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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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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II B. Voc ZOOLOGY THEORY
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

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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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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.

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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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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

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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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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

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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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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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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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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
UNIT –I	02	4	8	02	8	16
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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

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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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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

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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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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