbondioxide, total alkalinity, total hardness, phosphates and nitrites.
2. Soil analysis – Determination of soil texture, pH, conductivity, available nitrogen, available phosphorus and organic carbon.
3. Identification and study of common zooplankton, aquatic insects and aquatic weeds – Each 5

REFERENCES BOOKS

1. Bardach, JE *et al*. 1972. *Aquaculture – The farming and husbandry of freshwater and marine organisms*, John Wiley & Sons, New York.
2. Bose AN et al.1991. *Coastal aquaculture Engineering*. Oxford & IBH Publ.Co.Pvt.Ltd.
3. Chakraborty C & Sadhu AK. 2000. *Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn.* Daya Publ. House.
4. FAO. 2007. *Manual on Freshwater Prawn Farming*.
5. Huet J. 1986. *A text Book of Fish Culture*. Fishing News Books Ltd.
6. ICAR. 2006. *Hand Book of Fisheries and Aquaculture*. ICAR.
7. Ivar LO. 2007. *Aquaculture Engineering*. Daya Publ. House.
8. Jhingran V.G. 2007. *Fish and Fisheries of India*. Hindustan Publ. Corporation, India.
9. Landau M. 1992. *Introduction to Aquaculture*. John Wiley & Sons.
10. Lovell RT.1998. *Nutrition and Feeding of fishes*. Chapman & Hall.
11. Mcvey JP. 1983. *Handbook of Mariculture*. CRC Press.
12. MPEDA: *Handbooks on culture of carp, shrimp, etc*.
13. New MB. 2000. *Freshwater Prawn Farming*. CRC Publ.
14. Pillay TVR.1990. *Aquaculture- Principles and Practices*, Fishing News Books Ltd., London.
15. Pillay TVR & Kutty MN. 2005. *Aquaculture- Principles and Practices*. 2nd Ed. Blackwell
16. Rath RK. 2000. *Freshwater Aquaculture*. Scientific Publ.
17. Stickney RR. 1979. *Principles of Warmwater Fish Culture*, John Wiley & Sons
18. Wheaton FW. 1977. *Aquacultural Engineering*. John Wiley & Sons.

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III B.Sc BZC

SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-1

PRINCIPLES OF AQUACULTURE

INTERNAL MARKS ALLOTMENT

Zoology Theory- Internal		**Total Marks: 40**
1. Internals (2)	:	10 marks
2. Assignments (2)	:	5x2=10 marks
3. Project	:	10 marks
4. Seminar	:	5 marks
5. Attendance	:	5 marks

EXTERNAL MARKS ALLOTMENT

Zoology Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40

11 to 15

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-1
PRINCIPLES OF AQUACULTURE

PRACTICAL MARKS ALLOTMENT

Zoology Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major experiment	:	8 marks
2. Minor experiment	:	6 marks
3. Identification	:	6 marks
4. Viva voce	:	5 marks

Zoology Practical's - Internal

Total Marks: 25

1. Assessment	:	10 marks
2. Record	:	10 marks
3. Field note book	:	5 marks

Question Paper Blue Print

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-1
PRINCIPLES OF AQUACULTURE

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

I. Short Questions : 5 x 4 = 20
II. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

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ZOOLOGY –CLUSTER ELECTIVE
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PRINCIPLES OF AQUACULTURE

Time: 2½ hrs

ax Marks: 60

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary
5x4=20M

1. Characters to be present in cultivable fishes పె`ంపకపు చేపల ప్రధాన లక్షణాలు
2. Brackish water fishes ఉప్పు నీటి చేపలు
3. Monoculture మోనోకల్చర్
4. Intensive fish culture సాంద్ర చేపల పెంపకము
5. Natural seed resources of fish చేపల విత్తనాల యొక్క వనరులు
6. Criteria for selection of site for Brackish water pond ఉప్పు నీటి చెరువుల నిర్మాణానికి స్థలం ఎంపిక
7. Algal blooms ఆల్గల్ బ్లూమ్
8. Liming సున్నం చల్లడం
9. Economic importance of seaweeds సముద్రపు కలుపు మొక్కల యొక్క ఆర్థిక ప్రాముఖ్యత
10. Artificial pearl culture కృత్రిమ ముత్యపు చిప్పల పెంపకము

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary
5x8=40M

11. (a) Define Aquaculture. Explain the significance and History of Aquaculture
ఆక్వా కల్చర్ ను నిర్వచించండి. ఆక్వా కల్చర్ యొక్క ప్రాముఖ్యత మరియు చరిత్రను వివరించండి

Or

(b) Explain major cultivable species of freshwater fishes
మంచినీటి చెరువులలో పెంచే వివిధ రకాల చేపలను వివరించండి

12. (a) Write an essay on Integrated fish culture
సమీకృత చేపల పెంపకము పై ఒక వ్యాసం వ్రాయండి

Or

(b) Explain pen culture and cage culture

పెన్ పి`ంపకము మరి' ఎ కేజి` పి`ంపకమి3 ివ్యయండి

13. (a) Write an essay on design and construction of fish farm

చరి´పల చరి`రిఠవిఠల రరిRపకలప న మరరి' ఌరి'రిింఠాెరి' ణ్రిిం పై ఒక వ్యిరిR సరి`రిిం
వ్యిరిండి

Or

(b) Explain the natural food and artificial feeds and their importance in fish culture

చరి´పల పి`రిింపక చరి`రిఠవిఠలలో అరిిందిరిించ రడరి´ సర్రి`హజ మరరి' ఌ
కరిృతిమ ఆహారాలు మరరి' ఌ రి' పమంఖ్రిR త్న య
వరి'వరరి'రిించరిండి

14. (a) Write an essay on pre stocking management of major carps

పధన కరరి`ప ల యొకక సారిª కి'రిింరి` రి'రిింరరి`రి'
హణర్ పై ఒక వ్యిరిR సరి`రిిం వ్యియిండి

Or

(b) Write an essay on culture of Macrobrachium rosenbergi

మాపర్రరచయరిిం రరిªసర్నర్బరి`రి పి`రిింపకము పై ఒక వ్యిరిR సరి`రిిం వ్యియరిండి

15. (a) Explain the culture of seaweeds

సర్రి`మంద్పు కలుపఠ మరిªకక ల యొకక పె`రిింపకము పై ఒక వ్యిరిR సరి`రిిం
వ్యియిండి

Or

(b) Write an essay on ornamental fish culture

ఆకిరి´ రరి'యరిిం చరి´పల పి`రిింపకము పై ఒక వ్యిరిR సర్రి`రిిం వ్యియిండి

III B.Sc BZC

SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-2

AQUACULTURE MANAGEMENT

Periods : 60 **Max.Marks : 100**

Unit – I

1.1 Breeding and Hatchery Management

1.1.1 Bundh Breeding and Induced breeding of carp by Hypophysation; and use of synthetic hormones

1.1.2 Types of fish hatcheries; Hatchery management of Indian major carps

1.1.3 Breeding and Hatchery management of *Penaeus monodon*/ *Litopenaeus vannamei*

1.1.4 Breeding and Hatchery management of giant freshwater prawn.

Unit – II

2.1 Water quality Management

2.1.1 Water quality and soil characteristics suitable for fish and shrimp culture

2.1.2 Identification of oxygen depletion problems and control mechanisms in culture ponds

2.1.3 Aeration: Principles of aeration and Emergency aeration

2.1.4 Liming materials, Organic manures and Inorganic fertilizers commonly used and their implications in fish ponds

ADDITIONAL INPUT: Waste management in aquaculture

Unit – III

3.1 Feed Management

3.1.1 Live Foods and their role in shrimp larval nutrition.

3.1.2 Supplementary feeds: Principal foods in artificial diets; Types of feeds; Feed additives and Preservatives; role of probiotics.

3.1.3 Feed formulation and manufacturing; Feed storage

3.1.4 Feeding strategies: Feeding devices, feeding schedules and ration size; Feed evaluation- feed conversion efficiencies and ratios

Unit – IV

4.1 Disease Management

4.1.1 Principles of disease diagnosis and health management;

4.1.2 Prophylaxis, Hygiene and Therapy of fish diseases

4.1.3 Specific and non-specific defense systems in fish; Fish immunization and vaccination

4.1.4Etiology, Symptoms, prophylaxis and therapy of common fish diseases in fish ponds

4.1.5Etiology, Symptoms, prophylaxis and therapy of common shrimp diseases in shrimp ponds

Unit – V

5.1 Economics and Marketing

5.1.1 Principles of aquaculture economics – Capital costs, variable costs, cost-benefit analysis

5.1.2Fish marketing methods in India; Basic concepts in demand and price analysis

5.2 Fisheries Extension

5.1.3 Fisheries Training and Education in India; Role of extension in community development.

5.3 Fish Genetics

5.1.4 Genetic improvement of fish stocks – Hybridization of fish.

5.1.5 Gynogenesis, Androgenesis, Polyploidy, Transgenic fish, Cryopreservation of gametes, Production of monosex and sterile fishes and their significance in aquaculture.

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SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-2

AQUACULTURE MANAGEMENT

PRACTICALS

Periods :24 **Max.Marks : 50**

Nutrition

1. Identification and study of Live food organisms – Any five
2. Formulation and preparation of a balanced fish feed
3. Estimation of Proximate composition of aquaculture feeds – Proteins, carbohydrates, lipids, moisture, ash content.
4. Gut content analysis to study artificial and natural food intake.

Post harvest Technology

1. Evaluation of fish/ fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products, examination of salt, protein, moisture in dried / cured products, examination of spoilage of dried / cured fish products, marinades, pickles, sauce.
3. Preparation of isinglass, collagen and chitosan from shrimp and crab shell. ?
4. Developing flow charts and exercises in identification of hazards – preparation of hazard analysis worksheet, plan form and corrective action procedures in processing of fish.

REFERENCE BOOKS

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SEMESTER-VI
ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-2
AQUACULTURE MANAGEMENT

INTERNAL MARKS ALLOTMENT

Zoology Theory- Internal	**Total Marks: 40**
1. Internals (2) marks	: 10
2. Assignments (2) marks	: 5x2=10
3. Project marks	: 10
4. Seminar marks	: 5
5. Attendance	: 5 marks

EXTERNAL MARKS ALLOTMENT

Zoology Theory- External **Total Marks: 60**

Section –A

I.	Short Answer questions (Any 5 from given 10) 1 to 10	5x4=20

Section –B

II.	Essay Questions (With internal choice) 11 to 15	5x8=40

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AQUACULTURE MANAGEMENT

PRACTICAL MARKS ALLOTMENT

Zoology Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major experiment : 8 marks
2. Minor experiment : 6 marks
3. Identification : 6 marks
4. Viva voce : 5 marks

Zoology Practical's - Internal

Total Marks: 25

1. Assessment : 10 marks
2. Record : 10 marks
3. Field note book : 5 marks

Question Paper Blue Print

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AQUACULTURE MANAGEMENT

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUSTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

I. Short Questions : 5 x 4 = 20
II. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

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SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-2

AQUACULTURE MANAGEMENT

Time: 2½ hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary
5x4=20M

1. Bundh breeding రంద్ పెంపకం
2. Induced breeding ప్రేరిత్ జననం
3. Water quality నీరు నాణ్యత
4. .Liming సున్నం చలుట్
5. Types of feeds మేతలురాకాలు
6. Probiotics ప్రయోజనకరమైన సూక్ష్మజీవులు
7. Fish Immunization చేప ఇమ్యునైజేషన్
8. Explain Disease Management principles in fish culture.
   చేపల పెంపకంలో వ్యాధి నిర్వహణ యొక్క సూత్రాలను వివరించండి
9. Cost-benefit analysis ఖర్చు-ప్రయోజన విశ్లేషణ
10. Transgenic fish జన్యు పరివర్తన చేప

SECTION – B

II. Answer any FIVE of the following **5x8 = 40M**
Draw neat labeled diagram wherever necessary.

11. (a) Describe hatchery management of Indian major carps.
    భారతీయ ప్రధాన మేజర్ కార్ప్ ల హేచరీ యాజమాన్య పద్ధతులు వివరించండి.

    (or)

    (b) Describe breeding and hatchery management of Penaeus monodon.
    పెనాయస్ మోనోడాన్ నందు సంతానోత్పత్తి మరియు హేచరీ యాజమాన్య పద్ధతులు వివరించండి
12. (a) Describe water quality and soil characteristics suitable for fish culture.
    చేపల పెంపకానికి అనువైన నీటి నాణ్యత మరియు నేల లక్షణాలను వివరించండి.

    (or)

    (b) Explain principles of aeration and emergency aeration.
    ఏరియేషన్ సూత్రాలను మరియు అత్యవసర ఏరియేషన్ గురించి తెలపండి

13. (a) Describe role of supplementary feeding in aquaculture.
ఆకరి కలి రరి లో అను రరింధ ఆహారరిరిం పాత్న య వరి'వరరి'రించరిండరి'.

(or)

(b) Explain the feed formulation and manufacturing
ఫీడ్స్ సర్రిRరి'కరరిణ్ మరరి' మ తయా రి'రిం వరి'వరరి'రించరిండి

14. (a) Explain symptoms, prophylaxis and therapy of any four common diseases in fishes.
చరి'పలలో ఏవరి న నాలుగిరి సాధరరిణ్ వ్యరిR ధరి3ల లక్షణాలు,
రరిగరి'రింరోధకత్ మరరి' మ చకరి'త్రి వరివరరించండి

(or)

(b) Explain symptoms, prophylaxis and therapy of any four common diseases in shrimps
రొయరిR లలో ఏదరి నా నాలుగిరి సాధరరిణ్ వ్యరిR ధరి3ల
లక్షణాలు, రరిగరి'రింరోధకత్ మరరి' మ చకరి'త్రి వరి'వరరి'రించరిండి

15. (a) Write an essay on demand and price analysis in aquaculture.
గరకి మరరి' మ సర్రిరరిపరా మధరిR గల వరి'రషణ్గురరి'రించ వ్యయరిండి

(or)

(b) Explain Fisheries training and Education in India.
భరరితరిదరి'రంలో గల మత్రిR శరి'క్షణ్ మరరి' మ వరి'ద్రిR గురరి'రించ తెలప రిండి

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3
POSTHARVEST TECHNOLOGY

Periods : 60 **Max.Marks : 100**

Unit – I

1.1 Handling and Principles of fish Preservation

1.1.1 Handling of fresh fish, storage and transport of fresh fish, post mortem changes (rigor mortis and spoilage), spoilage in marine fish and freshwater fish.

1.1.2 Principles of preservation– cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to lowradiation of gamma rays.

Unit – II

2.1 Methods of fish Preservation

2.1.1 Traditional methods - sun drying, salt curing, pickling and smoking.

2.1.2 Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, Irradiation and Accelerated Freeze drying (AFD).

Unit – III

3.1 Processing and preservation of fish and fish by-products

3.1.1 Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

3.1.2 Fish by-products – fish glue, ising glass, chitosan, pearl essence, shark fins, fish leather and fish maws.

3.2Seaweed Products

3.2.1 Preparation of agar, algin and carrageen. Use of seaweeds as food for humanconsumption, in diseasetreatment and preparation of therapeutic drugs.

ADDITIONAL INPUT: Cold storage units

Unit – IV

4.1Sanitation and Quality control

4.2.1 Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants.

4.2.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

4.2 Regulatory affairs in industries

Unit – V

5.1 Quality Assurance, Management and Certification

5.1.1 Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

5.1.2 National and International standards – ISO 9000: 2000 Series of Quality Assurance System, *Codex Alimentarius*.

REFERENCE BOOKS

1. Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.
2. Clucas IJ. 1981. *Fish Handling, Preservation and Processing in the Tropics*. Parts I, II. FAO.
3. Gopakumar K. (Ed.). 2002. *Text Book of Fish Processing Technology*. ICAR.
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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3

POSTHARVEST TECHNOLOGY

PRACTICAL - III

Max Marks-50

Project Work

1. Visit to a fish breeding centre / fish farms and submit a project report

   or
2. Visit to a feed manufacturing unit and submit a project report

   or
3. Visit to a shrimp hatchery / shrimp farms and submit a project report

   or
4. Visit to a shrimp processing unit and submit a project report

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3
POSTHARVEST TECHNOLOGY

INTERNAL MARKS ALLOTMENT

Zoology Theory- Internal	**Total Marks: 40**
1. Internals (2) marks	: 10
2. Assignments (2) marks	: 5x2=10
3. Project marks	: 10
4. Seminar marks	: 5
5. Attendance	: 5 marks

EXTERNAL MARKS ALLOTMENT

Zoology Theory- External **Total Marks: 60**

Section –A

1. Short Answer questions (Any 5 from given 10) 1 to 10 — 5x4=20

Section –B

2. Essay Questions (With internal choice) 11 to 15 — 5x8=40

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3

POSTHARVEST TECHNOLOGY

PRACTICAL MARKS ALLOTMENT

Zoology Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major experiment : 8 marks
2. Minor experiment : 6 marks
3. Identification : 6 marks
4. Viva voce : 5 marks

Zoology Practical's - Internal

Total Marks: 25

1. Assessment : 10 marks
2. Record : 10 marks
3. Field note book : 5 marks

Question Paper Blue Print

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ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3
POSTHARVEST TECHNOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT –I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,

Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,

Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

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SEMESTER-VI

ZOOLOGY –CLUSTER ELECTIVE - PAPER – VIII-B-3

POSTHARVEST TECHNOLOGY

Time: 2½ hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Handling of fresh fish తాజా చేపలను పట్టడానంతర నిర్వహణ
2. Rigor mortis రిగర్ మోర్టిస్
3. Smoking ధూమీకరణము
4. Canning డబ్బాలలో రక్షణ
5. Fish oil చేప నూనె
6. Sea weeds which are useful for human consumption
   మానవ వినియోగానికి ఉపయోగపడే సముద్ర కలుపు మొక్కలు
7. Personal hygiene in processing plants ప్రాసెసింగ్ ప్లాంట్లలో వ్యక్తిగత పరిశుభ్రత
8. Regulatory affairs in industry పరిశ్రమలలో రెగ్యులేటరీ వ్యవహారాలు
9. Good Laboratory Practices GLPs మంచి ప్రయోగశాల పద్ధతులు
10. Codex alimentarius కోడెక్స్ ఎలిమెంటేరియస్

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. (a) Describe the spoilages in marine fish.
    సముద్ర చేప కుళ్ళు పట్ల వివరణమును వివరించండి.

    (OR)

    (b) Write an essay on Principles of preservation in fish
    చేపలకింది చర్చ పద్ధతులు గురించి వ్యాసం రాయండి

12. (a) What are the Traditional methods used in preservation.
    సాంప్రదాయ పద్ధతులలో చేపలకింది చర్చ పద్ధతి

    (OR)

(b) What are the advanced methods used in preservation.
అధునాతన పద్ధతులలో చేపలకింది చర్చ పద్ధతి

ీ3ల గూరి’ీ’ ప్రవ్యయిండి

ీ3ల గూరి’ీ’ ప్రవ్యయిండి

13. (a) Write about the different types of fish by products

వివిధ రకాలైన చేపల ఉత్పత్తుల గురించి వ్రాయండి

(OR)

(b) Write in detail about the preparation of agar

అగర్ తయారీ విధానమును వ్రాయండి

14. (a) Explain about Environmental hygiene in processing plants

ఆహార పదార్థాల ప్రాసెసింగ్ పరిశ్రమలో పాటించవలసిన పరిశుభ్రతా ప్రమాణాల గురించి వివరించండి

(OR)

(b) Write about the Quality control in fish and fish products

చేప మరియు చేపల ఉత్పత్తులలో నాణ్యత నియంత్రణ గురించి వ్రాయండి

15. (a) Explain Good Manufacturing Practices GMPs in processing plants

ఆహార పదార్థాల ప్రాసెసింగ్ పరిశ్రమలో మంచి తయారీ పద్ధతులను వివరించండి

(OR)

(b) Explain Hazard Analysis and critical control points in sea food safety

సముద్ర ఆహార రక్షణలో హజార్డ్ విశ్లేషణ మరియు కీలక నియంత్రణ పాయింట్లను వివరించండి

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EATZC- ZOOLOGY SYLLABUS

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Periods: 60 **Max. Marks:100**

Unit I: Biomolecules

1.1 Carbohydrates - Classification of carbohydrates. Structure of glucose

1.2 Proteins - Classification of proteins. General properties of amino acids

1.3 Lipids - Classification of lipids

1.4 Nucleic acids - DNA – Structure and function; RNA - Structure, types and functions

Unit II: Enzymes and Cellular Metabolism

2.1. Introduction to biocatalysis, Enzymes and their classification, Enzyme kinetics. Mechanism of action. Inhibition and Regulation

2.2 Carbohydrate Metabolism - Glycolysis, Krebs Cycle, Gluconeogenesis,

2.3 Glycogen metabolism, Review of electron transport chain

Unit - III : Cellular Metabolism and Cell Physiology

3.1 Lipid Metabolism - Biosynthesis and β oxidation of palmitic acid

3.2 Protein metabolism - Transamination, Deamination and Urea Cycle

3.3 Transport functions of plasma membrane – Active, passive and facilitated transport

3.4 Cell junctions – Tight junctions, desmosomes, gap junctions

Unit-IV: DNA as genetic material

4.1 DNA structure, types (A,B,Z); DNA as genetic material (Griffith's Transformation, Hershey Chase experiment, McKarthy experiment)

4.2 Fine structure of gene

Unit – V:Gene Expression

5.1 Gene Expression in prokaryotes (Lac Operon)

5.2 Gene Expression in eukaryotes.

5.3 Transcription and Translation.

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EATZC- ZOOLOGY PRACTICAL SYLLABUS

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Periods: 24 **Max. Marks: 50**

1. Qualitative tests to identify functional groups of carbohydrates in given Solutions (Glucose, Fructose, Sucrose, Lactose)
2. Estimation of total protein in given solutions by Lowry's method.
3. Study of activity of salivary amylase under optimum conditions
4. Preparation of permanent slide to show the presence of Barr body in Human female blood cells or cheek cells
5. Mounting of salivary gland chromosomes of *Chiranomous*

Reference Books:

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Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IVEdition. W.H. Freeman and Co.

Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Karp, G. (2010), Cell and molecular biology : Concepts and experiments. VI edition. John Wiley and sons. Inc.

De Robertis, EDP and De Robertis EMF (2006). Cell and molecular biology. VIII edition. Lippincott Williams and Wilkins, Philadelphia Biochemistry. XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Theory- Internal	**Total Marks: 40**
1. Internals (2)	: 10 marks
2. Assignments (2)	: 10 marks
3. Project	: 10 marks
4. Seminar	: 10 marks

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40
11 to 15

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Practical's – External **Total Marks : 25**

Project work/on-job training at industry-

Practical's – Internal **Total Marks: 25**

1 .Assessment	:	10 marks
2. Record	:	10 marks
3. Vivo Voce	:	5 marks

Question Paper Blue Print

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY THEORY

SEMESTER-V

PAPER – V
CELLULAR METABOLISM AND MOLECULAR BIOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.
Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

MODEL QUESTION PAPER

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- ZOOLOGY

SEMESTER-V

PAPER – V

CELLULAR METABOLISM AND MOLECULAR BIOLOGY

Time: 3 hrs **Max. Marks: 60**

I. Answer any FIVE of the following: **4x5=20**

Draw labeled diagrams wherever necessary

1. Structure of Glucose
2. Properties of amino acids
3. Enzyme inhibition
4. Glycolysis
5. Desmosomes
6. Urea cycle
7. Hershey chase experiment
8. Types of DNA
9. Lac operon
10. Transcription

II. Answer any FIVE of the following: **5x8=40**

Draw labeled diagrams wherever necessary

11. A. Write about the classification of lipids

OR

B. Explain the structure and functions of types of RNA

12. A. Write an essay on krebs cycle

OR

B. Describe the process of glycogen metabolism

13. A. Describe the biosynthesis and β-oxidation of palmitic acid

OR

B. Write an essay on transport functions of plasma membrane

14. A. Justify DNA as a genetic material

OR

B. Describe the fine structure of a gene

15. A. Explain the process of gene expression in prokaryotes

OR

B. Explain the process of gene expression in eukaryotes

□□□□□

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- ZOOLOGY PRACTICAL SYLLABUS

SEMESTER-V

PAPER – VI

HAEMATOLOGY

Hours 60 Marks 100

UNIT – I: Laboratory Preparation in Haematology: 10 Hours

Introduction to practical. Basic requirements. Collection of blood. Anticoagulants and effects of anticoagulants on blood cell morphology. Effects of storage of blood.

UNIT – II: Routine Haematology: 15 Hours

Composition of blood. Haemoglobin synthesis. Various haemoglobins. Haemopoietic system of the body. Blood cell counts. Erythropoiesis, Leucopoiesis and development of blood corpuscles. Thrombopoiesis. Laboratory technique of haemocytometry. Clinical significance of Total erythrocyte count, total leucocyte count, differential count, erythrocyte sedimentation rate and platelet count.

UNIT – III: Haemostasis and Haematological Diseases: 15 Hours

General consideration of blood coagulation. Mechanism of coagulation. The fibrinolytic mechanism. Clinical significance of routine coagulation tests. Anaemia. Various types of anaemias – Iron deficiency anaemia, Aplastic anaemia, Perinicious anaemia, Sideroblastic anaemia and Sickel cell anaemia. Other haematological diseases – HDNB, Thalassaemia, Leukaemia.

UNIT- IV: Automation in Haematology: 10 Hours

General considerations. Blood cell counters. Flow through cytochemical differential counter. Automated coagulated systems.

UNIT - V: Immunohaematology and Blood banking: 10 Hours

Human Blood Group Systems. Inheritance of blood group systems. Blood transfusion.

Deleted topics

Parasitic infections of blood – structure and life cycle of Plasmodium vivax, types of malaria, Structure and life cycle of Wuchereria bancrofti.

Reference Books

- Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
- Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
- Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
- Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
- Robbins and Cortan, Pathologic Basis of Disease, VIIIEdition.
- Prakash, G. (2012), Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- ZOOLOGY PRACTICAL SYLLABUS

SEMESTER-V

PAPER – VI

HAEMATOLOGY

- Routine haematological tests – Blood smear preparation, TC, DC, ESR, Platelet count.
- 6Determination of Haemoglobin.
- 7Determination of PCV.
- 8Determination of bleeding time.
- 9Determination of blood clotting time.
- 10Blood Grouping.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

HAEMATOLOGY

Theory- Internal	**Total Marks: 40**
1. Internals (2)	: 10 marks
2. Assignments (2)	: 10 marks
3. Project	: 10 marks
4. Seminar	: 10 marks

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

HAEMATOLOGY

Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40
11 to 15

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

HAEMATOLOGY

Practical's – External **Total Marks : 25**

Project work/on-job training at industry-

Practical's – Internal **Total Marks: 25**

1 .Assessment	:	10 marks
2. Record	:	10 marks
3. Vivo Voce	:	5 marks

Question Paper Blue Print

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) ZOOLOGY THEORY

SEMESTER-V

PAPER – V

HAEMATOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.
Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

MODEL PAPER

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- ZOOLOGY

SEMESTER-V

PAPER – VI

HAEMATOLOGY

Time: 3 hrs **Max. Marks: 60**

I. Answer any FIVE of the following: **4 x5=20**

Draw labeled diagrams wherever necessary

1. Effect of coagulants on storage of blood
2. Erythropoiesis
3. Functions of Blood
4. Types of Haemoglobin
5. Hemolytic disease of newborn
6. Leukaemia
7. Electrical blood cell counter
8. Flow cytometry cell counter
9. Rh blood grouping
10. Blood transfusion

II. Answer any FIVE of the following: **5x8=40**

Draw labeled diagrams wherever necessary

11. A. Write an essay on anticoagulants and their effect on blood cell morphology

OR

B. Write an essay on effects of storage of blood

12. A. Write an essay on synthesis of haemoglobin

OR

B. Write an essay on composition of blood

13. A. Write essay on mechanism of blood coagulation

OR

B. Write an essay on various types of anaemia

14. A. Write an essay on general consideration of automation in hematology

OR

B. Write an essay on blood cell counter

15. A. Write an essay on human blood grouping system

OR

B.Write an essay on Inheritance of blood groups

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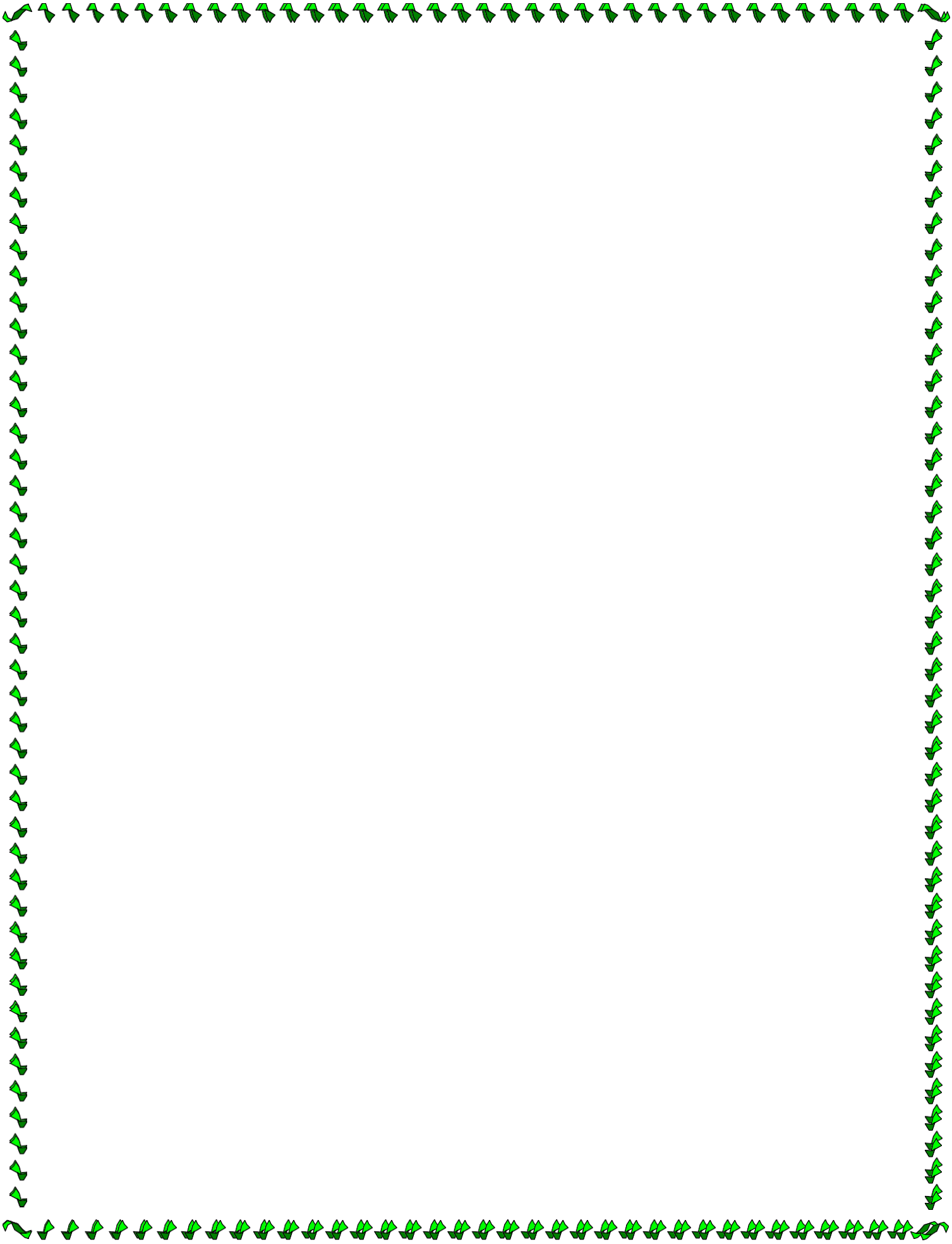

Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- AQUACULTURE TECHNOLOGY SYLLABUS
SEMESTER-V
PAPER – V
FISH HEALTH MANGEMENT

UNIT I: PATHOLOGY AND PARASITOLOGY

1-1 Introduction to fish diseases –Definition and categories of diseases – Disease and environment
1-2 Disturbance in cell structure – changes in cell metabolism, progressive and retrogressive tissue changes, types of degeneration, infiltration, necrosis, cell death and causes
1-3 Atrophy, hypertrophy, neoplasms, inflammation, healing and repair

UNIT II: DISEASES OF FIN FISH

2-1 Fungal diseases (both of shell and finfish) – Saprolegniosis, brachiomycosis, ichthyophorus diseases – Lagenidium diseases – Fusarium disease, prevention and therapy
2-2 Viral diseases – Emerging viral diseases in fish, haemorrhagic scepticemia, spring viremia of carps, infectious hematopoietic necrosis in trout, infectious pancreatic necrosis in salmonids, swim-bladder inflammation in cyprinids, channel cat fish viral disease, prevention and therapy
2-3 Baterial diseases – Emerging bacterial diseases, aermonas, pseudomonas and vibrio infections, columnaris, furunculosis, epizootic ulcerative syndrome, infectious abdominal dropsy, bacterial gill disease, enteric red mouth, bacterial kidney disease, proliferative kidney disease, prevention and therapy

UNIT III: DISEASES OF SHELL FISH

3-1 Major shrimp viral diseases – Bacculovirus penaeii, Monodon Bacculovirus, Bacculoviral midgut necrosis, Infectious hypodermal and haematopoietic necrosis virus, Hepatopancreatic parvo like virus, Yellow head bacculovirus, white spot bacculovirus.
3-2 Bacterial diseases of shell fish – aeromonas, pseudomonas and vibrio infections, luminous bacterial disease, filamentous bacterial disease. Prevention and therapy
3-3 Protozoan diseases- Ichthyophthiriasis, Costiasis, whirling disea/ses, trypanosomiasis. Prevention and therapy

UNIT IV: NUTRITIONAL DISEASES

4-1 Nutritional pathology – lipid liver degeneration, Vitamin and mineral deficiency diseases. Aflatoxin and dinoflagellates.
4-2 Antibiotic and chemotherapeutics. Nutritional cataract. Genetically and environmentally induced diseases.

UNIT V: FISH HEALTH MANAGEMENT

5-1 Diagnostic tools – immune detection- DNA/RNA techniques, General preventive methods and prophylaxis. Application and development of vaccines.
5-2 Quarantine – Significance, methods and regulations for transplants.
5-3 Production of disease-free seeds. Evaluation criteria of healthy seeds.
5-4 Good Feed management for healthy organisms, Zero water exchange, Probiotics in health management, Issues of biosecurity.

Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

EATZC- AQUACULTURE TECHNOLOGY PRACTICAL SYLLABUS

SEMESTER-V

PAPER – V

FISH HEALTH MANGEMENT

Periods: 24 **Max. Marks: 50**

1. Enumeration of Bacteria by TPC Method
2. Enumeration of total Coliforms
3. Observation of gross pathology and external lesions of fish and prawn with reference to the common diseases in aquaculture
4. Examination of pathological changes in gills and gut lumen, lymphoid organ, muscles and nerves of fish
5. Examination of pathological changes in gut lumen, hepatopncreas, lymphoid organ, muscles and nerves of prawn and shrimp
6. Collection, processing and analysis of data for epedemeiological investigations of viral diseases
7. Bacterial pathogens – isolation, culture and characterization
8. Identification of parasites in fishes: Protozoan, Helmiths, Crustaceans
9. Antibiograms – preparation and evaluation
10. Molecular and immunological techniques; Biochemical tests; PCR; ELISA; Agglutination test; Challenge tests; Purification of virus for development of vaccines (Demonstration at institutes/labs)
11. Estimation of dose, calculation of concentration, methods of administration of various chemotherapeutics to fish and shell fish
12. Estimation of antibiotics used in aquaculture practices
13. Estimation of probiotics used in aquaculture
14. Field visit to farm for health monitoring and disease diagnosis

PRESCRIBED BOOK(S):

1. Shaperclaus W. 1991 Fish Diseases- Vol.I & II. Oxonian Press Pvt.ltd
2. Roberts RJ 1989. Fish pathology. Bailliere Tindall, New York
3. Lydia Brown 1993. Aquaculture for veterinarians- fish husbandray and medicine. Pergamon Press. Oxford

REFERENCES:

1. Shankar KM & Mohan CV. 2002. Fish and Shellfish Health Management. UNESCO Publ. Sindermann CJ. 1990
2. Walker P & Subasinghe RP. (Eds.). 2005 Principal Diseases of Marine Fish and Shellfish. Vols. I, II. 2nd Ed. Academic Press
3. DNA Based Molecular Diagnostic Techniques: Research Needs for Standardization and Validation of the Detection of Aquatic Animal Pathogens and Diseases. FAO Publ. Wedmeyer G, Meyer FP & Smith L. 1999.
4. Bullock G et.al., 1972 Bacterial diseases of fishes. TFH publications, New Jersey
5. Post G 1987. Text book of Fish Health. TFH publications, New Jersey
6. Johnson SK 1995. Handbook of shrimp diseases. Texas A & M University, Texas

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

FISH HEALTH MANGEMENT

Theory- Internal **Total Marks: 40**

1. Internals (2)	:	10 marks
2. Assignments (2)	:	10 marks
3. Project	:	10 marks
4. Seminar	:	5 marks
5. Attendance	:	5 marks

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

FISH HEALTH MANGEMENT

Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40
11 to 15

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

FISH HEALTH MANGEMENT

Practical's - External

Time: 3 hrs. **Total Marks: 25**

1. Major experiment	:	8 marks
2. Minor experiment	:	6 marks
3.Identification	:	6 marks
4. Viva voce	:	5 marks

Practical's – Internal **Total Marks: 25**

1.Assessment	:	10 marks
2.Record	:	10 marks
3.Field note book	:	5 marks

Question Paper Blue Print

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER-V
PAPER – V
FISH HEALTH MANGEMENT
BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.
Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper **Course code:**

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER-V
PAPER – V
FISH HEALTH MANAGEMENT

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Necrosis
2. Inflammation
3. Aermonas in Fin fish
4. Fusarium in Fin fish
5. Costiasis in shell fish
6. Yellow head bacculovirus in shell fish
7. Aflatoxin
8. Zero water exchange
9. Mineral deficiency
10. Probiotics

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Explain progesssive and retrogressive tissue changes in fish.
(or)
b. Describe cell death and causes in fish

12. a. Explain any three fungal diseases in fin fish with preventive and therapeutic measures.
(or)
b. Describe spring viremia of carps and infectious pancreatic necrosis in Salmonids.

13. a. Explain any three viral diseases in shell fish.
(or)
b. Explain preventive and therapaeutic measeures of protozoan diseases in shell fish.

14. a. Describe vitamin deficiency diseases in Fin fish.
(or)
b. Explain genetically induced diseases in Fin fish

15. a. Describe immune detection techniques used in shell fish
(or)
b. Write an account on Probiotics in health management of shell fish.

Course code:

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY SYLLABUS
SEMESTER-V
PAPER – VI
FISHERIES EXTENSION, ECONOMICS & MARKETING

Periods: 60 **Max. marks: 100**

UNIT – 1 INTRODUCTION

1-1 Meaning and scope of economics with reference to fisheries

1-2 Basic concepts of economics – goods, services, wants and utility, demand and supply, value price, market demand and individual demand, elasticity of demand**,** law of diminishing marginal utility

1-3 Theory of production, production function in fisheries

1-4 Various factors influencing the fishery product's price

UNIT – I1 FISHERIES MARKETING

2-1 Basic marketing functions, consumer behaviour and demand, fishery market survey and test marketing a product

2-2 Fish marketing – prices and price determination of fishes

2-3 Marketing institutions- primary(producer fishermen, fishermen cooperatives, and fisheries corporations) and secondary (merchant/agent/speculative middlemen)

2-4 Methods of economic analysis of business organizations

2-5 Preparation of project and project appraisal

UNIT-III FISHERIES ECONOMICS

3-1 Aquaculture economics- application of economics principles to aquaculture operations

3-2 Various inputs and production function. Assumptions of production function in aquaculture analysis, least cost combination of inputs, laws of variable proportions

3-3 Cost and earnings of aquaculture systems – carp culture, shrimp farming systems, hatcheries, Cost and earnings of fishing units and freezing plants

3-4 Socio-economic conditions of fishermen in Andhra Pradesh, Role of Matsyafed and NABARD in uplifting fishermen's conditions, fishermen cooperatives

3-5 Contribution of fisheries to the national economy

UNIT-IV FISHERIES EXTENSION

4-1 Fisheries extension – scope and objectives, principles and features of fisheries extension education

4-1.1 Fisheries extension methods and rural development

4-3 Adoption and diffusion of innovations

UNIT-V TRANSFER OF TECHNOLOGY

5-1 ICAR programs – salient features of ORP, NDS, LLP, IRDP, ITDA, KVK, FFDA, FCS, FTI, TRYSEM

5-2 Training – meaning, training vs. education and teaching

5-3 DAATT centres and their role in tot programs, video conferencing, education of farmers through print and electronic media

Course code:

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
PRACTICAL SYLLABUS
SEMESTER-V
PAPER – VI
FISHERIES EXTENSION, ECONOMICS & MARKETING

Periods: 24 **Max. Marks: 50**

Project work/on-job training at industry

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PRESCRIBED BOOK(S):

1. Adivi Reddy sv 1997. An introduction to extension education. Oxford & IBH Co.Pvt. Ltd. New Delhi
2. Jayaraman R 1996. Fisheries Economics. Tamilnadu Veterinary and Animal Science University. Tuticorn
3. Subba Rao N 1986. Economics of Fisheries. Daya publishing house, Delhi

REFERENCES:

1. Dewwett KK and Varma JD 1993. Elementary economic theory. S.chand, New Delhi
2. Korakandy R 1996. Economics of Fisheries Mangement. Daya Publishing House, Delhi
3. Tripathi SD 1992. Aquaculture Economics. Asian Fisheries Society, Mangalore.

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SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

INTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

FISHERIES EXTENSION, ECONOMICS & MARKETING

Theory- Internal	**Total Marks: 40**	
1. Internals (2)	:	10 marks
2. Assignments (2)	:	10 marks
3. Project	:	10 marks
4. Seminar	:	5 marks
5. Attendance	:	5 marks

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

EXTERNAL MARKS ALLOTMENT

SEMESTER-V

PAPER – V

FISHERIES EXTENSION, ECONOMICS & MARKETING

Theory- External **Total Marks: 60**

Section –A

I. Short Answer questions (Any 5 from given 10) 5x4=20
1 to 10

Section –B

II. Essay Questions (With internal choice) 5x8=40
11 to 15

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY

PRACTICAL MARKS ALLOTMENT

SEMESTER-V

PAPER – VI

FISHERIES EXTENSION, ECONOMICS & MARKETING

Practical's – External **Total Marks : 25**

Project work/on-job training at industry-

Practical's – Internal **Total Marks: 25**

1 .Assessment	:	10 marks
2. Record	:	10 marks
3. Vivo Voce	:	5 marks

Question Paper Blue Print

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY THEORY

SEMESTER-V

PAPER – V

FISHERIES EXTENSION, ECONOMICS & MARKETING

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper **Course code:**

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER-V
PAPER – VI
FISHERIES EXTENSION, ECONOMICS AND MARKETING

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Value price
2. Market demand and individual demand
3. Fishery market survey
4. Fishermen cooperatives
5. Role of NABARD in fisheries
6. Contribution of fisheries to the national economy
7. Scope and objective of fisheries extension education
8. Adoption of innovation
9. Education of farmers through electronic media
10. LLP-Lab to Land Programme

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Explain various factors influencing the fishery products price.
(or)
b. Describe the theory of production in relation to fisheries

12. a. Describe price determination of fishes in market.
(or)
b. Explain basic marketing functions of fish.

13. a. Explain cost and earning of shrimp farming systems.
(or)
b. Explain the role of Matsyafed in uplifting fishermen's condition.

14. a. Explain scope and objectives of fisheries extension education.
(or)
b. Explain fisheries extension methods

15. a. Describe the salient features of FFDA
(or)
b. Explain the role DAATT centers and their role in tot programs.

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc ATZC
AQUACULTURE TECHNOLOGY - SUBJECT ELECTIVE SYLLABUS
SEMESTER-VI
PAPER-VII A
ORNAMENTAL FISHERY

UNIT I: INTRODUCTION

1-1 Aquarium and ornamental fishes – introduction
1-2 Present status of Aquarium trade in the world and India
1-3 Aquarium accessories – aerators, filters, lighters and heaters
1-4 Water quality needs and different kinds of feeds

UNIT II: FRESH WATER ORNAMENTAL FISHES

2-1 Live bearers, gold fish, koi, gourami, barbs and tetras, angel fish and cichlid fish
2-2 Brood stock development, breeding, larval rearing and grow out
2-3 Larval feeds and feeding

UNIT III: MARINE ORNAMENTAL FISHES

3-1 Varieties and habitat of marine ornamental fishes
3-2 major marine ornamental fish resources of India
3-3 Collection and transportation of live fish, use of anaesthetics
3-4 Breeding of marine ornamental fish
3-5 Other aquarium animals – sea anemones, lobsters, worms, shrimps, octopus and starfish

UNIT IV: AQUARIUM MANAGEMENT

4-1 Setting up fresh water, marine and reef aquariums
4-2 Water quality management for different types of aquariums
4-3 Common diseases of aquarium fish, diagnosis \\and treatment
4-4 Temperature acclimatization and oxygen packing for aquarium fish

UNIT V: COMMERCIAL PRODUCTION OF AQUARIUM FISH AND PLANTS

5-1 Commercial production units of ornamental fish- requirements and design
5-2 Commercial production of goldfish, live bearers, gouramies, barbs, angels and tetras
5-3 Mass production of aquarium plants
5-4 Retail marketing and export of ornamental fish

REFERENCES:

1. Jameson JD and Santhanan R 1996. Manual of ornamental fishes and farming technologies, Fisheries College and research institute, Tuticorn
2. Stephen Spotte 1993. Marine aquarium keeping. John wiley and sons, USA

PRESCRIBED BOOK(S):

1. Dick Mills 1998. Aquarium fishes, Dorling Kindersly Ltd, London
2. Van Ramshort JD 1978. The complete aquarium encyclopaedia, Elseveir

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III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER VI
SUBJECT ELECTIVE
PAPER-VIIA
ORNAMENTAL FISHERY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.
Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

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III B.Sc ATZC

AQUACULTURE TECHNOLOGY - SUBJECT ELECTIVE

SEMESTER VI – PAPER-VIIA

ORNAMENTAL FISHERY

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Present status of aquarium in India
2. Nitrogen cycle
3. Gold fish
4. Larval feeds
5. Use of anaesthetics
6. Natural breeding in marine ornamental fish
7. Tetras
8. Design of ornamental unit
9. Bat fish
10. Eichhornia

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Explain various accessories used in aquarium
(or)
b. Explain any four water quality parameters used in fresh water aquarium

12. a. Explain brood stouc development in ornamental fish
(or)
b. Describe any four live bearers of ornamental fish

13. a. Describe collection & transportation of live fish
(or)
b. Explain major marine ornamental fish resources of india

14. a. Explain any four bacterial diseases in aquarium fish
(or)
b. Describe water quality management of freshwater aquarium fishes

15. a. Explain commercial production of gold fish
(or)
b. Explain production of aquarium plants

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SYLLABUS FOR CLUSTER ELECTIVE –VIII-1
SEMESTER-VI

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc ATZC
SEMESTER VI
CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY
PAPER VIII – 1A
FISH PROCESSING TECHNOLOGY

Unit 1

Introduction: Principles of fish preservation. Importance of hygiene and sanitation in fish handling. Quality of water and ice in fish handling and processing. Preparation of ice. Different types of ice used in the seafood industry and their merits. Preservation by refrigerated seawater and chilled sea water

Unit 2

Freezing and Canning: Fundamental principles involved in chilling and freezing of fish and fishery products. Various freezing methods. Freezing of shrimps and fishes. Changes during the cold storage of fish and fishery products. Principles involved in canning of fish. Different types of containers. Different stages of canning of Tuna. Retortable pouch processing.

Unit 3

Drying, Smoking and Freeze-drying: (9 Hrs) Principles of smoking, drying and salting of fish, factors affecting drying. Traditional drying / curing methods. Different types of drying. Drying of fish and prawns. Packing and storage of dried products. Spoilage of dried products. Preventive measures. Standards for dry fish products. Cold smoking. Principles of freeze drying. Accelerated freeze drying and packing of freeze dried products. Modern methods of preservation by irradiation and modified atmospheric storage.

Unit 4

Packing, Cold Storage and Export of Fishery Products: Functions of packing. Different types of packing materials and its quality evaluation. Packing requirements for frozen and cured products. Statutory requirements for packing. Labeling requirements. Different types of cold storages. Insulated and refrigerated vehicles.

Unit 5

Export of fishery products from India - major countries, important products, export documents and procedures. Prospects and constraints in export including tariff and non- tariff barriers, marine insurance, export incentives, registered exporters

Reference Books:

1. A.M.Martin, Fisheries – Processing Chapman & Hall, Madras
2. Ed.G.M.Hall –Fish Processing Technology Chopra & Hall. Madras.

Text books:

1. K.Gopakumar, Fish Processing Technology, ICAR, New Delhi
2. T.K. Govindan, Fish Processing Technology Oxfor & IBH Publication Co.
3. K.K. Balachandran Fish Canning – Principles & Practices.
4. Borgstrom,G. Fish as Food.
5. K.K. Balachandran, Postharvest Technology in Fish and Fishery Products.
6. Moorjani,M.V. Fish Processing in India.
7. Connell,J.J. Advances in Fishery science and Technology.
8. CIFT. Manual of Quality Control in Fish and Fishery Products.
9. Gopakumar,K. Fish Packaging Technology

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III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY

SEMESTER VI

CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY

PAPER VIII – 1A

FISH PROCESSING TECHNOLOGY

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A Short Questions			Section B Essay Questions		
	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS	NO OF QUESTIONS	MARKS ALLOTED FOR EACH QUESTION	TOTAL MARKS
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
UNIT-III	02	4	8	02	8	16
UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.

Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY

SEMESTER VI

CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY

PAPER VIII – 1A

FISH PROCESSING TECHNOLOGY

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Types of ice used in sea food industry
2. Chilled sea water preservation
3. Canning
4. Types of containers
5. Smoking
6. Traditional drying
7. Low density poly ethylene(LDPE) & High density poly ethylene(HDPE)
8. Insulated vehicles
9. Marine insurance
10. Export incentives

SECTION-B

II. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Describe three methods of storing fish in ice on fishing vessels
(or)
b. Explain importance of hygiene & sanitation in fish handling
12. a. Explain principle, methods & application in freezing of fish
(or)
b. Explain principles involved in canning of fish
13. a. Explain salting & drying methods in fish preservation
(or)
b. Explain different packing & storage methods of fish & prawn dried products
14. a. Explain packing used in freshwater fish processing
(or)
b. Describe different types of cold storages
15. a. Discuss export documents & procedures of fish & prawn
(or)
b. Discuss tariff & non-tariff barriers in exporting fish & prawn

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SEMESTER VI
CLUSTER ELECTIVE – 1-POST HARVEST TECHNOLOGY
PAPER VIII – 1B
FISHERY MICROBIOLOGY AND FISHERY BY-PRODUCTS

Unit 1:

Introduction: History and development of microbiology –Different members of the microbial community – General characteristics of bacteria, fungi, viruses, algae and protozoans.

Ultrastructure of prokaryotic cell – structure and function of bacterial cell wall, plasmamembrane, capsule, flagella and endospore. Structure of fungi and yeast cell. Ultrastructure of virus – classification of viruses, Llfe cycle bacteriophages - lytic and lysogenic cycle.

Unit 2:

Aquatic Microbiology: Microflora of aquatic environment, Different culture techniques.

Nutrition and growth of bacteria – different types of media for isolation of bacteria and fungi.

Isolation, enumeration, preservation and maintenance of cultures. Routine tests for identification of bacteria – morphological, cultural biocehemical and serological. Basics of mycological and virologial techniques.

Unit 3:

Fish Microbiology: Perishability of seafood – Fish as an excellent medium for growth of microorganisms. Spoilage microflora of fish and shellfish. Intrinsic and extrinsic factors affecting spoilage.

Unit 4:

Fishery By-Products: Fish meal, fish protein concentrate, shark fin rays, fish maws, isinglass, fish liver oil, fish body oil, fish hydrolysates, chitin, chitosan, glucosamine hydrochloride, squalene, pearl essence, ambergris, gelatin, beche-de-mer, fish silage, fish ensilage and seaweed products like agar, alginic acid and carragenan.

Unit 5:

Value Added Products. Value addition in sea food. Different types of value added products from fish and shell fishes – status of value addition in Indian seafood sector. Advantages of value addition. Fish mince and Surimi. Analog and fabricated products. Preparation of coated fishery products. Different types of batter and breading and its applications. Preparation of products viz. fish / prawn pickle, fish wafers, prawn chutney powder, fish soup powder, fish protein hydrolysate, fish stacks, fillets, fish curry, mussel products, marinated products.

Text Books:

1. Pelzar, Reid & Chan – Microbiology
2. Prescolt, Harley & Klein – Microbiology
3. Adelogerg, Ingra & Wheates – Introduction to Microbial World
4. Windsor and Barlow. Introduction to Fishery Byproducts.
5. CIFT. Proceedings on Summer Institute on Non-traditional Diversified Fish Products&Byproducts.
6. Anon. Productivity in Aquatic Bodies.
7. Chincheste,C.O. and Graham,H.D. Microbial Safety of Fishery Products.
8. Amerine,M.A. and Pangborm,R.M. Principles of Sensory Evaluation of Foods.
9. Connell,J.J. Control of Fish Quality
10. Bigh,E.G. Seafood Science and Technology
11. Gopakumar.K Tropical Fishery Products

Reference Books

1. Kreuzer,R. Fishery Products.
2. Borgstrom,G .Fish as Food
3. Suzuki,T. Fish and Krill Protein: Processing Technology

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III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER VI
CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY
PAPER VIII – 1B
FISHERY MICROBIOLOGY AND FISHERY BY-PRODUCTS

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
UNIT-II	02	4	8	02	8	16
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UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
Out of 10 Questions 5 has to be answered.
Section-B: Questions numbers 11 to 15,
Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
2. Essay Questions : 5 x 8 = 40

Total : 60 Marks

Model Question Paper

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.
III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER VI
CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY
PAPER VIII – 1B
FISHERY MICROBIOLOGY AND FISHERY BY-PRODUCTS

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x4=20**

1. Endospore
2. Structure of prokaryotic cell
3. Anaerobic media
4. Oxidase test
5. Luminescent bacteria
6. Oxygen concentration
7. Fish liver oil
8. pearl essence
9. Advantages of value addition products
10. Fish mince

SECTION-B

I. Answer any FIVE of the following
Draw labeled diagram wherever necessary **5x8=40**

11. a. Describe the structure & function of plasma membrane
(or)
b. Explain lifecycle of bacteriophage with lytic & lysogenic cycles
12. a. Explain different types of media for isolation for bacteria
(or)
b. Explain different culture techniques & isolation of fungi
13. a. Explain spoilage microflora of shell fish
(or)
b. Describe extrinsic factors affecting fish spoilage
14. a. Explain any four fish by products
(or)
b. Explain production of agar
15. a. Describe the status of value addition & advantages Indian seafood sector
(or)
b. Explain battered & breaded fish products

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III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER VI
CLUSTER ELECTIVE – 1-POST HARVEST TECHNOLOGY
PAPER VIII – 1C
QUALITY CONTROL IN PROCESSING PLANTS

Unit I:
Quality management, total quality concept and application in fish trade. Quality assessment of fish and fishery products - physical, chemical, organoleptic and microbiological quality standards. Quality Assurance-Inspection and quality assurance:

Unit 2:
Fish inspection in India, process water quality in fishery industry, product quality. Water analysis, treatments, chlorination, ozonisation, UV radiation, reverse osmosis, techniques to remove pesticides and heavy metals.

Unit 3:
Sensory evaluation of fish and fish products, basic aspects, different methods of evaluation, taste panel selection & constitution, statistical analysis Quality problem in fishery products: good manufacturing practices. HACCP and ISO 9000 series of quality assurance system, validation and audit. national and international standards, EU regulation for fish export trade,

Unit 4:
IDP and SAT formations in certification of export worthiness of fish processing units, regulations for fishing vessels pre-processing and processing plants, eu regulations. Factory sanitation and hygiene: National and international requirements, SSOP.

Unit 5:
Hazards in sea foods: Sea food toxins, biogenic amines, heavy metals and industrial pollutants. Infection and immunity, Microbial food poisoning, bacteria of public health significance in fish / fishery products / environments - Salmonella, Clostridia, Staphylococcus ,E. coli, Streptococcus, Vibrio, Aeromonas, Listeria, Yersinia, Bacillus. Laboratory techniques for detection and identification of food poisoning bacteria. Mycotoxins in cured fish, bacterial associated with fish disease.

Reference Books
1. Ellis Harward. 18 Felix S, Riji John K, Prince Jeyaseelan MJ & Sundararaj V. 2001 Bacterial Fish Pathogens (Diseases in Farm and Wild)
2. Fish Disease Diagnosis and Health Management. Fisheries College and Research Institute, T.N. Veterinary and Animal Sciences University. Thoothukkudi. Inglis V, Roberts RJ & Bromage NR. 1993.

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III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY
SEMESTER VI
CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY
PAPER VIII – 1C
QUALITY CONTROL IN PROCESSING PLANTS

BLUE PRINT MODEL FOR EXTERNAL EXAMINATIONS

	Section A **Short Questions**			**Section B** **Essay Questions**		
	NO OF QUESTIONS	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**	**NO OF QUESTIONS**	**MARKS ALLOTED FOR EACH QUESTION**	**TOTAL MARKS**
UNIT -I	02	4	8	02	8	16
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UNIT-IV	02	4	8	02	8	16
UNIT-V	02	4	8	02	8	16

Section-A: Questions numbers 1 to 10,
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Internal Choice (either / or) and 5 Questions has to be answered.

1. Short Questions : 5 x 4 = 20
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Total : 60 Marks

Model Question Paper

SRR&CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA.

III B.Sc (EAT.Z.C) EMBEDDED AQUACULTURE TECHNOLOGY

III B.Sc ATZC

SEMESTER VI

CLUSTER ELECTIVE – 1- POST HARVEST TECHNOLOGY

PAPER VIII – 1C

QUALITY CONTROL IN PROCESSING PLANTS

Time: 3 hrs **Max Marks: 60**

SECTION-A

I. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x4=20**

1. Objectives of Quality control
2. Organoleptic quality assessment of fish
3. Chlorination
4. BOD and COD
5. GMPs
6. ISO 9000 series
7. Regulations for fishing vessels
8. SSOP
9. Heavy metals in seafoods
10. Mycotoxins in cured fish

SECTION-B

II. Answer any FIVE of the following

Draw labeled diagram wherever necessary **5x8=40**

11. a. Describe the chemical & microbiological methods in quality assessment of fish

(or)

b. Explain quality assurance of sea food products

12. a. Write about the quality control and pre-shipment inspection of fish and fishery products.

(or)

b. Explain various techniques to remove heavy metals

13. a. Explain about different sensory evaluation methods of fish & fish products

(or)

b, What is meant by HACCP? Explain the principles in HACCP.

14. a. Describe IDP & SAT formation in certificate of fish processing units

(or)

b. Write an essay on fish factory sanitation & hygiene

15. a. Write briefly about different sea food toxins.

(or)

b. Write about any six bacteria which are of public health significance in fish and fishery products.

Signatures of the Members in BOS/Upgradation

1. **Dr. M.VIJAYA KUMAR** — **(In-charge of the Department & Chairman, BOS)**
   Lecturer in Zoology
   SRR & CVR GDC (A)
   Vijayawada

2. **Dr.J.NAVEENA LAVANYA LATHA** — **(University Nominee)**
   Krishna University
   Machilipatnam

3. **Dr. N. ANKAMMA** — **(Subject Expert)**
   Associate Professor,
   Department of Zoology,
   Govt. College for Women (Autonomous),
   Guntur.A.P

4. **Dr.G.VANI** — **(Subject Expert)**
   Lecturer in Zoology,
   DRG Government Degree College
   Tadepalligudem.
   West Godavari District. A.P

5. **Sri. B.APPALA NAIDU** — **(Industrial Expert)**
   Assistant Project Manager-Tilapia Fish Project
   Rajiv Gandhi centre for Aquaculture (RGCA)
   Manikonda

6. **N.SUNEETHA** — **(Faculty Member)**
   Lecturer in Zoology
   SRR & CVR GDC (A),
   Vijayawada

7. **A.L.K.KRUPAVARM** — **(Faculty Member)**
   Lecturer in Zoology
   SRR & CVR GDC (A),
   Vijayawada

8. **B.VADAVATHI** — **(Faculty Member)**
   Lecturer in Zoology
   SRR & CVR GDC (A),
   Vijayawada