Adusumilli Gopalakrishnaiah & Sugarcane Growers
Siddhartha Degree College of Arts & Science Vuyyuru

(An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam)

Accredited by NAAC with "A" Grade

2024-25

MINUTES OF BOARD OF STUDIES

B.Sc. Aquaculture & B.Sc. Honours Major

2024-2025

I, III &V SEMESTERS

31st August 2024

DEPARTMENT OF ZOOLOGY

ODD SEMESTER

31-08-2024

ADUSUMILLI GOPALA KRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU

(An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam)

Accredited by NAAC with "A" Grade ISO 9001-2015 Certified Institution

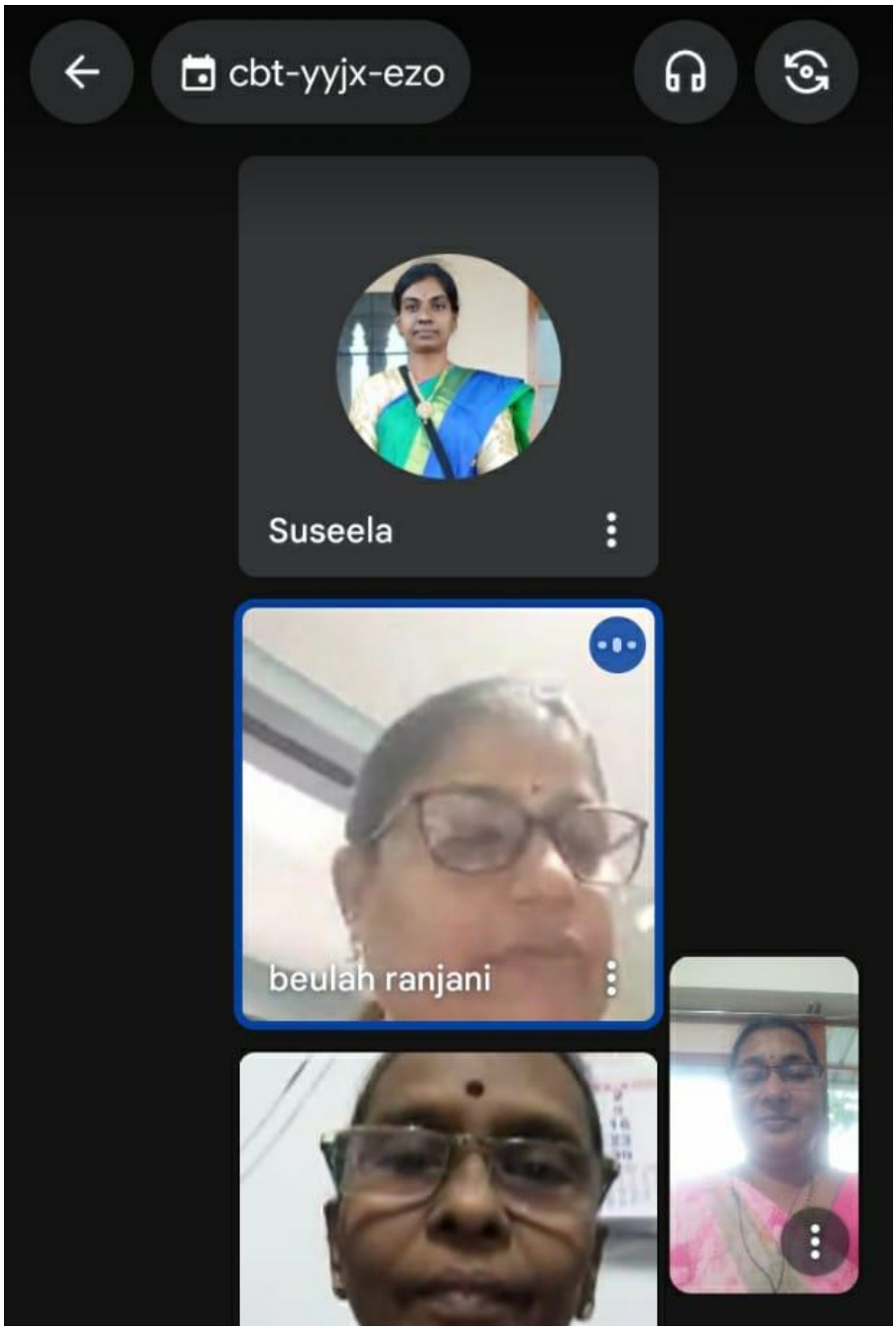
DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING: 31st August 2024

Minutes of meeting of Board of Studies of Department of Zoology was convened at 10:30 am on 31/08/2024 under the chairmanship of Smt. D.A. Kiranmayee, Head of the Department. The members present have discussed various aspects such as changes to be made in the syllabi, scheme of Evaluation and Blue print both for theory and practical papers, Departmental activities for I, III & V semester for the academic year 2024-2025 in online mode

The following members were present.

S.No	Name	Designation	Signature
1.	**Smt. D.A.Kiranmayee** Head, Department of Zoology A.G&S.G.Siddhartha Degree College of Arts & Science,Vuyyuru	Chair person	
2	**Smt. Dr.L.Suseela,** Assistant. Professor of Biotechnology. Krishna University, Machilipatnam.	University Nominee	
3	**Sri. Dr. A. Samba Naik,** Lecturer, department of zoology PB Siddhartha college of Arts and science, Vijayawada	Subject Expert	
4.	**Sri. G. Ravi Teja,** Lecturer, department of zoology Govt.College Autonomous Rajamundry.	Subject Expert	
5.	**Sri.B. Appala Naidu,** Asst. Project Manager, RGCA, Manikonda	Industrialist	
6.	**Smt.Dr.V.Subhashini,** Lecturer in Zoology,A.G & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
7	**Smt. K. Padmaja,** Lecturer in Zoology,A.G & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
8.	**Sri.Ch.Chiranjeevi,** Research Scholar, Dept.of Botany & Microbiology, Acharya Nagarjuna University, Guntur.	Alumni	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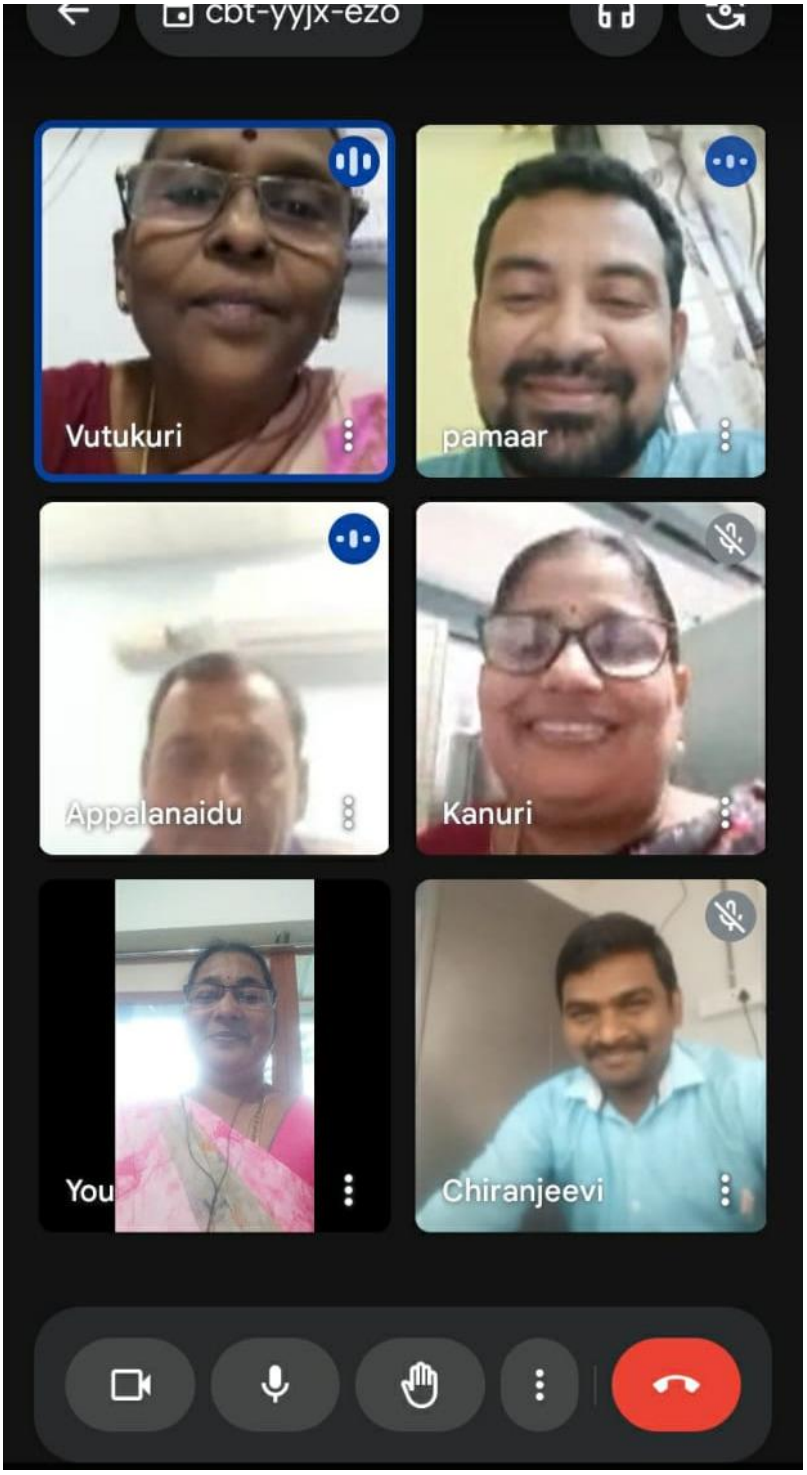
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AGENDA

1.To review and recommend the syllabi (Theory & Practical) for first Semester of **B.Sc. Honours in Aquaculture Major** for the academic year 2024 -2025.

2.To frame and recommend the syllabi (Theory & Practical) for third Semester of II B.Sc. **Honours in Aquaculture Major** for the academic year 2024 - 2025.

3.To review and recommend the syllabi (Theory & Practical) for V Semester of III B.Sc. Aquaculture for the academic year 2024 - 2025.

4.To review and recommend the Model question paper, Blue Print and Guidelines for Question paper setters for I, III semesters of B.Sc. **Honours in Aquaculture Major** & **V Semesters of III B.Sc. Aquaculture** for the academic year 2024 - 2025.

5.To introduce Value Added Course (Non-Credits) on Diary Technology for III Semester of II B.Sc. Honours Zoology and Aquaculture for the academic year 2024 - 2025.

6.To recommend the teaching and evaluation methods to be followed under Autonomous status.

7.Any other matter.

RESOLUTIONS:

1. It is resolved to implement the same syllabi of 2023-24 (Theory & Practical) for First Semester of **B.Sc. Honours Aquaculture Major** for the academic year 2024-2025 also without any changes as recommended by BOS members.
2. It is resolved to implement the **newly framed syllabus** based on APSCHE syllabus (Theory & Practical), for III Semester of II B.Sc. **Honours Aquaculture Major** for the academic year 2024-2025.
3. It is resolved to continue the same syllabus (Theory & Practical), for V Semester of III B.Sc. Aquaculture for the academic year 2024- 2025.
4. It is resolved and recommended to follow Question paper pattern with MCQ model under the guidelines of APSCHE for Core papers of Aquaculture Major in First Semester in the academic year 2024-2025.
5. It is resolved to continue the same Model question paper, Blue Print and Guidelines for Question paper setters for V Semester of III B.Sc. Aquaculture for the academic year 2024-2025.
6. It is resolved to introduce Value Added Course (Non-Credits) on Diary Technology for III Semester of II B.Sc. Honours Aquaculture for the academic year 2024 - 2025.
7. It is resolved to implement the following Teaching and Evaluation methods to be followed under Autonomous status.

Evaluation procedure:

Internal Assessment Examination:

- Out of maximum 100 marks in each paper for I B.Sc. Aquaculture Major of B. Sc. Honours 30 marksare allocated for internal assessment.
- Out of these 30 marks, 20 marks are allocated for Announced tests (IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student. 5 marks are allocated on the basis of candidate's percentage of attendance and remaining 5 marks are allocated for the assignment/activity.
- Out of maximum 100 marks in each paper for III Semester of II B. Sc Aquaculture Major 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, 20 marks are allocated for announced tests (IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks are allocated for assignment and remaining 5 marks for attendance. There is no pass minimum for internal assessment for III Semester.
- Out of maximum 100 marks in each paper for V Semester of III B.Sc. Aquaculture 30 marks shall be allocated for internal assessment.
- Out of these 30 marks, 20 marks are allocated for announced tests (IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated for assignment/seminar and reaming 5 marks for attendance. There is no pass minimum for internal assessmentfor V Semester.

Semester – End Examination:

- The maximum mark for I semester – End examination shall be 70 marks and duration of the examination shall be 3 hours.
- 70 marks are allocated for I Semester of First B.Sc. Aquaculture Major of B. Sc. Honours in Semester End Examination. Even through the candidate is absent for two IA exams / obtain zero marks the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS"
- 70 marks are allocated for III Semester of second B.Sc. Aquaculture in Semester End Examination. Even through thecandidate is absent for two IA exams / obtain zero marks, the external marks are considered (if the candidate gets 40/70) and the result shall be declared as "PASS"
- 70 marks are allocated for V Semester of III B.Sc. Aquaculture in Semester End Examination. Even though the candidate is absent for two IA exams / obtain zero marks, the external marks are considered (if the candidate gets 40/75) and the result shall be declared as "PASS.

A. Kiranmayee

Chairman.

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).

NACC reaccredited at 'A 'level

Autonomous –ISO 9001-2015 Certified

Title of the Paper: **Introduction to Classical Biology**

Semester: - I

Course Code	**23CBLT01**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours/ Week	5	Semester End Exam Marks	70
Year of Introduction: 2023-2024	Year of Offering 2024-2025	Total Marks	100

Learning objectives

Thestudentwillbeabletolearnthediversityandclassificationoflivingorganismsandunderstand their chemical, cytological, evolutionary and genetic principles.

Learning Out comes:

CO 1	Learn the principles of classification and preservation of biodiversity
CO 2	Understand the plant anatomical, physiological and reproductive processes
CO 3	Knowledge on animal classification, physiology, embryonic development and their economic importance
CO 4	Outline the cell components, cell processes like cell division, heredity and molecular processes.
CO 5	Comprehend the chemical principles in shaping and driving the macromolecules and life processes.

Syllabus: Introduction to Classical Biology **Course Code: 23CBLT01**

Unit	Learning Topics	Lecture Hours
I	. **Unit1: Introduction to systematic, taxonomy and ecology.** Systematic –Definition and concept, Taxonomy– Definition and hierarchy. Nomenclature–ICBN and ICZN, Binomial and trinomial nomenclature. Ecology – Concept of ecosystem**,(**Structure and function-outlines) Biodiversity and conservation.(Value of Biodiversity and types of conservation) Pollution and climate change. (Causes, effects of air, water and soil pollution, ozone ion, acid rain, greenhouse gases, global warming.	10
II	**Unit2: Essentials of Botany.** The classification of plant kingdom**.** (2Whittaker Classification of Planate) Plant physiological processes (Photosynthesis- light &dark reactions, Respiration (- glycolysis ,link reaction, Krebs cycle& oxidative phosphorylation, Transpiration- types ,stomatal complex, mechanism of stomatal movement based on K+ ion movement) , phytohormones - Role of Auxins, Gibberellins, Cytokinins, Abscissic acid ,Ethylene). Structure of flower–Micro and macro sporogenesis, pollination-(types& agents), fertilization and structure of mono and dicot embryos. Mushroom cultivation, oyster floriculture (of local flowers) and landscaping. (Principles)	15
III	**Essentials of zoology** Broad classification of Kingdom Animalia up to phyla. Animal Physiology – Basics of Organ Systems and their functions, Hormones and Disorders. Developmental Biology – Gametogenesis, Fertilization, Cleavage and Organogenesis (Basic concepts) Economic Zoology – Sericulture, Apiculture, Aquaculture (Concepts and Economic Importance.)	10
IV	**Evolution, Cell Biology and Genetics** Origin of life Cell theory , Ultra structure of prokaryotic and eukaryotic cell, cell cycle(Outlines only) Chromosomes and heredity – Structure of chromosomes, concept of gene. Central Dogma of Molecular Biology (Outlines of transcription and translation, Role of genetic code)	10
V	**Essentials of chemistry** Definition and scope of chemistry, applications of chemistry in daily life (Chemistry in food, Agriculture, Hygiene , Cosmetics, and Textiles & Building construction). Branches of chemistry (Inorganic, Organic ,Physical , Analytical and Industrial chemistry) Chemical bonds- ionic , covalent, non – covalent – vanderwaals , hydrophobic , hydrogen bonds. Green chemistry	15

References

1. Sharma O.P., 1993.Plant taxonomy.2nd Edition.McGraw Hill publishers.
2. PandeyB.P. 2001. The text book of botany Angiosperms. 4th edition. S.Chand publishers, New Delhi, India.
3. JordanE.L.,VermaP.S.,2018. Chordate Zoology. Scand publishers, New Delhi, India.
4. Restage, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.
5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chan publishers, New Delhi, India.
6. Satyanarayana U., Chakrapani, U., 2013.Biochemistry. 4th Edition. Elsevier publishers.
7. JainJ.L., SunjayJain,NitinJain,2000.Fundamental soft Biochemistry .S.Chand publishers, New Delhi,India.
8. Karen Timber lake, William Timber lake, 2019. Basic chemistry. 5th Edition. Pearson publishers.
9. Subrata Sen Gupta,2014. Organic chemistry.1st Edition.Oxford publishers.

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ACTIVITIES- I (At the end of I Semester)

Title of the paper: Introduction to Classical Biology

No of Hours: 30 **Credits: 01**
WEF: 2023-2024 **Course Code: 23 CBLT01**

ACTIVITIES:

1. Make a display chart of life cycle of non flowering plants.
2. Make a display chart of life cycle of flowering plants.
3. Study of stomata
4. Activity to prove that chlorophyll is essential for photo synthesis
5. Study of pollen grains.
6. Observation of pollen germination.
7. Ikebana.
8. Differentiate between edible and poisonous mushrooms.
9. Visit a near by mushroom cultivation unit and know the economic soft mushroom cultivation.
10. Draw the Ultra structure of Prokaryotic and Eukaryotic Cell
11. Visit to Zoology Lab and observe different types of preservation of specimens
12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
13. Visit to Zoo/Sericulture / Apiculture/ Aquaculture unit
14. List out different hormonal, genetic and physiological disorders from the society

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Title of the Paper: **Introduction to Applied Biology**

Semester: - I

Course Code	**23ABLT01**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	30
No. of Lecture Hours/ Week	5	Semester End Exam Marks	70
Year of Introduction: 2023-2024	Year of Offering 2024-2025	Total Marks	100

Learning objectives

The student will be able to learn the foundations and principles of microbiology, immunology,biochemistry, biotechnology, analytical tools, quantitative methods, and bioinformatics.

Learning Outcomes:

CO 1	Learn the history, ultra structure, diversity and importance of microorganisms.
CO 2	Understand the structure and functions of macromolecules
CO 3	Knowledge on biotechnology principles and its applications in food and medicine
CO 4	Outline the techniques, tools and their uses in diagnosis and therapy
CO 5	Demonstrate the bioinformatics and statistical tools in comprehending the complex biological data.

Syllabus: Introduction to Applied Biology **Course Code: 23ABLT01**

Unit	Learning Topics	Lecture Hours
I	**Essentials of Microbiology and Immunology** History and Major Milestones of Microbiology, Contributions of LouisPasteur, Robert Koch, Edward Jenner and Joseph Lister. Structure and characteristics of Bacteria, Fungi, Archaea and Viruses. Applications of microorganisms in Food, Agriculture, Environment and Industry. Immune system – Types of immunity (Innate and Acquired), Cells and organs of immune system.	12
II	**Essentials of Biochemistry** Bio molecules I – Carbohydrates, Lipids (General Structure, classification and Biological importance). Bio molecules II – Amino acids (General Structure, classification- Essential and Non- Essential and Biological importance), Proteins(General Structure, classification and Biological importance) Bio molecules III – Nucleic acids - DNA and RNA (Structure, Types and Biological importance) Basics of Metabolism – Anabolism and catabolism (Definition and examples)	12
III	**Essentials of Biotechnology** History, scope and significance of Bio technology- Applications of Biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences. Environmental Biotechnology – Bio remediation and Bio fuels, Bio fertilizers and Bio pesticides. (Definitions and common examples) Genetic engineering – Gene manipulation using restriction enzymes and cloning vectors- P^{BR322}, λ phage. Methods of Gene transfer- Physical- Electroporation, chemical- PEG, and Biological- Transduction. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salttolerance). Transgenic animals – Animal (Fish) and disease models.(Mouse)	15
IV	**Analytical Tools and techniques in biology – Applications** Applications in forensics – PCR and DNA fingerprinting (Concept and application) Immunological techniques – Immunoblotting and ELISA. (Concept and application) Monoclonal antibodies – Applications in diagnosis and therapy. Eugenics and Gene therapy (Definition and examples)	09
V	**Biostatistics and Bioinformatics** Data collection and sampling. Measures of central tendency – Mean, Median, Mode. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance- t- test Introduction , Genomics, Proteomics, types of Biological data, Biological databases- NCBI,EBI, Gen Bank; Protein 3D structures, Sequence alignment. Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench	12

REFERENCES

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition.McGraw Education, New York, USA.
3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers,New Delhi, India.
5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd.,Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bioinformatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Biostatistics. 2nd Edition. CBS publishers.

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ACTIVITIES- I (At the end of I Semester)

Title of the paper: Introduction to Applied Biology

No of Hours: 30 **Credits: 01**
WEF: 2023-2024 **Course Code: 23ABLP01**

ACTIVITIES

1. Identification of given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganism from pond water.
4. Visit to a microbiology industry or biotech company.
5. Visit to a waste water treatment plant.
6. Retrieving a DNA or protein sequence of a gene'
7. Performing a BLAST analysis for DNA and protein.
8. Problems on biostatistics.
9. Field trip and awareness programs on environmental pollution by different types of wastesand hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

[**NOTE**: In the colleges where there is availability of faculty for microbiology and biotechnology, those chapters need to be handled by microbiology and biotechnology faculty.In other colleges, the above topics shall be dealt by Botany and Zoology faculty]

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Title of the Paper**: Basic Principles of Aquaculture** **Paper - 5**

Semester: - III

Course Code	**23AQMAL231**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:

Course Aims and Objectives:

S.NO	**COURSE OBJECTIVES**
1	To study the concept of blue revolution and its impact at global, national and state level.
2	To get acquainted with different culture systems and culture methods.
3	To study the different types of ponds used in culture practices.
4	To study the criteria for construction of ideal fish pond.
5	To study the management practices in fish/ prawn culture

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

CO NO	**COURSE OUTCOME**	**BTL**	**PO**	**PSO**
CO1	Understand the concept of blue revolution, analyse the history and compare the presentstatus of aquaculture at global, national and state levels and its significance over agriculture.	**K2**		
CO2	Student will analyze the distribution and biology of important fishes and other aquatic animals in India.	**K4**		
CO3	Gain knowledge in the different types of culture ponds.	**K2**		
CO4	Understand the arrangement of different types of ponds in a fish farm and design an idealfish farm	**K2**		
CO5	Comprehend the best management practices to be adopted in aquaculture for good yield and acquire the skill in the analysis of water and soil parameters of a culture pond.	**K4**		

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX											
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	2							3			
CO2	3							3			
CO3	2							2			
CO4	3								2		
CO5						2					3

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Prescribed Books:

1. Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, New Delhi
2. Pillay TVR, 1996. Aquaculture Principles and Practices, Fishing News Books Ltd.,London

References:

1. Pillay TVR &M.A.Dill, 1979. Advances in Aquaculture. Fishing News BooksLtd.,London
2. Stickney RR 1979. Principles of Warm Water Aquaculture. John Wiley & SonsInc.1981
3. Boyd CE 1982. Water Quality Management for Pond Fish Culture. Elsivier ScientificPublishing
4. Bose AN et.al, 1991. Costal Aquaculture Engineering. Oxford & IBH PublishingCompany.

Syllabus: Basic Principles of Aquaculture **Course code: 23AQMAL231**

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction** 1.1 Definition and History of Aquaculture 1.2 Concept of Blue Revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY) 1.3 Present status of Aquaculture at global, India and Andhra Pradesh level 1.4Aquaculture versus Agriculture; Present day needs with special reference to AndhraPradesh **Assignment 1:** Collect the data of Concept of Blue Revolution **Assignment 2:** Collect the data of present status of Aquaculture at global level, India and Andhra Pradesh	**9**
II	**Types of Fish Ponds** 2.1 Lotic and Lentic systems, streams and springs 2.2 Classification of ponds based on water resources – spring, rain water, flood water, wellwater and water course ponds 2.3Functional classification of ponds – head pond, hatchery (Jar hatchery, Chinese Hatchery, hatching hapa) nursery, rearing, production and stocking ponds; 2.4. Quarantine ponds, isolation ponds and wintering ponds. **Assignment 1:** Classification of ponds **Exercises/Projects 1:** Prepare charts / models of Functional classification of ponds**.**	**9**
III	**Design and Construction of Aqua Farms** 3.1Important factors in the construction of an ideal fish pond – site selection, topography,nature of the soil, water resources 3.2 Lay out and arrangement of ponds in a fish farm 3.3 Design and construction of an ideal fish pond – space allocation, structure and components of Barrage pond and its importance **Case Studies**: Collect any 2 case studies regarding Design and Construction of Aqua Farms **Exercises/Projects**: Prepare charts / models of construction of an ideal fish pond	**9**
IV	**Aquaculture Systems and Practices** 4.1Types of aquaculture_ Fresh water aquaculture- Brackish water aquaculture -Mari culture 4.2Aquaculture Systems – Pond, Raceways, Cage, Pen, Rafts, Running water 4.3 Pond culture practices- Traditional, Extensive, Modified Extensive, Semi-Intensive,Intensive & Super-intensive systems of fish and shrimp and their significance. 4.4 Fin fish culture methods - Monoculture, Poly culture and Monosex culture and Integrated fish farming. **Case Studies:** Collect any 2 case studies regarding the usage of types of aquaculture **Exercises/Projects:** Prepare models/charts on Aquaculture Systems	**9**
V	**Management Factors of Culture Ponds,** 5.1Pre-stocking Management- Dewatering, drying, ploughing/desilting Control measures for Predators, weeds and weed fish in culture ponds - Advantages and disadvantages of weed plants; Toxins used for weed control and control of predators. Liming and fertilization; Algal blooms and their control 5.2Stocking Management – Stocking density and stocking 5.3 Post-stocking Management: Feeding: Role of nutrients 5.4 Water quality management: Physico-chemical conditions of soil and water optimum for culture – temperature, depth, turbidity, light, water and shore currents, PH, DOD, CO_2, NH_3, NO_2 **Assignment 1:** Physico-Chemical Conditions of Water Optimum for culture **Assignment 2:** Algal blooms and their control	**9**

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III SEMESTER END EXAMINATIONS

PAPER – V **MODEL PAPER** **Course Code: 23AQMAL231**

Title of the paper: Basic Principles of Aquaculture

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

SECTION-A

Answer all questions. **5X4= 20M**

Each question carries 4 marks

1. a) Explain Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Or

b) Write a short note on History of Aquaculture

2 .a) Describe the difference between Lotic and Lentic systems

Or

b) Write a short note on quarantine ponds

3.a) Give an account of site selection in the construction of an ideal fish pond

Or

b) Draw diagram of barrage pond and its importance

4. a) Write short notes on Mari culture

Or

b)Explain Monosex culture in tilapia

5.a) Explain control measures for Predators, weeds and weed fish in culture ponds weeds

Or

b) Write about Algal blooms in culture ponds

SECTION-B

Answer all the Questions. **5X10=50M**

6.a) Describe the present status of Aquaculture at global, Indian and Andhra Pradesh level

(Or)

b) Explain the Concept of Blue Revolution

7. a) Explain the classification of ponds based on water resources

(Or)

b) Describe the types of hatcheries with diagrams

8.a) Describe the Design and construction of an ideal fish pond

(Or)

b) Write an essay on lay out and arrangement of ponds in a fish farm

9.a) Explain different Aquaculture Systems

(Or)

b) Write an essay on integrated fish farming.

10. a) Describe the Pre-stocking Management practices in fish culture

(Or)

b) Explain the Physico-chemical conditions of water optimum for fish culture

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

w.e.f. 2024-2025.

PRACTICAL SYLLABUS Code: **23AQMAP231**

(2hrs/week)
Credits: 01 MAX.MARKS: 50.

PRACTICALS: **CourseNo.5** – **Basic Principles of Aquaculture**

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

References

1. Boyd CE. 1979. Water Quality in Warm Water Fish Ponds. Auburn University
2. Boyd, CE. 1982. Water Quality Management for Pond Fish Culture. Elsevier Sci. Publ.Co.
3. FAO. 2007. Manual on Freshwater Prawn Farming.

A.G. & S.G.Siddhartha Degree College of Arts & Science, Vuyyuru (Autonomous)

Aquaculture Practical - III

w.e.f. 2024-2025.

Title: Basic Principles of Aquaculture

Model Practical Paper

Code: **23AQMAP231** **Max Marks: 50 (CIA+ SEE)**

Time : 3 Hrs

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III. Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

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Title of the Paper**: Capture Fisheries** **Paper- 6**

Semester: - III

Course Code	**23AQMAL232**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: **2024-25**	Year of Offering **2024-2025**	Year of Revision –	Percentage of Revision:

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	Understand the EEZ concept & its implementation in fisheries
2	Knowledge on Fish Distribution
3	Acquire Knowledge on the River in systems of India
4	Discuss the mechanization of Indian fishing crafts and assess its impact on fishing efficiency, and resource utilization.
5	Interpret traditional and modern fishing gears used in India, including their design, materials, and fabrication techniques, and assess their suitability for different fishing environments and target species.

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

CO NO	COURSE OUTCOME	BTL	PO
CO1	Students will gain background knowledge in the fish catch statistics.	**K2**	2
CO2	Student will analyze the distribution and biology of important fishes and other aquatic animals in India.	**K4**	2
CO3	Students will understand the riverine fisheries of Indian resources and their fishery	**K2**	2
CO4	Create knowledge in critical discussion regarding the impact of mechanization on Indian fishing crafts, assessing its effects on fishing efficiency, labour dynamics, and resource utilization.	**K6**	2
CO5	Evaluate traditional and modern fishing gear designs, materials, and fabrication techniques, determining their appropriateness for various fishing environments and species.	**K5**	2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX											
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	2							2			
CO2	2							2			
CO3	2							2			
CO4	2										2
CO5	2										2

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Description:

Capture fisheries explains the present day fish production of the world both Inland &marine water bodies

Gives the knowledge on contribution of Fisheries in different countries,

Helps in attaining knowledge in EEZ zones of India, position of India.

Gives knowledge in distribution of fishes in different regions of India.

Attain knowledge in Riverine Fishery resources like Ganga, Brahmaputra, East coast, & West Coast riverine systems with their tributaries & which Aquatic species are available in those riverine systems.

Helps in gaining knowledge in construction &usage of different types of traditional crafts &Modern crafts in India.

Helps in gaining knowledge in construction & usage of different types of traditional gears& modern gears in India.

Reference Books:-

1. Jhingram,V.G.FishandFisheriesofIndia.Secondedition1983,HindustanPub.Co.Picker,
2. W.E.MethodsforassessmentofFishProductioninFreshWaters.BlackwellScient.Publ. 1970
3. Bal, D.V. and Veerabhadra Rao, K. Marine Fisheries, Tata MC Graw hill Publications, New Delhi.
4. Srivastava, U.K.et.al.FreshwateraquacultureinIndia,OxfordandIBHPubl.Co.NewDelhi1980
5. C.B.L. Srivastava–A textbook of Fishery Science and Indian Fisheries. Kitab Mahal Agencies, Patna.

Syllabus: Capture Fisheries **Course code:23AQMAL232**

Course Details

Unit	Learning Units	Lecture Hours
I	**Fish Catch Statistics** 1.1 Fish production of the world both inland and marine, contribution of different countries,and position of India in the Fish Catches. 1.2 The EEZ concept & its implementation in fisheries. The Indian EEZ, Fishery survey inIndia **Assignment 1:** **Collect the data regarding the position of India for past 10 years** **Assignment 2:** **Gather the information of present EEZ Zones in AP**	9
II	**Fish Distribution.** 2.1 General account of the fish distribution 2.2 Biology and fishery of Catla catla and labeo rohita 2.3 Biology and fishery of shell fishes - Macrobrachium rosenbergi and Scylla serrata 2.4. Economic importance of Fresh Water Fishes of Andhra Pradesh **Activity 1:** **Case study on comparative biology of Indian Major Carps** **Exercises/Projects:** **Collect the data of area wise& season wise availability of fishes in Andhra Pradesh (which area is is famous for which kind of fishes)**	**9**
III	**Riverine Fishery I:-** 3.1 Important characters of Streams. 3.2 Different riverine systems in India, and their fishery: The Ganga River System, the Brahmaputra river system 3.3The East Coast River System. 3.4The West Coast River System, River Jhelum of the Indus River System **Assignment 1:** **Ganga and Brahmaputra River systems in India** **Exercises/Projects: Prepare charts / models of river systems with their tributaries**	**9**
IV	**Fishing Craft** 4.1 Main types of the traditional crafts employed in Marine, fresh water fisheries of Andhra Pradesh- Coracle, Dhoni, Sangadam, Canoes, Catamaran, Masula type boats, Fiber Glass boats 4.2Modern fishing crafts- trawlers, BLC. Mechanized Crafts 4.3 Techniques for the maintenance of the craft **Activity1:** **Prepare models/charts on crafts**	**9**
V	**UNIT V: Fishing Gears** 5.1 Traditional gear - Dip & Lift nets, Cast nets, Gill nets, Shore seines, Boat Seines, Hand Lines, Long Lines, Conical Set nets, Drag nets, Trawl nets and Basket traps. 5.4 Modern gear- Techniques for the maintenance of the gear. 5.3 Fish Finding Equipment (Echo sounder and sonar) **Activity1:** **Exercises/Projects: Prepare models/charts on gears**	**9**

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III SEMESTER END EXAMINATIONS

PAPER – VI **MODEL PAPER** **Course Code: 23AQMAL232**

Title of the paper: Capture Fisheries

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

SECTION-A

Answer all questions. **5X4= 20M**

Each question carries 4 marks

1. a) Explain Fish catch statistic contribution of different countries,

Or

b) Write a short note on Indian EEZ

2 .a) Biology of Catla catla

Or

b) Economic importance of Fresh Water Fishes of Andhra Pradesh

3. a) Explain about Important characters of Streams

Or

b) Write short notes on Ganga River System

4. a) Discuss about Catamaran & Masula type boats

Or

b) Explain techniques for the maintenance of the craft

5.a) Explain about Dip & Lift nets

Or

b) Write about Fish Finding Equipment

SECTION-B

Answer all the Questions. **5X10=50M**

6.a) Describe the Fish production of the world both inland and marine?

(Or)

b) Explain the EEZ concept & its implementation in fisheries?

7. a) Explain the Biology and fishery of labeo rohita?

(Or)

b) Describe the biology and fishery of shell fish Macrobrachium rosenbergi

8.a) Give an account of East Coast River System.

(Or)

b) Write an essay on Indus River System

9.a) Describe the main types of traditional crafts employed in Marine fisheries of Andhra Pradesh

(Or)

b) Discuss about Modern fishing crafts

10. a) Discuss any five traditional gear in fish culture

(Or)

b) Explain the techniques for the maintenance of the gear.

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AQUACULTURE PRACTICAL – III paper 6

w.e.f. 2022-2023.

PRACTICAL SYLLABUS Code: **23AQMAP232**

(2hrs/week)

Credits: 01 MAX.MARKS: 50.

PRACTICALS: Course No.6 **–Capture Fisheries**

1. Identification of Freshwater fishes based on colour, Pigmentation, Morpho metric and Meristic characters and other characters relevant to the group.

2. Identification of fry and fingerlings of Indian Major Carps.

3.Examination of Commercially Important Freshwater fishes and prawns, from the point ofview of ecology and fishery.

4. Knowledge of common types of Freshwater craft and gear on models provided in the department.

5. Demonstration of fish collection and operation of nets, observing different instruments used in Fisheries

6. Field Work: Visit to fish landing centers of rivers, lakes and reservoirs.

Reference Books :-

1. Jhingram, V.G. Fish and Fisheries of India. Second edition 1983, Hindustan Pub. Co.Picker,

2. W.E. Methods for assessment of Fish Production in Fresh Waters. Blackwell Scient.Publ. 1970

3. Bal, D.V. and Veerabhadra Rao, K. Marine Fisheries, Tata MC Grawhill Publications,New Delhi.

4. Srivastava, U.K. et.al. Freshwater aquaculture in India, Oxford and IBH Publ. Co. NewDelhi 1980

5. C.B.L. Srivastava – A text book of Fishery Science and Indian Fisheries. Kitab MahalAgencies, Patna.

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Aquaculture Practical - III

w.e.f. 2024-2025.

Title: Capture Fisheries

Model Practical Paper

Code: **23AQMAP232** **Max Marks: 50 (CIA+ SEE)**

Time : 3 Hrs

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva		**2M**
III. Record		**8M**

	Total	**35M**
B. Continuous Internal Assessment		**15M**
Total (A+ B**)**		**50M**

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Title of the Paper**: Fresh Water Aquaculture** **Paper-7**

Semester: - III

Course Code	**23AQMAL233**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To know the present status of freshwater and brackish water aquaculture and their role in world economy and food production
2	To gain knowledge on Indian major, minor carp culture and exotic carp culture
3	To improve the technical knowledge on Composite fish culture system
4	To gain knowledge on recent developments in the culture of air-breathing and cold water fish
5	To improve the knowledge on commercial value Fresh water prawns of India

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

CO NO	COURSE OUTCOME	BTL	PO
CO1	Learn the Status, Scope and Prospects of fresh water aquaculture in the world, India andAP.	**K2**	2
CO2	Learn about Major Cultivable Indian Carps and Exotic fish Species introduced in India	**K2**	2
CO3	Understand the Composite fish culture system of Indian and exotic carps	**K2**	2
CO4	Analyse about recent developments in the culture of clarius, anabas and murrels and specialsystems of aquaculture.	**K4**	2
CO5	Gain knowledge of commercially valuable Fresh water prawns of India and their culturingmethods	**K2**	2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

CO-PO MATRIX											
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	2							2			
CO2	2							2			
CO3	2							2			
CO4	2										2
CO5	2							3			

PRESCRIBED BOOK(S):

1 Jhingran VG 1998. Fish and Fisheries of India. Hindusthan Publishing Corporation, NewDelhi

REFERENCES:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH,New Delhi

2. Srivatsava 1993. Fresh water aquaculture in India, Oxford-IBH, New Delhi Marcel H1972. Text book of fish culture.Oxford fishing news books.

Syllabus: Fresh Water Aquaculture **Course code: 23AQMAL233**

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction to Freshwater Aquaculture** 1.1Status, scope and prospects of fresh water aquaculture in the world, India and AP 1.2Criteria for the selection of species for culture 1.3 Natural seed resources and procurement of seed for stocking 1.4Special systems of Aquaculture- brief study of culture in Recirculatory aquaculture systems (RAS) Biofloc Technology, Integrated multi –trophic aquaculture (IMTA) and 3-C System **Assignment1** Criteria for the selection of species for culture	9
II	**Carp Culture** 2.1 Culture of cultivable Major Indian carps – Labeo, Catla and Cirrhinus 2.2 Culture of cultivable Minor Indian carps - Labeobata, Labeo fimbriatus, Labeo calbasu 2.3 Culture of Exotic fish species introduced to India – Tilapia, Pangassius and Clarius sp. 2.4 Induced breeding of Indian Major carp by Hypophysation technique **Activity1** **Collection of photos of Indian Major and Minor carps and Exotic carps**	**9**
III	**Composite fish culture system** 3.1Composite fish culture system of Indian and exotic carps 3.2 1Composite fish culture system of genetically modified carps (Amur - Common carp(Cyprinus carpio haematopterus) , Jayanthi Rohu) 3.3Impact of exotic fish, Compatibility of Indian and exotic carps and competition among them **Assignment1** Composite fish culture system of genetically modified carps	**9**
IV	**Culture of Carp air-breathing and cold water fish** 4.1Recent developments in the culture of Clarius, Anabas, Murrels 4.2Advantages and constraints in the culture of air-breathing and cold water fishes- seed resources, feeding, management and production 4.3Adaptations of air-breathing and cold water fish **Assignment 1** **Special systems of Aquaculture**	**9**

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III SEMESTER END EXAMINATIONS

PAPER – VII **MODEL PAPER** **Course Code: 23AQMAL233**

Title of the paper: Fresh Water Aquaculture

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

SECTION-A

Answer all questions. **5X4= 20M**

Each question carries 4 marks

1. a) Explain the scope and prospects of fresh water aquaculture in AP

Or

b) Write a short note on Recirculatory aquaculture systems (RAS)

2 .a) Discuss the culture of Cirrhinus

Or

b) Write short notes on culture of Minor carp

3. a) Explain the Composite fish culture system of Jayanthi Rohu

Or

b) Explain composite fish culture system of Indian carps

4. a) What are the recent developments in the culture of Murrels

Or

b) Discuss about the seed resources of air-breathing fishes

5.a) Explain the morphotypes of Macrobrachium rosenbergii

Or

b) Write about pond preparation of M. Malcomsonii

SECTION-B

Answer all the Questions. **5X10=50M**

6.a) Explain the criteria for the selection of species for culture

(Or)

b) Give an account of Natural seed resources and procurement of seed for stocking

7. a) Explain the culture of Exotic fish species Tilapia introduced into India

(Or)

b) Describe the process of Induced breeding in Indian Major Carp

8.a) Give an account of Composite fish culture system of Exotic carps

(Or)

b) Write an essay on compatibility of Indian and exotic carps and competition among them

9.a) What are the advantages and constraints in the culture of cold water fishes

(Or)

b) Discuss about adaptations of air-breathing and cold water fish

10. a) Discuss the commercial value of Fresh water prawns of India

(Or)

b) Compare the biology of Macrobrachium rosenbergii and M. malcomsonii

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AQUACULTURE PRACTICAL - III

w.e.f. 2024-2025.

PRACTICAL SYLLABUS Code: 23AQMAP233

(2hrs/week)

Credits: 01 MAX.MARKS: 50.

PRACTICALS: Course No.7 – Fresh Water Aquaculture

1. Identification of important cultivable carps.
2. Identification of important cultivable air-breathing fishes.
3. Identification of important cultivable freshwater prawns.
4. Identification of different life history stages of fish.
5 Identification of different life history stages of fresh water prawn.
6 Identification of commercially viable crabs – Scylla cerrata, Portunus pelagicus,P.sanguinolentus, Neptunus pelagicus, N. Sanguinolentus .
7. Identification of lobsters – Panulirus polyphagus, P.ornatus, P.homarus, P.sewelli,P.penicillatus.
8. Identification of oysters of nutritional significance – Crossostrea madrasensis,C.gryphoides, C.cucullata, C.rivularis , Picnodanta .
9. Identification of mussels and clams.
10. Identification of developmental stages of oysters.

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Aquaculture Practical - III

w.e.f. 2024-2025.

Title: **Fresh Water Aquaculture**

Model Practical Paper

Code: **23AQMAP233** **Max Marks: 50 (CIA+ SEE)**

Time : 3 Hrs

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III. Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

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Title of the Paper**: Brackish Water Aquaculture** **Paper: VIII**

Semester: - III

Course Code	**23AQMAL234**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2024-2025	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To know the present status of brackish water farming in India
2	To gain knowledge on culture practices of brackish water prawns
3	To improve the technical knowledge on culture of important fishes
4	To gain knowledge on recent developments of Management practices of cultivable shrimps
5	To learn about culture of brackish water crabs and edible oysters

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

CO NO	COURSE OUTCOME	BTL	PO
CO1	Knowledge on development and present status of brackish water farming in India	**K2**	2
CO2	Learn about the types of culture practices of shrimp commercial value of prawns in India	**K2**	2
CO3	Gain knowledge on biology and culture of important fishes	**K2**	2
CO4	Apply knowledge of Management practices for sustainable development	**K3**	2
CO5	Understand about the of culture of brackish water crabs and edible oysters	**K2**	2

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	2							2	
CO2	2							2	
CO3	2							3	
CO4	2							3	
CO5	2							2	

References:

1.Pillay, TVR. Aquaculture principles and practices, Fishery News (Books) Ltd., London1990. Prawn and prawn fisheries by Kurain and Sebestain.

2.Shankar KM & Mohan CV 2002. Fish and Shell Fish Health Management UNESCO. Publ.

3. Sundermann CJ 1990.Johnson SK 1995. Hand book of shrimp diseases Texas A & M university, Texas.

4. Guland J.A. (ed) 1984. Penaeid Shrimps – Their Biology and Management.

5.Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, NewYork

Syllabus Brackish Water Aquaculture

Course Details

Unit	Learning Units	Lecture Hours
I	**Introduction** 1.1Introduction, History, Development and present status of brackish water farming in India. 1.2Brackish water as a medium for aquaculture, ecological factors – Abiotic and biotic factors. 1.3Types of culture systems – Traditional, extensive, semi-intensive and intensive culture systems of shrimp, their management and economics. **Assignment1** Compare the extensive and intensive culture systems of shrimp	9
II	**Culture of brackish water prawns** 2.1Culture practices of Penaeus monodon- hatchery technology and culture practices including feed and disease management 2.2 Culture practices of P. vannamei - hatchery technology and culture practices including feed and disease management 2.3 Brackish water prawns of India – Commercial value, Morphotypes and harvesting 2.4 Mixed culture of fish and prawn **Assignment1** Mixed culture of fish and prawn **Assignment2** Culture practices of Penaeus monodon	**9**
III	**Culture of brackish water Fishes** 3.1Biology and culture of Lates calcarifer 3.2 Biology and culture of Chanos chanos 3.3Biology and culture of Mugil cephalus 3.4 Biology and culture of Etroplus suratensis **Assignment1** Culture of Lates calcarifer **Assignment2** Case study of Biology of Etroplus suratensis and Mugil cephalus	**9**
IV	**Management practices** 4.1Nutritional requirements of cultivable prawns. 4.2 Natural food and artificial feeds and their importance in shrimp culture 4.3 Pond preparation, stocking of Hatchery, Nursery, Grow out ponds and harvesting of shrimp. **Assignment1** Pond preparation of shrimp	**9**
V	**Culture of Brackish water species** 5.1Species of crabs cultured, biology and culture technique, prospects in India. 5.2 Species of edible oysters, 5.3 Culture techniques used for edible oysters (Bottom culture, Rock and bag culture, Floating culture, Nursery culture) 5.4 Important species of pearl oysters and method of artificial pearl production. **Exercises/Projects:** Prepare charts on Culture techniques used for edible oysters	**9**

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III SEMESTER END EXAMINATIONS

PAPER – VIII **MODEL PAPER** **Course Code: 23AQMAL234**

Title of the paper: Brackish Water Aquaculture

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

SECTION-A

Answer all questions. **5X4= 20M**

Each question carries 4 marks

1. a) Explain the present status of brackish water farming in India.

Or

b) Write a short note on economics in shrimp culture.

2 .a) Discuss the hatchery technology in Penaeus monodon

Or

b) Write short notes on harvesting of brackish water prawns of India

3. a) Explain the biology of Lates calcarifer

Or

b) Explain culture of Etroplus suratensis

4. a) Write short notes on Natural food in shrimp

Or

b) Discuss about the stocking of shrimp in grow out ponds

5.a) Explain the species of edible oysters

Or

b) Write about biology of Scylla serrata

SECTION-B

Answer all the Questions. **5X10=50M**

6.a) Explain the ecological factors in brackish water aquaculture

(Or)

b) Give an account of types of culture systems of shrimp

7. a) Explain the feed and disease management in the culture practices of L. Vennamei

(Or)

b) Write an essay on mixed culture of fish and prawn

8.a) Give an account on biology and culture of Chanos chanos

(Or)

b) Write an essay on biology and culture of Mugil cephalus

9.a) What are the nutritional requirements of cultivable prawns

(Or)

b) Discuss about artificial feeds and their importance in shrimp culture

10. a) Discuss any two Culture techniques used for edible oysters

(Or)

b) Explain the method of artificial pearl production

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AQUACULTURE PRACTICAL - III

w.e.f. 2024-2025.

PRACTICAL SYLLABUS Code: 23AQMAP234

(2hrs/week)

Credits: 01 MAX.MARKS: 50.

PRACTICALS: CourseNo.8 – Brackish Water Aquaculture

1. Identification of cultivable fresh water and marine water prawns (any 3 each)
2. Identification of marine crabs and oysters of commercial importance (any 2 each).
3. Identification of Phytoplankton and Zooplankton (any 5 each).
4. Identification of different live feed organisms for shrimp larvae (any 4)
5. Identification of larval stages of prawn. 6. Demonstration of eye stalks ablation in penaeusmonodon
6. Identification and mounting of appendages of prawn / shrimp.
7. Field visit to prawn / shrimp hatchery
8. Field visit to prawn / shrimp culture ponds.

References:

1. Pillay, TVR. Aquaculture principles and practices, Fishery News (Books) Ltd., London1990.
2. Prawn and prawn fisheries by Kurain and Sebestain.
3. Shankar KM & Mohan CV 2002. Fish and Shell Fish Health Management UNESCO.Publ. Sundermann CJ 1990.
4. Johnson SK 1995. Hand book of shrimp diseases Texas A & M university, Texas.
5. Guland J.A. (ed) 1984. Penaeid Shrimps – Their Biology and Management.
6. Raymond T et al., 1990. Crustacean Sexual Biology, Columbia University Press, NewYork.

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Aquaculture Practical - III

w.e.f. 2024-2025.

Title: Brackish Water Aquaculture

Model Practical Paper

Code: **23AQMAP234** **Max Marks: 50 (CIA+ SEE)**

Time : 3 Hrs

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III. Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

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Title of the Paper: **Aquarium management and Ornamental fish Culture**

Semester: - V

Course Code	**AQTSET01**	Course Delivery Method	Class Room/Blended Mode -Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2022-23	Year of offering 2024-2025	Year of Revision –	Percentage of Revision:

I. Learning Outcomes:

After successful completion of this course student will be able to

CO 1	Understand the design and construction of aquarium
CO 2	Identify the ornamental fresh water fishes
CO 3	Identify the marine ornamental fish resources
CO 4	Know the mass production of ornamental fishes
CO 5	Identify the Major marine ornamental fish resources of India. Method of collection of live fish.

Syllabus: Aquarium management and Ornamental fish Culture

Unit	Learning Units	Lecture Hours
I	**Aquarium design and Construction** **Introduction** to aquarium. World aquarium trade and present status. Design and construction of home and public aquaria (freshwater andmarine), oceanarium. Aquarium accessories - Aerators, filters (different types) and lighting. Water quality requirements.	**9**
II	**Aquarium Management** Setting up of aquarium – under gravel filter, pebbles, plants, drift wood, ornamental objects and selection of fishes, Quarantine measures. Aquarium maintenance and water quality management for fresh water and marine aquariums. Handling, care, packing and transportation of fishes - Use of anesthetics. Temperature acclimation	**9**
III	**Freshwater Ornamental Fishes** Species of ornamental fishes - their taxonomy and biology- Live bearers, Gold fish and Koi, Gourami, Barbs and Tetras, angel fish, cichlids. Maturation, secondary sexual characters, breeding habits, spawning, parental care, fertilization and development of eggs. Hatching, larval rearing and their health.	**9**
IV	**Commercial Production** Commercial production of goldfish, live bearers, gouramies, barbs and tetras, angel fish. Natural ponds for the mass production of ornamental fishes. Multiplication of aquarium plants – different methods.	**9**
V	**Marine Ornamental Fishes** Marine ornamental fishes – varieties and their habitat. Major marine ornamental fish resources of India. Method of collection of live fish. Breeding of marine ornamental fishes (clown fishes and Damsel fishes).	**9**

References

1. Alappat, H.J. & A. Biju Kumar 1996. Aquarium Fishes (A Colourful Profile). B.R. Publ., Delhi, 106 pp.
2. Atz, W. 1971. Aquarium Fishes. Pelham Books Ltd., London, 110 pp.
3. Axelrod, H.R. & W. Vorderwinkler 1962. Encyclopedia of Tropical Fishes with SpecialEmphasis on Techniques of Breeding. TFH. Publ., Inc., NJ, 763 pp.
4. Biju Kumar, A. & H.J. Alappat 1996. A Complete Guide to Aquarium Keeping. Books for All, Delhi,80 pp.
5. Dholakia, A.D. 2009. *Ornamental fish Culture & Aquarium Management.* Daya Publishing House, Delhi, 313pp.
6. Faulkner, D. & J.W. Atz 1971. Aquarium Fishes, Their Beauty, History and Care. PelhamBooks, London, 110 pp.
7. Favre, H. 1977. Dictionary of the Freshwater Aquarium. Wardlock Ltd., London, 160 pp.
8. Frey, H. 1961. Illustrated Dictionary of Tropical Fish. TFH. Publ. Inc., NJ, 768 pp.
9. Gohm, D. 1984. Tropical Fish. Hamlyn Publ. Group Ltd., London, 143 pp.
10. Gopakumar G. 2011. *Marine Ornamental fish Culture: Package of Practices*. CMFRI Cochin. 100pp.
11. ICAR 2011. Handbook of Fisheries and Aquaculture. ICAR, New Delhi, 1116 pp.
12. Innes, W.T. 1953. Exotic Aquarium Fishes. Innes Publ. Co., Philadelphia, 533 pp.
13. Kurup, M.B. 2008. Ornamental Fish Farming, Breeding and Trade. Dept. Fish., Govt. Kerala, 280pp.
14. Meenakshi, J., N.K. Yadava & R.K. Gupta. 2010. *Freshwater Ornamental Fishes.* MangalamPubications, Delhi, 397pp.
15. Mills, D. 1981. The Tropical Aquarium. Salamander Books Ltd., London, pp.
16. Mills, D. 1984. A Fish Keepers Guide to the Tropical Aquarium. Salamander Books, Ltd.,London, 115 pp.
17. Mills, D. 1987. The Practical Encyclopedia of the Marine Aquarium. Salamander BooksLimited, London.
18. Petrovicky, I. 1988. Aquarium Fish of the World. Hamlyn Publ. Group Ltd., London, 499 pp.

A.G & S.G.S. DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU – 521165,
KRISHNADt., A. P. (AUTONOMOUS)
SEMESTER-V (Model Question paper)

Paper Title: **Aquarium management and Ornamental Fish Culture** w.e.f.- 2022-2023

Paper Code: AQTSET01

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

Part– A

Answer all questions **Each question carries four marks. 5X4=20**

1.a). Write short notes on Aerators
or
b). Explain about Oceanarium.
2. a).Use of anesthetics
or
b).Explain the Drift wood
3. a). Biology of Gourami
or
b).Secondary sexual characters
4. a).Commercial production of goldfish.
or
b).Multiplication of aquarium plants – different methods
5. a).Breeding of marine ornamental fishes
or
b).Write any two marine ornamental fishes

Part – B

Answer all questions. **Each question carries Ten marks. 5X10=50**

6.(a) Write an essay on World aquarium trade and present status?
OR
(b) Write an essay on Design and construction of home and public aquaria?
7.(a) Explain about Aquarium maintenance and water quality management for fresh water and marine aquariums?
OR
(b) Write about packing and transportation of fishes?
8 (a). Give an account of parental care in Ornamental fishes?
OR
(b) Write in detail about the fertilization and development of eggs?
9.(a) Write an essay on. natural ponds for the mass production of ornamental fishes?
OR
(b) Explain about Commercial production of gold fish ?

10(a). Discuss about the Breeding of marine ornamental fishes?
OR
(b) Write an essay on method of collection of live fish.

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

AQUACULTURE PRACTICAL - V

w.e.f. 2022-2023.

PRACTICAL SYLLABUS Code: **AQTSEP01**

(2hrs/week)

Credits: 01 MAX.MARKS: 50.

Title of the paper: - Aquarium management and Ornamental Fish Culture

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1.Fresh water Ornamental fishes (Exotic-Goldfish, Angel, Tiger barb, Sword tail, Fighter fish,Oscar.

2. Indigenous- Dwarf Gourami, Indian glass fish, Zebra Danio, Y loach, Peacock eel, Rosy barb) – characters with diagrams – record work

3.Aquarium accessories (Aerators/filters/decors/feeding equipment/heaters/pumps/lights)

4.Aquarium plants (6 species)

5.Aquarium setting (Freshwater)

6.Aquarium fabrication and maintenance

7.Breeding trials on selected aquarium fishes.

II. Lab References:

1. Atz, W. 1971. Aquarium Fishes. Pelham Books Ltd., London, 110 pp.
2. https://www.agrifarming.in/ornamental-fish-farming-beginners
3. http://ecoursesonline.iasri.res.in/course/view.php?id=297
4. https://agritech.tnau.ac.in/fishery/fish_cul_ornamental.html
5. https://nfdb.gov.in/PDF/E%20Publications/4%20Mission%20Ornamental%20Fisheries%202017.pdf

Co-Curricular Activities

Mandatory: (Student training by teacher in field skills: Total 15 hrs., Lab:10 + field 05)

For Teacher: Training of students by the teacher in the classroom or in the laboratory for atotal of not less than 10 hours various concepts aquarium – types –models- aquarium maintenance- ornamental fish culture-commercial production- importance - marketing

For Student: Individual laboratory work and visit to local aquarium for observation of aquarium fishes- aquarium accessories- ornamental fishes- marketing and maintenance

Max marks for Field Work Report: 05.

Suggested Format for Field work

Name of the aquarium /shop visited, date of visit, persons contacted, details of aquarium maintenance - details observed in marketing - breeding of ornamental fish - important points to be correlated with the theory/ practical curriculum in relation to ornamental fisheries

Unit tests (IE).

Suggested Co-Curricular Activities

Preparation of aquarium

Ornamental fish breeding

Listing out accessories of aquarium

Seminar, Invited lecture, Assignment, Group discussion. Quiz, Collection of Material,

Video preparation et

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Aquaculture Practical
Model Practical Paper

w.e.f. 2022-20253

Title: Aquarium management and Ornamental Fish Culture Code: AQUSEP01

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva	**2M**
III.Record	**8M**
Total	**35M**
B. Continuous Internal Assessment	**15M**
Total (A+ B**)**	**50M**

ADUSUMILLI GOPALAKRISHNAIAH & SUGAR CANE GROWERS SIDDHARTHA DEGREECOLLEGE OF ARTS & SCIENCE, VUYYURU-521165, KRISHNA Dt., A.P. (AUTONOMOUS).

NAAC reaccredited at 'A 'level
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Certified

Title of the Paper: **Post harvest technology fish and fisheries**
Semester: - V

Course Code	**AQTSET02**	Course Delivery Method	Class Room/Blended Mode -Both
Credits	3	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2022-23	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:

Objective of the course :- To prepare students to become future aqua culturists.

CO 1	Identify the types of preservation methods employed in aquaculture
CO 2	Choose the suitable processing methods in aquaculture
CO 3	They can earn while they learn
CO 4	Maintain the standard quality control protocols laid down in aqua industry
CO 5	Identify the best Seafood quality assurance system

Syllabus: Post harvest technology fish and fisheries

Unit	Learning Units	Lecture Hours
I	**Handling and Principles of fish Preservation** Handling of fresh fish, storage and transport of fresh fish, post mortem changes -rigor mortis and spoilage. spoilage in marine fish and fresh water fish. Principles of preservation – cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays	9
II	**Methods of fish Preservation** Traditional methods - sun drying, salt curing, pickling and smoking. .Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).	**9**
III	**Processing and preservation of fish and fish by-products** Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure. Fish by-products – fish glue, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.	**9**
IV	**Sanitation and Quality control** Sanitation in processing plants - Environmental hygiene and Personal hygiene in processing plants. Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing	**9**
V	**Quality Assurance, Management and Certification** Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety. National and International standards – ISO 9000: 2000 Series of Quality Assurance System, Codex Aliment Arius.	**9**

A.G & S.G.S. DEGREECOLLEGE OF ARTS & SCIENCE, VUYYURU – 521165,
KRISHNA Dt., A.P. (AUTONOMOUS)
SEMESTER-V (Model Question paper)

Paper Title: **Post harvest technology of fish and fisheries** **w.e.f.- 2022-2023**

Paper Code: AQTSET02

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

Part– A

Answer all questions. **Each question carries four marks 5x4=20**

1.a). Write short notes on Post mortem changes
or
b). Explain about Cleaning,
2.a). Sun drying,
or
b) Canning,
3a). Explain about Chitosan
or
b). Write short notes on fish maws
4.a) Pre-processing control
Or
b). Control after processing
5.a).Codex Aliment Arius.
Or
b). Standard Operating Procedures

Part – B

Answer all questions. **Each question carries Ten marks. 5X10=50**

6.(a) Give a detailed account on handling of fresh fish and storage fish
OR
(b) Describe the processes principles of preservation
7.(a) Explain Traditional methods of fish drying
OR
(b) Explain any four advanced methods fish products?11 8. (a).
Describe any four fish by products?
OR
(b) Explain any four fish products?

9.. (a) Give a detailed note on sanitation in processing plant.
OR
(b) Describe the process of quality control in processing plants?
10.(a). Write about National and International standards for quality control?
OR
(b) National and International standards – ISO 9000: 2000?

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AQUACULTURE PRACTICAL - V

w.e.f. 2022-2023.

PRACTICAL SYLLABUS Code: **AQTSEP02**

(2hrs/week)

Credits: 01 MAX.MARKS: 50.

Title of the paper: - Post harvest technology of fish and fisheries

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Practical Syllabus:

1. Evaluation of fish/fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish
3. Examination of salt, protein, moisture in dried/cured products
4. Examination of spoilage of dried/cured fish products marinades, pickles, sauce.
5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards–preparationof Hazard analysis work sheet
7. Corrective action procedures in processing of fish-flowchart-work sheet preparation

References:

Balachandran KK. 2001. *Post-harvest Technology of Fish and Fish Products*. Daya Publ.

2. Bond, et al. 1971. *Fish Inspection and Quality Control.*Fishing News Books, England.

Websites of Interest:

Https://www.youtube.com/watch?v=xyf_g7fku-4

https://www.youtube.com/watch?v=bvtqb_ccmy4

Co-Curricular Activities

a) Mandatory: *(Lab/field training of students by teacher (lab 10 + field 05):* 1. For Teacher: Training of students by the teacher in laboratory/fieldfornotlessthan15hourson various steps of post-harvest techniques of fishes, on the advanced techniques in post-harvest technology – Training of students on other employability skills in the Post-harvest sector of Aquaculture Industry- like Processing, Packing, marketing of processed aqua products. 2. For Student: Students shall (individually) visit - Any fish/shrimp Processing Plant/Packing industry and makeobservations on post harvesting techniques and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.

3. Max marks for Fieldwork/Project work Report: 05.

4. Suggested Format for Fieldwork/Project work: *Title page, student details, index page, details ofplace visited, observations made, findings and acknowledgements.*

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Aquaculture Practical
Model Practical Paper

w.e.f. 2022-20253

Title: Post Harvest Technology Code: AQUSEP02

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva	**2M**
III.Record	**8M**
Total	**35M**
B. Continuous Internal Assessment	**15M**
Total (A+ B**)**	**50M**

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Siddhartha Degree College of Arts & ScienceVuyyuru

(An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam)

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2024-25

MINUTES OF BOARD OF STUDIES

B.Sc. BZC & B.Sc. Honours Zoology

2024-2025

I,III&VSEMESTERS

31st August 2024

DEPARTMENT OF ZOOLOGY

ODD SEMESTER

31-08-2024

ADUSUMILLI GOPALA KRISHNAIAH & SUGARCANE GROWERS SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE, VUYYURU

(An Autonomous College in the Jurisdiction of Krishna University, Machilipatnam)

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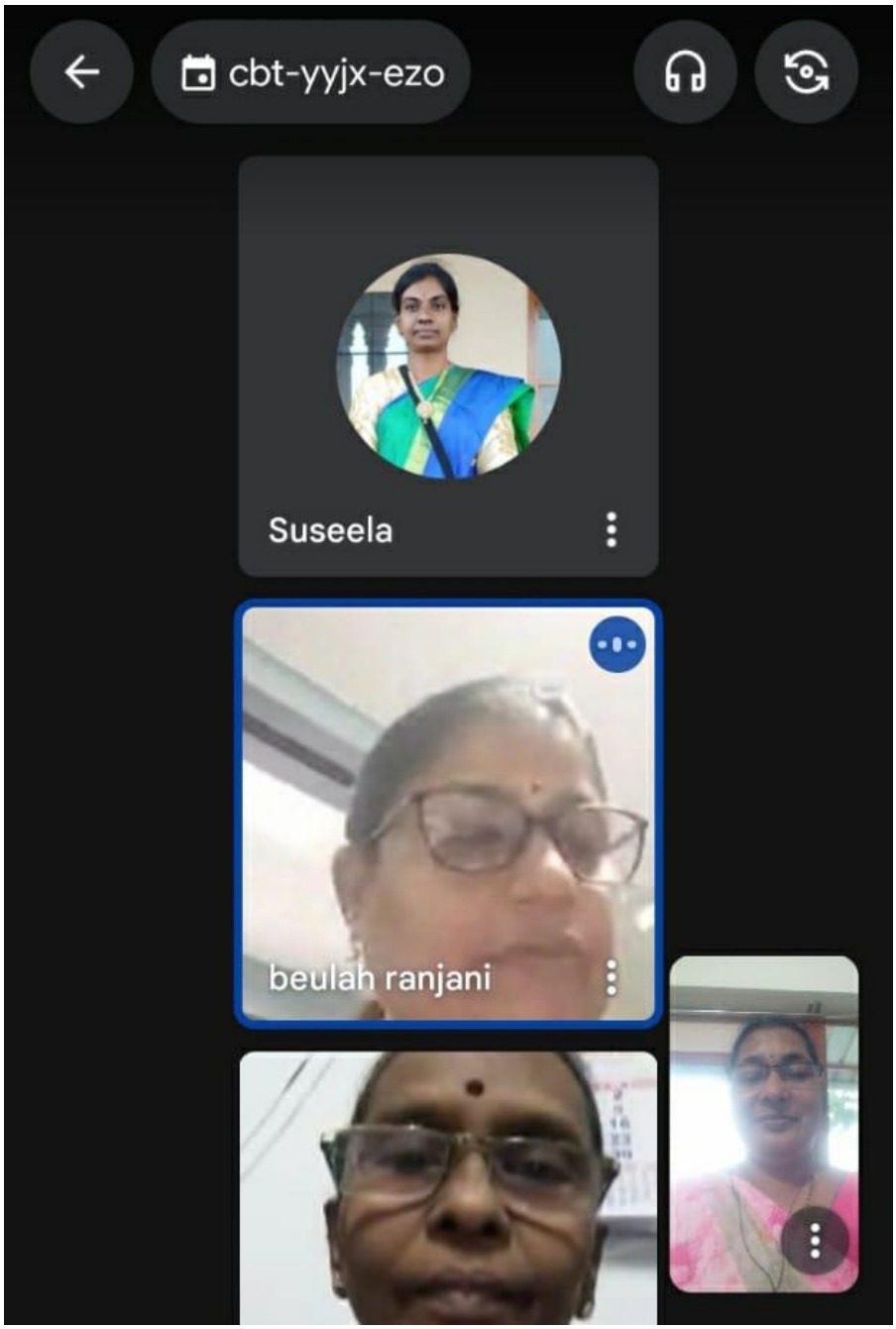
DEPARTMENT OF ZOOLOGY

BOARD OF STUDIES MEETING: 31st August 2024

Minutes of meeting of Board of Studies of Department of Zoology was convened at 10:30 am on 31/08/2024 under the chairmanship of Smt. D.A. Kiranmayee, Head of the Department. The members present have discussed various aspects such as changes to be made in the syllabi, scheme of Evaluation and Blue print both for theory and practical papers, Departmental activities for I, III & V semester for the academic year 2024-2025 in online mode

The following members were present.

S.No	Name	Designation	Signature
1.	**Smt. D.A.Kiranmayee** Head, Department of Zoology A.G&S.G.Siddhartha Degree College of Arts & Science,Vuyyuru	Chair person	
2	**Smt. Dr.L.Suseela,** Assistant. Professor of Biotechnology. Krishna University, Machilipatnam.	University Nominee	
3	**Sri. Dr. A. Samba Naik,** Lecturer, department of zoology PB Siddhartha college of Arts and science, Vijayawada	Subject Expert	
4.	**Sri. G. Ravi Teja,** Lecturer, department of zoology Govt.College Autonomous Rajamundry.	Subject Expert	
5.	**Sri.B. Appala Naidu,** Asst. Project Manager, RGCA, Manikonda	Industrialist	
6.	**Smt.Dr.V.Subhashini,** Lecturer in Zoology,A.G & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
7	**Smt. K. Padmaja,** Lecturer in Zoology,A.G & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru	Member	
8.	**Sri.Ch.Chiranjeevi,** Research Scholar, Dept.of Botany & Microbiology, Acharya Nagarjuna University, Guntur.	Alumni	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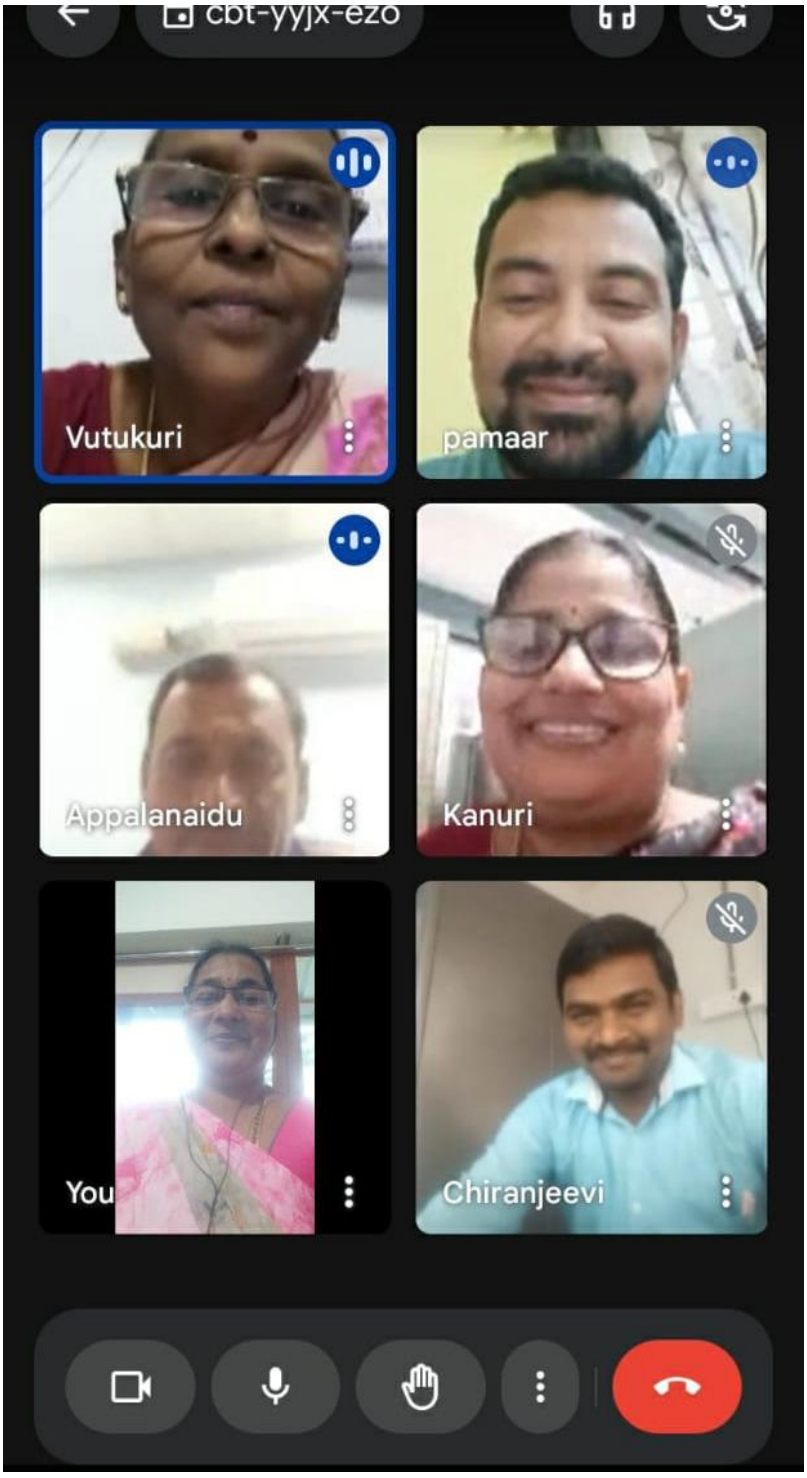
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DEPARTMENT OF ZOOLOGY

Agenda

1. To recommend the introduction of **B.Sc. Honours Zoology Minor,** to be introduced for the academic year 2024-2025.
2. To frame and recommend the syllabi (Theory & Practical) for third Semester of **II B.Sc. Honours in Zoology Major** for the academic year 2024-2025.
3. To review and recommend the syllabi (Theory & Practical) for V Semester of III B.Sc. B.Z.C for the academic year 2024-2025.
4.To review and recommend the Model question paper, Blue Print and Guidelines for Question paper setters for **III semesters of B.Sc. Honours in Zoology** & **V Semesters of III B.Sc. B.Z.C** for the academic year 2024-2025.
5. To introduce Value Added Course (Non-credits) on Diary Technology for III Semester of II B.Sc. Honours Zoology for the academic year 2024 – 2025.
6. To recommend the teaching and evaluation methods to be followed under Autonomous status.
7. Any other matter.

A. Kiranmayee

Chairman.

RESOLUTIONS:

1. It is resolved to introduce **B.Sc. Honours Zoology Minor** for the academic year 2024-2025 as recommended by BOS members.
2. It is resolved to implement the newly framed syllabus based on APSCHE syllabus (Theory & Practical), for III Semester of II B.Sc. **Honours Zoology Major** for the academic year 2024-2025.
3. It is resolved to continue the same syllabus (Theory & Practical), for V Semester of III B.Sc. Zoology for the academic year 2024- 2025.
4. It is resolved to continue the same Model question paper, Blue Print and Guidelines for Question paper setters for III &V Semesters of II B.Sc. Honours Zoology Major and III B.Sc. BZC for the academic year 2024-2025.
5. It is resolved to introduce Value Added Course (Non-Credits) on Diary Technology for III Semester of II B.Sc. Honours Zoology Major for the academic year 2024 - 2025.
6. It is resolved to implement the following Teaching and Evaluation methods to be followed under Autonomous status.

Evaluation procedure:

Internal Assessment Examination:

❖ Out of maximum 100 marks in each paper for III Semester of II B.Sc, Zoology Major 30 marks shall be allocated for internal assessment.

❖ Out of these 30 marks, 20 marks are allocated for announced tests (IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated for assignment and remaining 5 marks for attendance. There is no pass minimum for internal assessment for III Semester.

❖ Out of maximum 100 marks in each paper for V Semester of III B.Sc.BZC 30 marks shall be allocated for internal assessment.

❖ Out of these 30 marks, 20 marks are allocated for announced tests (IA-1& IA-2). Two announced tests will be conducted and average of these two tests shall be deemed as the marks obtained by the student, 5 marks allocated for assignment and remaining 5 marks for seminar. There is no pass minimum for internal assessment for V Semester.

Semester–End Examination:

❖ 70 marks are allocated for III Semester of second B.Sc. BZC in Semester End Examination. Even through thecandidate is absent for two IA exams / obtain zero marks, the external marks are considered (if the candidategets40/70) and the resultshallbe declared as“PASS”

❖ 70 marks are allocated for V Semester of III B.Sc. BZC in Semester End Examination. Even though thecandidate is absent for two IA exams / obtain zero marks, the external marks are considered (if the candidate gets 40/70) and the result shall be declared as “PASS.

A. Kiranmayee

Chairman.

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Animal Diversity-II Biology of Chordates **Paper V**

Course Code	**23ZOMAL231**	Course Title	**Animal Diversity-II Biology of Chordates**
Credits	**3**	CIA Marks	30
No. of Lecture Hours/ Week	3	Semester End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:
Semester	**III**	Type of the Course:	Skill Development
Course Relates to:	Global	Pre-requisites, if any	Basic knowledge in Vertebrates

Course Aims and Objectives:

S. No	COURSE OBJECTIVES
1	To understand the animal kingdom
2	To understand the taxonomic position of Protochordates to Mammalia.
3	To understand the general characteristics of animals belonging to Fishes, Amphibians, Reptiles, Aves and Mammals
4	To understand the body organization of Chordata.
5	To understand the taxonomic position of Protherian mammals

Course Outcomes

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

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Describe general taxonomic rules on animal classification of chordates.	**K1**	**1**	**1**
CO2	Classify and applythe taxonomic keys from Protochordates to Mammalia	**K3**	**2**	**1**
CO3	Understand Mammals with specific structural adaptations.	**K2**	**1**	**1**
CO4	Understand the significance of dentition and adaptations of aquatic mammals	**K2**	**1**	**1**
CO5	Understand the origin and evolutionary relationship of different phyla from Prochordata to Mammalia.	**K2**	**1**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX											
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	**1**							**1**			
CO2		**2**						**1**			
CO3	**1**							**1**			
CO4	**1**							**1**			
CO5	**1**							**1**			

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Syllabus: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES CC: 23ZOMAL231

Unit	Learning Units	Lecture Hours
I	1.1 General characters and classification of Chordata up to classes 1.2 Salient features of Cephalochordata, Salient features of Urochordata 1.3Structure and life history of Herdmania, Retrogressive metamorphosis – Process and Significance 1.4 Cyclostomata, General characters, Comparison of Petromyzon and Myxine **Assignment 1:** Prepare a Cladogram on Chordates **Assignment 2**: Preparation of chart on Retrogressive Metamorphosis	9
II	2.1 General characters of Fishes, Salient featuresof Dipnoi 2.2 Scoliodon: External features, Digestive system, Respiratory system 2.3 Scoliodon Structure and function of Heart, Structure and functions of the Brain. 2.4 Migration in Fishes, Types of Scales **Assignment 1**: Develop a conservation plan for Scoliodon, considering current threats and protection strategies. **Assignment 2**: Migration patterns ofa fish species known for its (e.g., salmon, eels, tuna)	9
III	3.1 General characters of Amphibia, General characters of Reptilia 3.2 Rana hexadactyla: External features, Respiratory system, Structure and function of Heart 3.3 Rana hexadactyla structure and functions of the Brain 3.4 Calotes: External features, Digestive system, structure and function of Brain 3.5 Identification of Poisonous snakes **Assignment 1:** Amphibian conservation issues and propose solutions. **Assignment 2:** Compare and contrast reptiles with amphibians. Create a poster or digital presentation summarizing your findings	9
IV	**UNIT - IV** 4.1 General characters of Aves 4.2 Columbalivia: External features, Digestive system, Respiratory system 4.3 Columba livia: Structure and function of Heart, and Brain 4.4 Migration in Birds, Flight adaptation in birds **Assignment 1:** Select a few migratory bird species and track their migration patterns. **Assignment 2:** Flight adaptation in birds	9
V	**Unit – V:** 5.1 General characters of Mammalia 5.2 Classification of Mammalia up to sub - classes with examples 5.3 Comparison of Prototherians, Metatherians and Eutherians 5.4 Dentition in mammals, Aquatic mammals Adaptations **Assignment 1:** Dentition in mammals **Assignment 2:**Aquatic mammals Adaptations	9

WEBLINKS:

https://youtu.be/2iwOPEGVHVY?si=dZ8Z55pgze6XmvyU

https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/cyclostome

https://www.notesonzoology.com/phylum-chordata/dogfish/external-features-of-dogfish-scoliodon-with-diagram-chordata-zoology/7558

https://youtu.be/aMGjmSOAXj8?si=KE0Zh8BCAzplmX_4

https://youtu.be/ye6Nlf_tNw4?si=jPYWKOO8qLWMv5xf

https://youtu.be/xgMzNW0Scug?si=gTIqkNItzP6uo-uh

https://dpbck.ac.in/wp-content/uploads/2022/03/Classification-of-mammals.pdf

Co-curricular activities (suggested)

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes Maintaining of aquarium by students
- Model of fish heart and brain
- Preparation of slides of scales of fishes
- Visit to local/nearby river to identify migratory fishes and prepare study notes Preparation of Charts on above topics by students (Eg: comparative account of vertebrate heart/brain/lungs, identification of snakes etc.)
- Collecting and preparation of Museum specimens with dead frogs/snakes/lizards etc., and/or their skeletons
- Additional input on types of snake poisons and their antidotes (student activity). Collection of bird feathers and submission of report on Plumology
- Taxidermic preparation of dead birds for Zoology Museum
- Map pointing of prototherian and metatherian mammals
- Chart preparation for dentition in mammals

REFERENCE BOOKS

- J.Z. Young, 2006. The life of vertebrates. (The Oxford University Press, New Delhi). 646 pages. Reprinted
- Arumugam, N. Chordate Zoology, Vol. 2. Saras Publication. 278 pages. 200 figs. A.J. Marshall, 1995. Textbook of zoology, Vertebrates. (The McMillan Press Ltd., UK). 852 pages. (Revised edition of Parker &Haswell, 1961).
- M. EkambaranathaAyyar, 1973. A manual of zoology. Part II. (S. Viswanathan Pvt. Ltd., Madras).
- P.S. Dhami& J.K. Dhami, 1981. Chordate zoology. (R. Chand & Co.). 550 pages. Gurdarshan Singh & H. Bhaskar, 2002. Advanced Chordate Zoology. Campus Books, 6 Vols., 1573 pp., tables, figs.
- A.K. Sinha, S. Adhikari& B.B. Ganguly, 1978. Biology of animals. Vol. II. Chordates. (New Central Book Agency, Calcutta). 560 pages.
- R.L. Kotpal, 2022. Modern textbook of zoology, Vertebrates. (Rastogi Publ., Meerut). 632 pages. E.L. Jordan & P.S. Verma, 1998. Chordate zoology. (S. Chand & Co.). 1092 pages. G.S. Sandhu, 2005. Objective Chordate Zoology. Campus Books, vii, 169 pp.
    - Sandhu, G.S. & H. Bhaskar, H. 2004. Textbook of Chordate Zoology. Campus Books, 2 vols., xx, 964 p., figs.
    - Veena, 2008. Lower Chordata. (Sonali Publ.), 374 p., tables, 117 figs.

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III SEMESTER END EXAMINATIONS

PAPER – V

MODEL PAPER **Course Code:23ZOMAL231**

Title of the paper:Animal Diversity-II Biology of Chordates

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

Note: Draw neat labeled Diagrams wherever necessary.

SECTION-A

Answer all questions. 5X4= 20M

Each question carries 4 marks

1. a) Describe the General characters of Chordata

Or

b)Write a short note on Salient features of Urochordata

2. a) Describe theSalient features of Dipnoi

Or

b) Write a short note on Placoid scale in fishes

3.a) Give an account of General characters of Amphibia

Or

b) Explain thestructure and function of Brain in calotes

4. a) Explainstructure ofQuill feather in Columba livia

Or

b) Explain the structure of air sacs in Columba livia

5. a) Why are Prototherians the connecting link between reptiles and mammals

Or

b) Explain the general characters of Mammalia

SECTION-B

Answer all the Questions .5X10=50M

6.a) Describe theprocess and significance of Retrogressive metamorphosis in Herdmania

(Or)

b) Compare the characters of Petromyzon and Myxine

7.a)Explain Respiratory systemin Scoliodon

(Or)

b) Describe the Migration in Fishes

8.a) Describe thestructure and function of Heart in Rana hexadactyla

(Or)

b) How do youidentify thepoisonous snakes from non-poisonous snakes

9.a) Write an essay on Migration in Birds

(Or)

b) Describe the mechanism of flight adaptations in birds

10. a) Write an essay on Dentition in mammals

(Or)

b) Describe the adaptations of Aquatic mammals

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

PRACTICAL -V **w.e.f: 2024-25**

Paper Title: **Animal Diversity-II Biology of Chordates** **Code: 23ZOMAP231**

MAX.MARKS: 50

(2hrs/week)

Credits: 01

PRACTICAL SYLLABUS

SEMESTER-III COURSE 5: ANIMAL DIVERISTY-II BIOLOGY OF CHORDATES

LEARNING OBJECTIVES

- To understand the importance of preservation of museum specimens
- To identify animals based on special identifying characters
- To understand different organ systems through demo or virtual dissections
- To maintain a neat, labelled record of identified museum specimens

SYLLABUS:

1. Protochordata: Herdmania, Amphioxus, Amphioxus T.S through pharynx.
2. Cyclostomes: Petromyzon and Myxine.
3. Pisces: Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla,Clarius, Channa, Anguilla.
4. Amphibia: Ichthyophis, Amblystoma, Axolotl larva, Hyla,
5. Reptilia: Draco, Chamaeleon, Uromastix, Testudo, Trionyx, Russels viper, Naja, Krait, Hydrophis, Crocodile.
6. Aves: Psittacula, Eudynamis, Bubo, Alcedo.
7. Mammalia: Ornithorhynchus, Pteropus, Funambulus.
8. Dissections-As per UGC guidelines

a. Scoliodon IX and X Cranial nerves

Scoliodon V and VII Cranial nerves

d. Mounting of fish scales

Note: 1. Dissections are to be demonstrated only by the faculty or virtual

2.Laboratory Record work shall be submitted at the time of practical examination.

RFERENCE WEB LINKS:

https://nt7-mhe-complex-assets.mheducation.com/nt7-mhe-complex-assets/Upload20190715/InspireScience6-8CA/LS15/index.html

- https://themammallab.com/
- http://abacus.bates.edu/acad/depts/biobook/LabConCh.htm
- https://virtualzoology.wordpress.com/scoliodon/
- http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru (Autonomous)
Zoology Practical

w.e.f. 2024-2025.

Title: Animal Diversity-II Biology of Chordates **Code: 23ZOMAP231**

Model PracticalPaper

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III.Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

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NAAC reaccredited at 'A 'level

Autonomous –ISO 9001-2015 Certified

Course Code	**23ZOMAL232**	Course Title	**Principles of Genetics**
Credits	**3**	CIA Marks	30
No. of Lecture Hours/ Week	3	Sem End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:
Semester	**III**	Type of the Course:	Employability &Skill Development
Course Relates to:	Global	Pre-requisites, if any	Basics of recombinant DNA technology

Course Aims and Objectives:

S. No	COURSE OBJECTIVES
1	Providing the background knowledge on the history of genetics and the importance of Mendelian principles
2	Providing the required knowledge on the gene interactions
3	Acquainting the students, distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance and extra chromosomal inheritance.
4	Understanding the principles of sex determination in animals with a reference to human being, and sex-linked inheritance
5	Understanding the human karyotyping and the concept of pedigree analysis basics.

Course Outcomes

At the end of the course, the student will / will be…

NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Gain knowledge on basic terminology of genetics	K1	5	1
CO2	Understand various types of gene interactions and inheritance patterns existing in animals with reference to non-Mendelian inheritance.	K2	5	1
CO3	Understand and gain knowledge on multiple alleles and Extra-chromosomal inheritance	K2	5	1
CO4	Applying several aspects of genetics involved in sex determination.	K3	5	1
CO5	Analyzing human karyotyping, pedigree analysis and chromosomal disorders, concepts of proteomics and genomics	K4	6	1

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO-PSO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	CO1					1	2	3	1
CO2	CO2					1	2	3	1
CO3	CO3					1	2	3	1
CO4	CO4					1	2	3	1
CO5						1	2	3	1

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Structure:

Syllabus: Principles of Genetics **CC: 23ZOMAL232**

Unit	Learning Units	Lecture Hours
I	**Unit – I: Introduction to Genetics** 1.1 History of Science of Genetics: Concepts of Genotype and Phenotype, Heredity and Variation, Pure lines and Inbreed Lines 1.2 Mendelian principles on Monohybrid cross, Backcross, and Testcross. 1.3 Mendelian principles on Dihybrid cross **Assignment 1**: Mendelian Monohybrid cross **Assignment 2:** Mendelian dihybrid cross **Activity:** Two Problems on Mendelian Principles	9
II	**Unit – II: Linkage, Crossing over and Gene interactions** 2.1Linkage: Definition, Types of Linkages- Complete Linkage and Incomplete Linkage, Significance of Linkage 2.2 Crossing over: Definition, Mechanism of Crossing over, Kinds of Crossing over, Significance of Crossing over. 2.3 Allelic Gene Interactions: Incomplete Dominance, Co-dominance, Pleiotropy 2.4 Non- allelic Gene Interactions: - Epistasis – Dominant and Recessive Epistasis, Lethal alleles and their inheritance with an example. **Assignment 1**: Incomplete dominance. **Assignment 2:** Lethal genes	9
III	**Unit – III: Multiple Alleles and Extra chromosomal inheritance** 3.1Multiple alleles: Characteristics of multiple alleles; Blood group inheritance 3.2 Rh inheritance: Erythroblastosis foetalis 3.3Polygenes: Characteristics of polygenes and Examples: Eye Colour in Drosophila, Skin colour in Humans 3.4 Extra chromosomal inheritance – Kappa particles in Paramecium and Shell coiling in snails **Assignment 1:** Blood group Inheritance **Assignment 2:** Kappa particles in Paramecium **Activity:** Case study on blood groups other than ABO types / Erythroblastosis foetalis	9
IV	**Unit – IV: Sex determination and Sex-Linked inheritance** 4.1Chromosomal theory and Genic balance theory of Bridges 4.2 Environment and sex determination: Hormonal control of sex determination. Gynandromorphs / Intersexes, Super sexes in Drosophila. 4.3Sex-Linked Inheritance: X-Linked inheritance (Red green colour blindness, Hemophilia) 4.4 Y-Linked inheritance (Characteristics of Y Linked Inheritance and Y linked Disorders) XY-Linked Inheritance **Assignment 1:** Prepare a ppt on chromosomal theory of sex determination. **Assignment 2:** Prepare ppt on gynandromorphs, intersexes in Drosophila.	9
V	**Unit – V: Human Genetics** 5.1 Human karyotyping, Pedigree Analysis (basics) 5.2Autosomal Recessive Disorder-Sickle cell anemia – causes, treatment, inheritance pattern, modes of testing and prevention 5.3 Autosomal Dominant disorder- Huntington disease 5.4 Basics on Genomics and Proteomic **Assignment 1:** List out the rules for pedigree analysis with examples. **Assignment 2:** List out Autosomal recessive and dominant disorders in human being and explain them.	9

WebLinks:

https://www.omim.org/

https://www.ncbi.nlm.nih.gov/books/NBK132145/

https://www.dnaftb.org/1/links.html

Textbooks:

1. Gupta, P.K. 2007. Genetics. Rastogi Publications, Meerut.
2. Pundhan Singh, 2000. Elements of Genetics. Kalyani Publishers, Ludhiana.
3. Singh, B.D. 2007. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.

References

1. Robert H. Tamarin, seventh edition, principles of genetics TATA McGRAW-HILL EDITION, New Delhi.
2. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
4. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.

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III SEMESTER END EXAMINATIONS

PAPER – VI

MODEL PAPER

Title of the paper: Principles of Genetics **Course Code:23ZOMAL232**

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

Answer All questions.

Each question carries 4 Marks. **Max Marks:5x4= 20**

Section A

1 (a) Describe law of dominance with an example. K1

OR

(b) Differentiate between Genotype and Phenotype K1

2 (a) Distinguish between complete and incomplete linkages K2

OR

(b) What do understand about Complementary genes K2

3 (a) Review Erythroblastosis foetalis K2

OR

(b) List out the characteristics of polygenes K2

4 (a) Review the relation between environment and sex determination K3

OR

(b) Elaborate gynandromorphy in Drosophila K3

5 (a) Describe autosomal recessive disorder Sickle cell anaemia. K4

OR

(b) Describe autosomal dominant disorder Huntington Chorea K4

Section B

Answer All questions.

Each question carries 10 Marks.**Max: Marks: 50**

6 (a) Explain the principle deduced from dihybrid cross of Mendel with an example? K1

OR

(b) What is the law deduced from Monohybrid cross of Mendel? Explain K1

7 (a) Define and explain the mechanism of Crossing over K2

OR

(b) What do you mean by lethal genes? Explain their inheritance with an exampleK2

8 (a) What are multiple alleles? Explain them with Blood group inheritance. K2

OR

(b) Explain Extra chromosomal inheritance with the example of Kappaparticles in Paramecium. K2

9 (a) Describe the Chromosomal theory of sex determination. K3

OR

(b) Describe the X-Linked inheritance with an example K3

10 (a) Create a pedigree and analyse it. K4

OR

(b) Describe the differences between proteomics and genomics. K4

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III SEMESTER END EXAMINATIONS

SEMESTER-III

PAPER – VI

Practical Syllabus

Course Code:23ZOMAP232

Title of the paper: Principles of Genetics **Course Code:23ZOMAP232**

2 Hours/week

Credits: 1 **Max. Marks: 40**

Learning Objectives

- To acquire practical knowledge on the importance of Mendelian principles by solving the problems.
- To provide the required knowledge on the gene interactions
- To acquaint the students on Human karyotype & pedigree analysis basics
- To understand the various genetic concepts through Virtual labs

SYLLABUS:

1. Study of Mendelian inheritance using suitable examples/Problems
2. Study of linkage recombination, gene mapping using the data
3. Study of human karyotypes
4. Blood grouping and Rh in humans
5. Demonstration of prenatal diagnosis (Virtual lab).
6. Amniocentesis demo or virtual lab
7. Demonstration of Ultrasonography (Virtual lab).
8. Scoring dysmorphic features in syndromic patients
9. Genetic Counselling methods based on case history
10. Construction and analysis of Pedigree

Rference Web Links:

- https://www.iitg.ac.in/cseweb/vlab/anthropology/Experiments/Mendels%20law/index.html
- https://learn.genetics.utah.edu/content/labs/
- https://virtuallabs.merlot.org/vl_biology.html
- https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/
- https://jru.edu.in/studentcorner/lab-manual/agriculture/Fundamentals%20of%20Genetics.pdf
- https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1008&context=ny_oers
  - https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory-Manual-17-18.pdf
  - https://www.rlbcau.ac.in/pdf/Agriculture/AGP%20113%20%20Fundamentals%20of%20Genetics .pdf
  - https://coabnau.in/uploads/1610707528_GPB3.2PracticalManual-Final.pdf *****

A.G. & S.G. Siddhartha Degree College of Arts & Science, Vuyyuru (Autonomous)
Aquaculture Practical – III
Model Practical Pape

w.e.f. 2024-2025.

Title: Principles of Genetics Code: **23ZOMAP232**

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva	**2M**
III.Record	**8M**
Total	**35M**
B. Continuous Internal Assessment	**15M**
Total (A+ B**)**	**50M**

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NAAC reaccredited at 'A 'level

Autonomous –ISO 9001-2015 Certified

Course Code	**23ZOMAL233**	Course Title	**Animal Biotechnology**
Credits	**3**	CIA Marks	30
No. of Lecture Hours/ Week	3	Sem End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:
Semester	**III**	Type of the Course:	Employability &Skill Development
Course Relates to:	Global	Pre-requisites, if any	Basics of recombinant DNA technology

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To provide knowledge on animal cell and tissue culture and their preservation To understand principles of animal culture, media preparation.
2	To empower students with latest biotechnology techniques like stem cell technology, genetic
3	To explain in vitro fertilization, embryo transfer technology and other reproduction manipulation methodologies.
4	To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins
5	To understand principles of animal culture, media preparation.

Course Outcomes

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Get knowledge of the Vectors and Restriction enzymes used in biotechnology	**K1**	**1**	**1**
CO2	Describe the gene delivery mechanism and PCR technique	**K2**	**1**	**1**
CO3	Acquire basic knowledge on media preparation and cell culture techniques	**K3**	**1**	**1**
CO4	Understand the manipulation of reproduction with the application of biotechnology	**K4**	**1**	**1**
CO5	Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.	**K5**	**1**	**1**

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyse; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1	**1**							**1**	
CO2	**1**							**1**	
CO3	**1**							**1**	
CO4	**1**							**1**	
CO5	**1**							**1**	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Syllabus: Animal Biotechnology **CC:23ZOMAL233**

Unit	Learning Units	Lecture Hours
I	**Enzymes and Vectors** 1.1 Mode of action, nomenclature, Restriction modification systems: Types I, II and III. 1.2 Applications of Type II restriction enzymes in genetic engineering 1.3 DNA modifying enzymes and their applications: DNA polymerases. Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases 1.4 Cloning Vectors: Plasmid vectors: p BR and p UC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs **Assignment 1:** Explain different types of restriction enzymes **Assignment 2:** Explain different enzymes in DNA modification system **Activity 1:** Discussion about various cloning vectors and plasmids with examples	9
II	2.1 Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral mediated delivery 2.2 PCR: Basics of PCR. 2.3 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing 2.4 Hybridization techniques: Southern, Northern and Western blotting. **Applications:** **Assignment 1:** Prepare PPT on PCR and its applications **Assignment 2:**Seminar on Blotting techniques	9
III	3.1 Natural and Synthetic Cell cultures: primary culture, secondary culture, continuous cell lines 3.2 Organ culture; Cryopreservation of cultures. 3.3 Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb 3.4 Stem cells: Types of stem cells, applications **Assignment 1:** Prepare PPT on Cryopreservation techniques **Assignment 2:** prepare PPT on Hybridoma technology	9
IV	4.1 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization 4.2 Manipulation of reproduction in animals: Super ovulation, Embryo transfer, Embryo cloning 4.3 Transgenic Animals: Strategies of Gene transfer 4.4 Transgenic - sheep, - fish; applications **Assignment 1:** Comparison betweenArtificial Insemination, In vitro fertilization **Assignment 2:** Strategies of Gene transfer **Activity:**Visit to laboratory for observation of Artificial Insemination, In vitro fertilization/model preparation of transgenic animal	9
V	5.1 DNA fingerprinting 5.2 Application of biotechnology in fisheries – monoculture in fishes, polyploidy in fishes 5.3 Gene therapy-application 5.4 Bio informatics- concept-definition-database types **Assignment 1:** Prepare PPT on DNA finger printing **Assignment 2:** Prepare PPT on applications of Biotechnology in various disciplines	9

Web Links

https://microbenotes.com/recombinant-dna-technology-steps-applications-and-limitations/

https://microbenotes.com/cloning-vectors/

https://byjus.com/biology/difference-between-electroporation-and-microinjection/

https://microbenotes.com/pcr-principle-enzymes-steps-types-uses/

https://www.khanacademy.org/science/ap-biology/gene-expression-and-regulation/biotechnology/a/dna-sequencing

https://byjus.com/neet/difference-between-northern-southern-and-western-blotting/

https://microbenotes.com/animal-cell-culture/

https://www.geeksforgeeks.org/cryopreservation/

https://www.news-medical.net/life-sciences/Monoclonal-Antibodies.aspx

https://byjus.com/biology/stem-cells/

https://www.biologydiscussion.com/reproductive-technology/artificial-breeding-of-animals-4-approaches/10049

https://www.davuniversity.org/images/files/study-material/transgenic%20animal.pdf

Text Books:

- Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
- Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
- P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
- B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

References:

- Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press
- Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
- Brown TA. (2007). Genomes-3. Garland Science Publishers

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III SEMESTER END EXAMINATIONS

PAPER – VIMODEL PAPERCourse Code:23ZOMAL233

Title of the paper: Animal Biotechnology

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

Answer All questions.

Each question carries 4 Marks. **Max Marks:5x4= 20**

Section A

1 (a) Describe the mode of action and nomenclature of Restriction enzymes

OR

(b) Write short notes on DNA polymerases K1

2 (a) Explain the process of Gene delivery by Microinjection method

OR

(b) What do understand about PCR.

3 (a) Write short notes on Cryopreservationof cultures

OR

(b) List out the characteristics of primary culture,

4 (a) Review the Strategies of Gene transfer

OR

(b) Explain Transgenic sheep

5 (a) Describe the concept of Bio- informatics

OR

(b) Describe polyploidy in fishes

Section B

Answer All questions.

Each question carries 10 Marks. **Max: Marks:5x10= 50**

6 (a) Explain the Plasmid vectors pBR and pUC series

OR

(b) What are the applications of Type II restriction enzymes in genetic engineering

7 (a) Explain the mechanism of DNA Sequencing by Sanger's method

OR

(b) Describe Southern blotting method in Hybridization techniques

8 (a) What are Monoclonal antibodies? Explain theirProduction

OR

(b) Describe the types of stem cells and their applications

9 (a) Describe the process of In vitro fertilization

OR

(b) List out the differences between Embryo transfer and Embryo cloning

10 (a) Describe the process of DNA fingerprinting

OR

(b) Write an essay on monoculture in fishes

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III SEMESTER END EXAMINATIONS

SEMESTER-III

PAPER – VII

Practical Syllabus

Title of the paper: Animal Biotechnology **Course Code:23ZOMAL233**

2 Hours/week

Credits: 1 **Max marks:50**

LEARNING OBJECTIVES

This course will provide students with a practical knowledge in animal biotechnology, by the completion of the course the graduate shall able to –

- Acquire knowledge on Cloning vectors widely used in biotechnology
- Empower with the process of DNA quantification and amplification
- Explain purification of biological compounds by paper chromatography
- Get insight maintenance of laboratory apparatus
- Understand principles of animal culture, media preparation

SYLLABUS:

1.Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs, (Charts/Images/Models)

2. DNA quantification using DPA Method.

3. Techniques: DNA Fingerprinting

4. Separation, Purification of biological compounds by paper chromatography

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

6. Preparation of culture media.

7. Amplification of DNA by PCR Note: above practical may be demonstrated in the lab or demonstrated by V- lab

RFERENCE WEB LINKS:

- https://vlab.amrita.edu/
- https://www.vlab.co.in/broad-area-biotechnology-and-biomedical-engineering
- https://blog.praxilabs.com/2020/06/30/dna-extraction-virtual-lab/
- http://mbvi-au.vlabs.ac.in/
- https://webstor.srmist.edu.in/web_assets/downloads/2021/18BTC203J-lab-manual.pdf
- https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BT%200312%20-%20ANIMAL%20CELL%20AND%20TISSUE%20CULTURE%20LABORATORY.pdf
- https://davjalandhar.com/dbt/biotechnology/SOP/BSc%20Biotechnology%20Semester%20V%

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Aquaculture Practical
Model Practical Pape

w.e.f. 2024-2025.

Title: Animal Biotechnology Code: **23ZOMAP233**

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva	**2M**
III.Record	**8M**
Total	**35M**
B. Continuous Internal Assessment	**15M**
Total (A+ B**)**	**50M**

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Course Code	**23ZOMAL234**	Course Title	**Evolution and Zoogeography**
Credits	**3**	CIA Marks	30
No. of Lecture Hours/ Week	3	Sem End Exam Marks	70
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction: 2024-25	Year of Offering 2024-2025	Year of Revision –	Percentage of Revision:
Semester	**III**	Type of the Course:	Employability &Skill Development

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	To provide knowledge on origin of life, theories and forces of evolution
2	To explore the evidences of evolution
3	To Explain the theories of evolution
4	To understand the role of variations and mutations in evolution of organisms
5	To understand the zoogeographical distribution of animals

Course Outcomes

CO No	COURSE OUTCOME	BTL	PO	PSO
CO1	Understand the principles and forces of evolution of life on earth, the process of evolution of new species.	K2		
CO2	Explain the different evidences of evolution	**K1**		
CO3	Understand the theories of evolution	**K1**		
CO4	Explain the various tools for evolution	**K2**		
CO5	Map the distribution of animals according to zoological realms	**K4**		

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CO1					**3**				
CO2									
CO3									
CO4									
CO5									

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Syllabus: Evolution and Zoogeography **CC:23ZOMAL234**

Unit	Learning Units	Lecture Hours
I	**Unit – 1:** 1.1 Origin of life: different ancient concepts -Origin of Earth and Solar system: Big Bang theory, Primitive atmosphere, formation of macromolecules 1.2 Biological evolution: Coacervates, Microspheres, formation of Nucleic acids, Nucleoproteins 1.3 Formation of primary organisms, evolution of modes of nutrition, oxygen revolution, presents day atmosphere, evolution of eukaryotes. 1.4 Experimental evidences in support of Biochemical origin of life (Miller and Urey experiment) **Assignment** -1 – Origin of life **Assignment** - 2- Experimental evidences for biochemical origin of life. **Activities** - Report writing after watching any video on the above	9
II	**UNIT-II** 2.1 Paleontological and taxonomical evidences of evolution 2.2 Morphological and anatomical evidences of evolution 2.3 Embryological and physiological evidences of evolution 2.4 Evidences from connecting links, missing links and bio geographical distribution **Assignment: 1.**Morphological and anatomical evidences of evolution **Assignment: 2.** Evidences from connecting links, missing links **Activity**: **Quiz**	9
III	**UNIT -III** 3.1 Lamarckism-Neo Lamarckism 3.2 Germplasm theory-August Weismann 3.3 Darwinism-Theory of Natural selection 3.4 Modern synthetic theory of evolution (Neo Darwinism) **Assignement:1**. Germplasm theory. **Assignment:2**. Modern synthetic theory. **Activity:** Students Seminar (PPT presentation)	9
IV	**UNIT-IV** 4.1 Variations-types-sources of variations- importance in evolution 4.2 Mutations-classification-causes-significance in evolution 4.3 Isolation mechanisms-role in evolution 4.4 Sewall wright effect, Hardy Weinberg Principle **Assignment**: 1. Variation types and sources **Assignment**: 2. Isolation mechanism. **Activity**:Report writing after watching any video on the above topics.	9
V	**UNIT-V** 5.1 Animal distribution and barriers of distribution 5.2 Zoogeographical realms – Palearctic & Nearctic regions 5.3 Zoogeographical realms – Neotropical & Ethiopian regions 5.4 Zoogeographical realms – Oriental & Australian regions **Assignment:** 1. Ethiopian regions. **Assignment**: 2. Australian regions. **Activity:** Case study on the observation of fauna in the college locality	9

Web links:

1. https://www.sciencedirect.com/topics/earth-and-planetary-sciences/origin-of-life
2. https://www.nature.com/scitable/definition/evolution-78/
3 http://www.strangescience.net
4 http://paleo.cc/kpaleo/fosshist.htm
5. https://www.amnh.org/exhibitions/darwin/evolution-today/natural-selection
6. https://www.utas.edu.au/about/news-and-stories
7.https://www.informatics.jax.org/glossary/gain-of-function
8.https://bioprinciples.biosci.gatech.edu/module-1
9.https://www.scribd.com/document/495161880/ETHIOPIANREGION
10.https://gdcplnr.edu.in/admin/uploads/8219Australian%20Region_240420_PB-converted.pdf

Text Books:

1. Philip J. Darlington, 2017, zoogeography, Academic publishers.

REFERENCES BOOKS:

1. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
2. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
3. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.

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III SEMESTER END EXAMINATIONS

PAPER – VIMODEL PAPERCourse Code:23ZOMAL234

Title of the paper:Evolution and Zoogeography

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

Answer All questions.

Each question carries 4 Marks. **Max Marks:5x4= 20**

Section A

1a.Describe the primitive atmosphere. K1

OR

b.Describe the formation of nucleic acid. K1

2 a. Illustrate the taxonomical evidences of evolution. K3

OR

b.Distinguish the physiological evidences of evolution. K2

3a.Illustrate the theory of Natural selection. K3

OR

b Demonstrate modern synthetic theory. K3

4a.Review the variations in evolution. K2

OR

b.Elaborate about mutations. K2

5 a.Describe the animal distribution. K1

OR

b.Describe zoogeographical realms of Australian region. K1

Section B

Answer All questions.

Each question carries 10 Marks. **Max: Marks: 50**

6 (a). Explain origin of life and different ancient concepts. K1

OR

(b).What is the primary organisms and explain detailed. K1

7 .(a). Explain the morphological and anatomical evidences of evolution. K1

OR

(b).What is embryological evidences explain with suitable examples. K1

8 .(a). Describe Lamarckism and neo Lamarckism. K2

OR

(b). Explain modern synthetic theory. K2

9.(a)Describe the isolating mechanism with examples. K1

OR

(b) What is mutation write classifications, causes and significances in evolution.K1

10 (a). Illustrate the animal distribution. K4

OR

(b) Describe the zoogeographical differences between Ethiopian and Australian regions. K4

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III SEMESTER END EXAMINATIONS

SEMESTER-III

PAPER – VIII

Practical Syllabus

Title of the paper: **Evolution and Zoogeography** **Course Code:23ZOMAP234**

2 Hours/week

Credits: 1 **Max marks:40**

LEARNING OBJECTIVES

- Acquainting and skill enhancement in the usage of laboratory equipment
- To apply the basic concept of inheritance for applied research
- To get familiar with phylogeny ad geological history of origin & evolution of animals
- To understand the zoogeographical distribution of animals

SYLLABUS:

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Study of embryological evidences by charts/ pictures
4. Study of Lamarckism with images /animations
5. Study of Darwinism with images/ animation
6. Study of connecting links/missing links images/charts
7. Phylogeny of horse with pictures
8. Study of Genetic Drift by using examples of Darwin's finches (pictures)
9. Visit to Natural History Museum and submission of report
10. Mapping distribution of animals according to zoogeographical regions.
11. Mapping zoogeographical regions

RFERENCE WEB LINKS:

- https://www.labster.com/course-packages/evolution-and-diversity
- https://www.biointeractive.org/classroom-resources/stickleback-evolution-virtual-lab
- https://www.youtube.com/watch?v=tXbmPhrS4eA
- https://www.studocu.com/en-us/document/temple-university/bioe-lab-2- biomaterials/1632834116536-zoogeography-assignment/17915777
- https://guides.library.tulsacc.edu/c.php?g=932434&p=6720765
- https://bio.libretexts.org/Courses/Butte_College/BC%3A_BIOL_2_-_Introduction_to_Human_Biology_%28Grewal%29/Text/09%3A_Biological_Evolution/9.3%3A_Evidence_for_Evolution
- https://www.coursehero.com/study-guides/boundless-biology/evidence-of-evolution/

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Aquaculture Practical
Model Practical Paper

w.e.f. 2024-2025.

Title: Evolution and Zoo geography Code: **23ZOMAP234**

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva	**2M**
III.Record	**8M**
Total	**35M**
B. Continuous Internal Assessment	**15M**
Total (A+ B**)**	**50M**

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Title of the Paper:**Sustainable Aquaculture management**

Semester: - V

Course Code	**ZOOSET01**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	3	CIA Marks	25
No. of Lecture Hours/ Week	3	Semester End Exam Marks	75
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2020-21	Year of Offering:2023-24	Year of Revision :2023-24	Percentage of Revision: 30 %

LearningOutcomes: -Students at the successful completion of this course will be able to

LearningOutcomes:

CO 1	Aquaculture is a rapidly growing fisheries sector in India with an annual growth rate of over 7%
CO 2	A fertilizer for fishponds comes in tablets and will provide a slow release of nutrients that is gentle and easy on your pond's citizens.
CO 3	Pre-stocking management aims at proper preparation of ponds to remove the causes of poor survival, unsatisfactory growth, etc
CO4	Sustainable, productive fisheries and aquaculture improve food and nutrition security, increase income and improve livelihoods, promote economic growth and protect our environment and natural resources.
CO 5	Many of the disorders and diseases that are known to occur in fish are the result of stress, poor water quality, overcrowding, and failure

Syllabus
Course Details

Unit	Learning Units	Lecture Hours
I	Present status of Aquaculture–Global and National scenario. Major cultivable species for aquaculture : freshwater, brackish water and marine, criteria for selection of species for culture. Culture practices and culture systems Traditional,extensive,modifiedextensive,semi-intensiveandintensive, ponds, race ways, cages and pens	**9**
II	Functional classification of ponds – nursery, rearing, stocking and quarantine ponds. Pond preparation, fertilizer and manure application in culture ponds. Physio- chemical conditions of soil and water optimal for culture (Temperature,depth,turbidity,PH,BOD, CO2, N,P,K and C:N ratio)	**9**
III	Induced breeding in carps (Catla -Labio) and shrimp (Peneaus and vannamei – P.monodon). Culture f Indian major carps–Pre Stocking management. Culture of Indian major carps – Stocking management. Culture of Indian major carps-post-stocking management	**9**
IV	Commercial importance of shrimp &prawn *Macro brachium rosenbergii*- biology, seed production. Culture of *L. vannamei* – hatchery technology and culturepractices Mixed culture of fish andprawns.	**9**
V	Viral diseases of Fin Fish & shellfish Fungal diseases of Fin & Shellfish Bacterial diseases of Finfish & Shellfish Protozoan and metazoan diseases of fin fish and shell fish	**9**

III Text Book

1. S. Armugam, A text book of Aquaculture: ISBN: 978-93-82459-99-6.
2. Kondaiah .A and Vijayalaxmi, A text book of Aquaculture.

Web links:

Https://www.youtube.com/watch?v=rv8fzewn2gu

https://www.youtube.com/watch?v=w9oy1loucvw

IV Co- Curricular Activities:

1. Preparation of Model/ Charts of Cultivable species of fin fish shellfish
2. Preparation of Model/Chart of Ideal fish Pond-with the standards prescribed.
3. Observation of aquaculture activities in their area (Observation of any activity related to aquaculture in the vicinity of the college/village)
4. Preparation of Model –charts of Fin/Shellfish Diseases with eco-friendly material.
5. Assignments,Groupdiscussion,Seminar,Quiz,CollectionofMaterial,Videopreparationetc., Invitedlecture

Mandatory :(Training of students by teacher in field related skills:(lab:10 + field: 05)

For Teacher: Training of students by the teacher (if necessary, by a localexpert)inlaboratory/fieldforatotalofnotlessthan15hoursonthefieldtechniques/skills on the familiarization of various optical instruments available in thelaboratory;constructionofdifferenttypesoftelescopesandtheircomparisoninconstruction, operation and their utility and limitations; the details of construction of eye and various defects in the eye sight, emerging techniques in the design of eyelensesincludingcontactlensesandmakingthestudenttounderstandonthetestingofabiological sample using a clinical microscope

For Student: Students shall (individually) visit and observe the functioning of optical instrument sat any one of the following places /centre like

Pathological laboratory or
A local ophthalmologist or
A local optician to understand the various types of eye lenses or
A local computer based eye testing center or
An optician, who fixes contact lenses or
A local cinema theatre or
A planetarium.

Student shall write the observations and submit a hand-written Fieldwork/ Project work not exceeding10pagesinthegivenformattotheteacher.

1. Max marks for Fieldwork/Projectwork:10.
2. Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations, findings and acknowledgements.
3. Comprehensive Continuous Assessment Test (CCIA): (2 tests will be conducted, each carries 30Marks,considerAverageMark:15)

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SEMESTER-V (Model Question paper)

Paper Title: Sustainable Aquaculture management w.e.f.- 2022-2023 Paper Code: ZOOSET01

Time: 3 hrs. Max.Marks:70m.

SECTION – A (Total: 20 Marks)

Answer all questions. Each answer carries 4 marks.

1.a).Explain Semi-intensive culture. CO1, L2.

or

b).Describe Major cultivable species for aquaculture. CO1, L1.

2.a).Give a short note on Pond preparation. CO2, L2.

Or

b). Explain about stocking and quarantine ponds.

3.a).Illustrate Post stocking management. CO2, L4

Or

b). b). Write short notes on Stocking management

4. a).Explain Seed production. CO3, L2.

Or

b).Describe Culture practices. CO4, L1.

5.a.Give a short note on viral diseases of Fin Fish. CO4, L2.

Or

b).Describe bacterial diseases of shell fish. CO5, L1.

SECTION-B

Answer all questions. Each answer carries 10 marks**.** Total:5x10 =50Marks

6 (a). Give a detailed on cultivable fishes of brackish water. CO1, L2

Or

(b) Describe the Processes extensive and intensive cultures. CO1, L1

7(a).Explain the Functional classification of ponds. CO2, L2

Or

(b). Illustrate pond preparation. CO2, L4

8. (a). Explain Induced breeding in carps. CO3, L2

Or

(b). Describe post stocking management of Indian major carps.CO3, L1

9 (a). Give a detailed note on Commercial importance of prawn. CO4.L2

Or

(b). Describe the process of Hatchery technology. CO4, L1

10 (a). Explain fungal diseases of shell fish. CO5, L2

Or

(b). Illustrate protozoan diseases of fin fish. CO5, L4

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PRACTICAL - V

w.e.f. 2022-2023.

Sustainable Aquaculture management **Code: ZOOSEP01**
(3hrs/week) **Credits: 02**
(30 hrs) **MAX.MARKS: 50.**

PRACTICAL SYLLABUS

Practical syllabus: (30 Periods): At least 8 Practical

1. Fresh water Cultivable species any (Fin &Shell Fish Specimens–Observation of morphological characters by observation and drawings)-5.

2. Brackish water cultivable species (Fin & Shellfish-Specimens-Observation of Morphological Character by observing drawing)-5.

3. Hands on training on the use of kits for determination of water quality in aquaculture (DO Salinity, pH, Turbidity- Testing kits to be used for the estimation of various parameters/Standard procedure can be demonstrated for the same).

4. Demonstration of Hypophysation (Procedure of hypophysation to be demonstrated in the practical as with any edible fish as model).

5. Viral diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/Models of viral pathogens in fin/ shell fish – one edible specimen can be used for observation of same in the laboratory).

6. Bacterial diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts /Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation of same in the laboratory).

7. Fungal diseases of Fin & Shell Fish (Observation of his to pathological slides / Charts/Models of Bacterial pathogens in fin/ shell fish – One edible specimen can be used for observation o same in the laboratory)

III .Lab References:

1. Chakraborty C & Sadhu AK. 2000. Biology Hatchery and Culture Technology of Tiger Prawn and Giant Freshwater Prawn.Daya Publ. House.

ICAR. 2006. Handbook of Fisheries and Aquaculture. ICAR.
Jhingran VG &Pullin RSV. 1985. Hatchery Manual for the Common, Chinese and Indian Major Carps. ICLARM, Philippines.

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Aquaculture Practical
Model Practical Paper

w.e.f. 2022-20253

Title: Sustainable Aquaculture Management Code:ZOOSET01

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III.Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

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Title of the Paper: **Post harvest Technology of Fish and Fisheries**

Semester: - V

Course Code	**ZOOSET02**	Course Delivery Method	Class Room/Blended Mode - Both
Credits	4	CIA Marks	25
No. of Lecture Hours/ Week	3	Semester End Exam Marks	75
Total Number of Lecture Hours	45	Total Marks	100
Year of Introduction : 2021-22	Year of Offering:2023-24	Year of Revision –	Percentage of Revision: 0%

I. Course Outcomes: Students at the successful completion of the course will beable to**:**

LearningOutcomes:

CO 1	Before refrigerating a fish, wash it in cold water and dry it with a clean cloth or paper towels.
CO 2	Fish are preserved through such traditional methods as drying, smoking and salting. The oldest traditional way of preserving fish was to let the wind and sundry it.
CO 3	The traditional fishery byproducts are fishmeal, fish body and liver oils, fish maw, isinglass etc.
CO 4	Proper personal hygiene, including frequent hand and arm washing and covering cuts; Proper cleaning and sanitizing of all food contact surfaces.
CO 5	HACCP is a management system in which food safety is addressed through the analysis and control of biological, chemical, and physical hazards.

Syllabus: Post-Harvest Technology of Fish and Fisheries **CC: ZOOSET02**

Unit	Learning Units	Lecture Hours
I	**Handling and Principles of fish Preservation** 1.1Handling of fresh fish, storage and transport of fresh fish, postmortem changes (rigor mortis and spoilage), microbial, spoilage in fish and their prevention , process value calculation. 1.2Principles of preservation–cleaning, lowering of temperature, rising of temperature, denudation, use of salt, use of fish preservatives, exposure to low radiation of gamma rays.	9
II	**Methods of fish Preservation** 2.1Traditional methods- sun drying, salt curing, pickling and smoking. 2.2Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).	9
III	**Processing and preservation of fish and their by-products** 3.1Fish products -fish minced meat, fish meal, fish oil ,fish liquid (ensilage), fish protein concentrate, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fishmanure. 3.2Fish by-products –fish glue, isinglass, chitosan, pearl essence, shark fins, fish Leather and fish maws.	9
IV	**Sanitationand Qualitycontrol** 4.1Sanitation in processing plants-Environmental hygiene and Personal hygiene in processing plants. 4.2QualityControloffishandfisheryproducts–pre-processing control, control during processing and control after processing.	9
V	**QualityAssurance, Managementand Certification** 5.1Seafood Quality Assurance and Systems: Good Manufacturing Practices(GMPs); 5.2Good Laboratory Practices (GLPs) ;Standard Operating Procedures (SOPs); 5.3Concept of Hazard Analysis and Critical Control Points (HACCP)in seafood safety trace ability. 5.4National and International standards– ISO9000:2000 Series of Quality Assurance System, CodexAliment Arius, detection of antibiotics and heavy metals in fishery	9

References:

Santharam R,N SukumaranandPNatarajan1987.Amanualofaquaculture,Oxford-IBH,NewDelhi.
Lakshmi Prasad's, FishProcessingTechnology2012, Arjun Publishing House
D rSunitha Rai, Fish ProcessingTechnology,2015, Random Publications

Web Resources:

http://ecoursesonline.iasri.res.in/mod/page/view.php?id=145743
https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=03

Co –curricular activities:

Observation of fish/shrimp processing plants–visit.
Interaction with local fishermen to know the method of preservation and details with the available traditional technology
Collection of web resources on the Quality assurance, quality control measures in Aqua Industries-cross checking he standards during the visit to any processing units.
Assignments, Seminar Group discussion. Quiz, Collection of Material, invited lecture, Video preparation etc.,

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SEMESTER-V (Model Question paper)

Paper Title: **Post harvest technology of fish and fisheries** **w.e.f.- 2022-2023**

Paper Code: ZOOSET02

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

Part– A

Answer all questions.

Each question carries four marks **5x4=20**

1.a). Write short notes on Post mortem changes

Or

b). Explain about Cleaning,

2.a). Sun drying,

Or

b) Canning,

3a). Explain about Chitosan

Or

b). Write short notes on fish maws

4.a) Pre-processing control

Or

b). Control after processing

5.a). Codex Aliment Arius.

Or

b). Standard Operating Procedures

Part – B

Answer all questions.

Each question carries Ten marks **5X10=50**

6.(a) Give a detailed account on handling of fresh fish and storage fish

OR

(b) Describe the processes principles of preservation

7.(a) Explain Traditional methods of fish drying

OR

(b) Explain any four advanced methods fish products?

8. (a). Describe any four fish by products?

OR

(b) Explain any four fish products?

9.. (a) Give a detailed note on sanitation in processing plant.

OR

(b) Describe the process of quality control in processing plants?

10.(a). Write about National and International standards for quality control?

OR

(b) National and International standards – ISO 9000: 2000?

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PRACTICAL

w.e.f. 2021-2022.

Paper Title: **Post harvest Technology of Fish and Fisheries** **Code: ZOOSEP02**

(3hrs/week) Credits: 02

(30 hrs) **MAX.MARKS: 40.**

PRACTICAL SYLLABUS

Learning Outcomes:

CO1:Before refrigerating a fish, wash it in cold water and dry it with a clean cloth or paper towels.

.CO2: Fish are preserved through such traditional methods as drying, smoking and salting. The

Oldest traditional way of preserving fish was to let the wind and sundry it.

CO3: The traditional fishery byproducts is fishmeal, fish body and liver oils, fish maw, Isinglass etc.

CO4: Proper personal hygiene, including frequent hand and arm washing and covering cuts; Proper cleaning and sanitizing.

CO5: HACCP is a management system in which food safety is addressed through the analysis

and control of biological, chemical, and physical hazards from raw material.

Practical Syllabus:

1. Evaluation of fish/fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish
3. Examination of salt, protein, moisture in dried/cured products
4. Examination of spoilage of dried/cured fish products marinades, pickles, sauce.
5. Preparation of isinglass, collagen and chitosan from shrimp and crab shell.
6. Developing flow charts and exercises in identification of hazards–preparation of Hazard analysis work sheet
7. Corrective action procedures in processing of fish-flowchart-work sheet preparation.

References:

1. Balachandran KK. 2001. Post-harvest Technology of Fish and Fish Products. Daya Publ.
2. Bond, et al. 1971. Fish Inspection and Quality Control.Fishing News Books, England.

Websites of Interest:

Https://www.youtube.com/watch?v=xyf_g7fku-4
https://www.youtube.com/watch?v=bvtqb_ccmy4

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Zoology Practical
Model Practical Paper

w.e.f. 2022-20253

Title: Post Harvest Technology Code: ZOOSEP02

Time : 3 Hrs **Max Marks: 50 (CIA+ SEE)**

A. Semester End Lab Exam

I Answer the following **Max Marks: 25**

Q1:

Q2:

Q3:

Q4:

Q5:

II. Viva **2M**

III.Record **8M**

Total **35M**

B. Continuous Internal Assessment **15M**

Total (A+ B**)** **50M**

VALUE ADDED COURSE OFFERED

DURING -2024-2025

DIARY TECHNOLOGY

FOR

III SEMESTER