BOARD OF STUDIES MEETING

ZOOLOGY

2022-2023

DEPARTMENT OF ZOOLOGY& FISHERIES

SRI. Y. N. COLLEGE (AUTONOMOUS)

NARSAPUR

SRI Y.N.COLLEGE (Autonomous)

(Affiliated to Adikavi Nannaya University)
Thrice Accredited by NAAC at 'A' Grade
Recognised by UGC as 'College with Potential for Excellence'
NARSAPUR-534 275, W.G.Dt.,A.P.,

Date: 23-08-2022

NOTICE

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

AGENDA:

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

Ch. R.V. Ratna Prasad
MEMBER SECRETARY

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DEPARTMENT OF ZOOLOGY

MEMBERS OF THE BOARD

The Board of Studies for Zoology& Aquaculture technology for the year 2022-2023 is constituted with the following members.

1. Dr.P.Y.V.Satyanarayana	HOD	Chairman	
2. Ms. K. S. S. V. N. Lakshmi	Lecturer	Member	
3. Mrs. G. Sunitha	Lecturer	Member	
4. Ms. Ch. Bhavani	Lecturer	Member	

University Nominee : Dr. K. Ramaneswari ,
Principal, AKNU
Rajahmahendravaram.
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Mail.id: ramaneswari.zoo@aknu.edu.in

Subject experts:

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M. Radha Krishna Murthy.
3/09/2022

Alumni: B. Anu

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3/9/22

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DEPARTMENT OF ZOOLOGY

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

Resolutions:

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

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

APPROVED

SRI Y. N. COLLEGE (A) NARSAPUR - 534 275, W.G. Dt. DEPARTMENT OF ZOOLOGY

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SRI YN COLLEGE (A) – NARSAPUR
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I B.Sc Zoology – Semester – I - Paper – 1
Theory Syllabus for batch 2022 Onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

Course Outcomes: By the completion of the course the graduate should able to –

- Describe general taxonomic rules on animal classification
- Classify Protozoa to Coelenterata with taxonomic keys
- Classify Phylum Platyhemninthes to Annelida phylum using examples from parasitic adaptation and vermin composting
- Describe Phylum Arthropoda to Mollusca using examples and importance of insects and Molluscans
- Describe Echinodermata to Hemichordate with suitable examples and larval stages in relation to the phylogeny

Learning objectives

- To understand the taxonomic position of protozoa to helminthes.
- To understand the general characteristics of animals belonging to protozoa to hemichordate.
- To understand the structural organization of animal's phylum from protozoa to hemichordate.
- To understand the origin and evolutionary relationship of different phyla from protozoa to hemichordate.
- To understand the origin and evolutionary relationship of different phylum from annelids to hemichordates.

UNIT I:

Principles of Taxonomy – Binomial nomenclature – Rules of nomenclature Whittaker's five kingdom concept and classification of Animal Kingdom.

Phylum Protozoa:

General Characters and classification of protozoa up to species level with suitable examples Locomotion, nutrition and reproduction in Protozoan's *Elphidium (typestudy)*

UNIT II:

Phylum Porifera:

General characters and classification up to species level with suitable examples Skelton in Sponges, Canal system in sponges.

Phylum Coelenterate:

General characters and classification up to species level with suitable examples, Mutagenesis in Obelia, Polymorphism in coelenterates, Corals and coral reefs formation

Phylum Ctenophore:

General Characters and Evolutionary significance (affinities)

UNIT III:

Phylum Platyhelminthes:

General characters and classification up to species level with suitable examples, Life cycle and pathogen city of Fasciolahepatica, Parasitic Adaptations in helminthes.

Phylum Nemathelminthes:
General characters and classification up to classes with suitable examples, Life cycle and pathogen city of Ascaris lumbricoides

UNIT IV:
Phylum Annelida:
General characters and classification up to species level with suitable examples, Evolution of Coelom and Coelomoducts, Vermiculture - Scope, significance, earthworm species, processing, Vermicompost, economic importance of vermin compost

Phylum Arthropoda :
General characters and classification up to species level with suitable examples

Vision and respiration in Arthropoda, Metamorphosis in Insects Peripatus- Structure and affinities Social Life in Bees and Termites

UNIT V:
Phylum Mollusca: General characters and classification up to species level with suitable examples ,Pearl formation in Pelecypoda, Sense organs in Mollusca

Phylum Echinodermata: General characters and classification up to species level with suitable examples, Water vascular system in starfish, Larval forms of Echinodermata
Phylum Hemichordate: General characters and classification up to species level with suitable examples, Balanoglossus - Structure and affinities

Co-curricular activities (suggested)

- Preparation of chart/model of phylogenic tree of life, 5-kingdom classification, Elphidium life cycle etc.
- Visit to Zoology museum or Coral island as part of Zoological tour
- Charts on life cycle of Obelia, polymorphism, spongespicules
- Preparation of charts on life cycles of Fasciola and Ascaris

REFERENCE BOOKS:
1. L.H. Hyman 'The Invertebrates' Vol I, II and V. – M.C. Graw Hill Company Ltd.
2. Kotpal, R.L. 1988 - 1992 Protozoa, Porifera, Coelenterata, Helminthes, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
3. E.L. Jordan and P.S. Verma 'Invertebrate Zoology' S. Chand and Company.
4. R.D. Barnes 'Invertebrate Zoology' by: W.B. Saunders CO.,1986.
5. Barrington. E.J.W., 'Invertebrate structure and Function' by ELBS.
6. P.S. Dhami and J.K. Dhami. Invertebrate Zoology. S. Chand and Co. New Delhi.
7. Parker, T.J. and Haswell'A text book of Zoology' by, W.A., Mac Millan Co. London.
8. Barnes, R.D. (1982). Invertebrate Zoology, VEdition"

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I B.Sc Zoology – Semester – I - Paper – 1
Theory Model paper for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

Time: 3Hrs **Max.Marks:75**

PART-I

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

5 x 5 = 25M

1. Nutrition పోషణ
2. Sponges స్పంజికలు
3. Coral reef ప్రవాళావరోధము
4. Parasites పరాన్నజీవులు
5. Coelom శరీర కుహరము
6. Arthropoda ఆర్థ్రోపొడా
7. Pelecypoda పెలిసిపొడ
8. Bipinnaria Larva బైపిన్నేరియా డింభకము

PART-II

Answer any FIVE of the following, choosing atleast two questions from each section. Draw labeled diagrams wherever necessary. **5 x 10 = 50M**

SECTION-A

9. Write the general characters and classification of Protozoa.
   ప్రోటోజోవా యొక్క సాధారణ లక్షణాలు మరియు వర్గీకరణను వ్రాయుము.
10. Give an account on life history of Elphidium.
    ఎల్ఫీడియం జీవిత చరిత్రను గూర్చి వ్రాయుము.
11. Write an essay on Canal System in Sponges.
    స్పంజికలలో కుల్యా వ్యవస్థను గూర్చి ఒక వ్యాసము వ్రాయుము.
12. Describe the Polymorphism in Coelenterates.
    సీలెంటీరేటా జీవులలో బహురూపకతను గూర్చి వర్ణింపుము.
13. Describe the pathogencity of Fasciola hepatica.
    ఫాసియోలా హెపాటికా వ్యాధి సంక్రమణను గూర్చి వర్ణింపుము.

SECTION-B

14. Give an account on life history of Ascaris lumbricoides.

ఆస్కారిస్ లూంబ్రికాయిడిస్ యొక్క జీవిత చరిత్రను గూర్చి వ్రాయండి.

15. Write an essay on Vermiculture.

వెర్మికల్చర్ ను గూర్చి ఒక వ్యాసము వ్రాయుము.

16. Give an account on structure and affinities of Peripatus.

పెరిపేటస్ జీవి నిర్మాణము మరియు సంభంద భాంధవ్యాలను గూర్చి వ్రాయుము.

17. Describe the water vascular system in star fish.

సముద్ర నక్షత్రములలో జల ప్రసరణ వ్యవస్థను గూర్చి వర్ణింపుము.

18. Give an account on structure and affinities of Balanoglossus.

బెలనోగ్లాసస్ జీవి యొక్క నిర్మాణము మరియు సంభంద భాంధవ్యాలను గూర్చి వ్రాయుము.

BLUE PRINT

Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	1	25	2 Essay Questions
Unit – 2	2	2	30	2 Essay Questions
Unit – 3	2	1	25	2 Essay Questions
Unit – 4	2	2	30	2 Essay Questions
Unit - 5	2	2	30	2 Essay Questions
Total Marks including Choice 140				

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Practical Syllabus for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

1. Study of museum slides / specimens / models
(Classification of animals up to orders)

Protozoa: Amoeba, Paramecium, Paramecium Binary fission and Conjugation, Vorticella, Entamoebahistolytica, Plasmodium vivax
Porifera: Sycon, Spongilla, Euspongia, Sycon- T.S & L.S, Spicules, Gem mule
Coelenterata: Obelia – Colony & Medusa, Aurelia, Physalia, Velella, Corallium, Gorgonia, Pennatulav.
Platyhelminthes: Planaria, Fasciola hepatica, Fasciolalarval forms – Miracidium, Redia, Cercaria, Echinococcusgranulosus, Taeniasolium,
Nemathelminthes: Ascaris (Male & Female), Drancunculus, Ancylostoma, Wuchereria
Annelida: Nereis, Aphrodite, Chaetopteurs, Hirudinaria, Trochophore larva
Arthropoda: Cancer, Palaemon, Scorpion, Scolopendra, Sacculina, Limulus, Periapt's, Larvae - Nauplius, Mysis, Zoea, Mouth parts of male &female Anopheles and Culex, Mouthparts of Housefly and Butterfly.
Mollusca: Chiton, Pila, Unio, Pteredo, Murex, Sepia, Loligo, Octopus, Nautilus, Glochidium larva
Echinodermata: Asterias, Ophiothrix, Echinus, Clypeaster, Cucumaria, Ante don, Bipinnaria larva
Hemichordata: Balanoglossus, Tornaria larva.

2. Dissections:
Prawn: Appendages, Digestive system, Nervous system, Mounting of Statocyst
Insect: Mouth Parts

Laboratory Record work shall be submitted at the time of practical amination
An "**Animal album**" containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to differentsets of students for thispurpose
Computer - aided techniques should be adopted or show virtual dissections

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I B.Sc Zoology – Semester – I - Paper – 1
Practical Model paperfor batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF NONCHORDATES

Time : 3 Hrs. Max. Marks : 50

1. Draw a neat labeled diagram of Nervous system of Prawn or
   Digestive system of Prawn 10 + 5 = 15M
2. Mounting of Statocyst / Appendages of Prawn or Mouth parts
   of an Insect (Labeled Diagram). 10M
3. Identify, Sketch and Comment on 5 x 3 = 15M
   A
   B
   C
   D
   E
4. Record + Viva 10M

TOTAL : 50M

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I B.Sc Zoology – Semester – II - Paper – II
Theory Syllabus for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

Course Outcomes: By the completion of the course the graduate should able to –

- Describe general taxonomic rules on animal classification of chordates
- Classify Protochordata to Mammalian with taxonomic keys
- Understand Mammals with specific structural adaptations
- Understand the significance of dentition and evolutionary significance
- Understand the origin and evolutionary relationship of different phyla from Prochordata tomammalian.

Learning objectives

- To understand the animal kingdom.
- To understand the taxonomic position of Protochordata to Mammalian.
- To understand the general characteristics of animals belonging to Fishes to Reptilians.
- To understand the body organization of Chordata.
- To understand the taxonomic position of Protherian mammals.

UNIT I:
General characters and classification of Chordata upto species level Protochordata-Salient features ofCephalochordate, Structure of *Branchiostoma*Affinities of Cephalochordate. Salient features ofUrochordata Structure and life history of *Herdmania*Retrogressive metamorphosisProcess andSignificance.

UNIT II:
Cyclostomata, General characters, Comparison of *Petromyzon* and *Myxine* Pisces: General characters andclassification of Fishes upto species level ***Scoliodon*:** External features, Digestive system, Respiratorysystem, Structure and function of Heart, Structure and functions of the Brain. Migration in Fishes Types ofScales Dipnoi.

UNIT III:
General characters of Amphibian Classification of Amphibian upto species level with examples.
***Ranahexadactyla*:** External features, Digestive system, Respiratory system, Structure and function of Heart,structure and functions of the Brain
Reptilia: General characters of Reptilia, Classification of Reptiliaupto species level with examples*Calotes*: External features, Digestive system, Respiratory system, Structure and function of Heart, structureand function of Brain Identification of Poisonous and non-poisonous snakes and Skull in reptiles.

UNIT IV:
Aves: General characters and classification of Aves upto species level *Columba livia*: External features,Digestive system, Respiratory system, Structure and function of Heart, structure and function of BrainMigration in Birds Flight adaptation in birds.

UNIT V:
General characters of Mammalian Classification of Mammalian upto species level with examplesComparison of Prototherians, Metatherians and Eutherians Dentition in mammals.

Co-curricular activities (suggested)

- Preparation of charts on Chordate classification (with representative animal photos) and retrogressive metamorphosis
- Thermocol or Clay models of Herdmania and Amphioxus
- Visit to local fish market and identification of local cartilaginous and bony fishes
- Maintaining of aquarium by students
- Thermocol 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 metatherianmammals
- Chart preparation for dentition in mammals.

REFERENCE BOOKS:

1. J.Z. Young, 2006. The life of vertebrates. (The Oxford University Press, New Delhi).
2. Arumugam, N. ChordateZoology, Vol. 2. Saras Publication.
3. A.J. Marshall, 1995. Textbook of zoology, Vertebrates. (The McMillan PressLtd., UK). (Revised edition of Parker &Haswell,1961).
4. M. EkambaranathaAyyar, 1973. A manual of zoology. Part II. (S. Viswanathan Pvt. Ltd.,Madras).
5. P.S. Dhami& J.K. Dhami, 1981. Chordate zoology. (R. Chand & Co.)

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I B.Sc Zoology – Semester – II - Paper – II
Theory Model Paper for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

Time: 3Hrs **Max.Marks:75**

PART-I

Answer any FIVE of the following. Draw labeled diagrams wherever necessary **5 x 5 = 25M**

1. Urochordata యూరోకార్డేట
2. Myxine మిక్సీన్
3. Draco డ్రాకో
4. Identification of Poisonous Snakes విష సర్పములను గుర్తించుట
5. Quil feather క్విల్ ఈక
6. Migration వలస
7. Mammalian characters క్షీరద లక్షణములు
8. Prototheria ప్రోటోథీరియా

PART-II

Answer any FIVE of the following, choosing atleast two questions from each section.
Draw labeled diagrams wherever necessary. **5 x 10 = 50M**

SECTION-A

9. Explain the general characters of chordates.
   సకశేరుక జీవుల సాధారణ లక్షణములను గూర్చి వివరింపుము.
10. Describe the life history of Herdmania.
    హెర్డ్మేనియా జీవిత చరిత్రను గూర్చి వర్ణింపుము.
11. Describe the structure and functions of heart of Scoliodon.
    సొరచేప గుండె నిర్మాణము మరియు విధులను గూర్చి వర్ణింపుము.
12. Write an essay on Migration in Fishes.
    చేపలలో వలస విధానమును గూర్చి ఒక వ్యాసము వ్రాయుము.

13. Describe the Respiratory system of Rana hexadactyla.

కప్ప శ్వాస వ్యవస్థను గూర్చి వర్ణింపుము.

SECTION-B

14. Explain the structure and functions of Brain in Calotes.

తొండ మెదడు నిర్మాణము మరియు విధులను గూర్చి వివరింపుము.

15. Give an account on Digestive system of Columba livia.

పావురము యొక్క జీర్ణ వ్యవస్థను గూర్చి వ్రాయుము.

16. Write an essay on flight adaptations in birds.

పక్షులలో ఉడ్డయక అనుకూలనాలను గూర్చి ఒక వ్యాసము వ్రాయుము.

17. Compare the characters of Metatheria and Eutheria.

మెటాథీరియా మరియు యూథీరియా లక్షణములను పోల్చుము.

18. Write an essay on dentition in mammals.

క్షీరదాలలో దంత విన్యాసమును గూర్చి ఒక వ్యాసము వ్రాయుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	1	25	2 Essay Questions
Unit – 2	2	1	30	2 Essay Questions
Unit – 3	2	2	25	2 Essay Questions
Unit – 4	2	2	30	2 Essay Questions
Unit - 5	2	2	30	2 Essay Questions
Total Marks including Choice 140				

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I B.Sc Zoology – Semester – II- Paper – II
Practical Syllabus for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

Observation of the Following Slides / Spotters / Models

- Protochordata: Herdmania, Amphioxus, Amphioxus T.S through pharynx.
- Cyclostomata: Petromyzon and Myxine.
- Pisces: Pristis, Torpedo, Hippocampus, Exocoetus, Echeneis, Labeo, Catla, Clarics, Channa,Anguilla.
- Amphibian: Ichthyophis, Amblystoma, Axolotl larva,Hyla,
- Reptilia: Draco, Chameleon, Uromastix, Testudo, Trionyx, Russelsviper,Naja
- Krait, Hydrophis, Crocodile.
- Aves: Psittacula, Eudynamis, Bubo, Alcedo.
- Mammalian: Ornithorhynchus, Pteropus, Funambulus.

Dissections-

1. Scoliodon IX and X, Cranial nerves
2. Scoliodon Brain
3. 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.

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4. H. Rakkaiah Murthy. 3/09/2022
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Practical Model paper for batch 2022 onwards (w.e.f.2020-21)
ANIMAL DIVERSITY – BIOLOGY OF CHORDATES

Time : 3 Hrs. Max. Marks : 50

1. Draw a neat labeled diagram of Carnival Nerves of Scoliodon (IX&X) or Brain of Scoliodon — 10 + 5 = 15M
2. Mounting of Scale (Labeled Diagram). — 10M
3. Identify, Sketch and Comment on — 5 x 3 = 15M
   - A
   - B
   - C
   - D
   - E
4. Record + Viva — 10M

TOTAL : 50M

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4. M. Radhakrishnamurthy. 3/09/2022
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II B.Sc Zoology – Semester – III
Theory Syllabus for 2021 -24 batch (w.e.f.2021-22) Paper – 3
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

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

- To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
- Acquiring in-depth knowledge on various of aspects of genetics involved in sex determination, human karyo typing and mutations of chromosomes resulting in various disorder.
- Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
- Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society.

Learning Objectives

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

UNIT I:
Cell Biology: Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma Electron microscopic structure of animal cell. Plasma membrane – Models and transport functions of plasma membrane. Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosomes Structure and functions of Ribosomes, Mitochondria, Nucleus, Chromosomes.

UNIT II:

Genetics-I: Mendel's work on transmission of traits Gene Interaction – Incomplete Dominance, Codominance, Lethal Genes Polygene's (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy types of sex determination) Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

UNIT III:

Genetics - II: Mutations &Mutagenesis, Chromosomal Disorders (Autosomal and Allosomal) HumanGenetics – Karyo typing, Pedigree Analysis(basics) Basics on Genomics and Proteomics

UNIT IV:

Molecular Biology: Central Dogma of Molecular Biology Basic concepts of-

1. DNA replication – Overview (Semi-conservative mechanism, Semi- discontinuous mode, Origin & Propagation of replication fork)
2. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications(basics)
3. Translation – Initiation, Elongation and Termination Gene Expression in prokaryotes (Lac Operon); Gene Expression in eukaryotes

UNIT V:

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

Co-curricular activities (Suggested)

- Model of animal cell
- Working model of mitochondria to encourage creativity among students
- Photo album of scientists of cell biology
- Charts on plasma membrane models/cell organelles
- Observation of Mendelian / Non-Mendelian inheritance in the plants of college botanical garden or local village as a student study project activity
- Observation of blood group inheritance in students, from their parents and grandparents
- Karyo typing and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders
- Charts on central dogma/lac Operon/geneticcode
- Model of semi-conservative model of DNA replication
- Model of tRNA and translationechanism
- Power point presentation of transcription or any other topic by students
- Draw geological time scale and highlight important events along the timeline

- Chart on industrial melanism to teach directed selection, Darwin's finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

REFERENCE BOOKS:

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2. Cell Biology by DeRobertis
3. Bruce Alberts, Molecular Biology of the Cell
4. Rastogi, Cytology
5. Varma & Aggarwal, Cell Biology
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9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
10. Russell, P. J. (2009). Genetics- A Molecular Approach. III Edition. Benjamin Cummings.
11. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. Introductionto Genetic Analysis. IX Edition. W. H. Freeman andCo.
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II B.Sc Zoology – Semester – III
For 2021 -24 batch (w.e.f.2021-22) Paper – 3
CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION
Theory Model paper

Time : 3Hrs **Max.Marks:75**

PART - I

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

5 x 5 = 25M

1. Virus వైరస్
2. Lethalgenes లేతల్ జన్యువులు
3. Mutagenesis ఉత్పరివర్తనము
4. Proteomics ప్రోటీయోమిక్స్
5. Lacoperan లాక్ ఓపరాన్
6. Origin of DNA డి.ఎన్.ఏ.ఉద్భవము
7. Genetic Drift జెనీటిక్ డ్రిఫ్ట్
8. Speciation జాతుల ఉత్పత్తి

PART - II

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

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

5 x 10 = 50M

SECTION – A

9. Write an essay on electron microscopic structure of animal cell.
   సాధారణ జంతుకణ నిర్మాణమును గూర్చి వ్యాసము వ్రాయుము.
10. Describe the structure and functions of Endoplasmic Reticulum.
    అంతర్జీవ ద్రవ్యజాలకము యొక్క నిర్మాణము మరియు విధులను గూర్చి వర్ణింపుము.
11. Describe the Mendel's work on transmission of traits.
    లక్షణముల అనువంశికతను గూర్చి మెండల్ చేసిన ప్రయోగములను గూర్చి వర్ణింపుము.
12. Give an account on sex determination in animals.
    జంతువులలో లింగ నిర్ధారణను గూర్చి వ్రాయుము.

13. Write an essay on sex – linked inheritance.
లింగ సహలజ్ఞత అనువంశికతను గూర్చి ఒక వ్యాసం వ్రాయుము.

SECTION – B

14. Explain "Karyo Typing" and "Pedigree Analysis of Human Genetics".
మానవ జన్యు శాస్త్ర రీత్యా "కెరియో టైపు" మరియు "వంశానుక్రమ విశ్లేషణ" గూర్చి వ్రాయండి.

15. Explain the semi – conservative mechanism and semi – discontinuous mode.
పాక్షిక సంరక్షణ విధానము మరియు పాక్షిక విచ్ఛిన్న పద్ధతులను గూర్చి వ్రాయండి.

16. Write the Elongation and Termination of Gene Expression in Prokaryotes.
కేంద్రక పూర్వ జీవులలో జన్యు వ్యక్తీకరణ గురించి వ్రాయండి.

17. Describe the evolutionary theory of Lamarck.
లామార్క్ పరిణామ సిద్ధాంతమును గూర్చి వర్ణింపుము.

18. Give an account on different types of specification.
జాతులు ఏర్పడు వివిధ రకముల పద్ధతులను గూర్చి వ్రాయుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	1	25	2 Essay Questions
Unit – 2	2	1	30	2 Essay Questions
Unit – 3	2	2	25	2 Essay Questions
Unit – 4	2	2	30	2 Essay Questions
Unit - 5	2	2	30	2 Essay Questions
Total Marks including Choice 140				

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4. M. Rallakrishnamurthy 3/09/2022

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II B.Sc Zoology – Semester – III
Practical Syllabus for 2021 -24 batch (w.e.f.2021-22) Paper – 3

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

I. Cell Biology

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

II. Genetics

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

III. Evolution

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

REFERENCE BOOKS:

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3. Harth and Jones EW. 1998. Genetics – Principles and Analysis. Jones and BarHett Publ. Boston.
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9. White MJD. 1973. Animal Cytology and Evolution. Cambridge Univ.Press.

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Practical Model paper for 2021 -24 batch (w.e.f.2021-22)

CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Time : 3 Hrs. Max. Marks : 50

1. Preparation of temporary slides of _____ with onion root tips — 10M
2. Study of Mendelian inheritance using suitable examples and problems_____ — 2 x 5 = 10M
   A
   B
3. Study of Human karyo types_____ (identify, draw and comment on) — 2 x 5 = 10M
   A
   B
4. Study of Homology pictures (identify, draw and comment on) — 2 x 5 = 10M
   A
   B

Record + viva — 5 + 5 = 10M

TOTAL : 50M

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II B.Sc Zoology – Semester – IV
Theory Syllabus for 2021 -24 batch (w.e.f.2021-22) Paper – 4
Animal Physiology, Cellular Metabolism and Embryology

Course Outcomes:

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

- Understand the functions of important animal physiological systems including digestion, cardiorespiratory and renal systems.
- Understand the muscular system and the neuro-endocrine regulation of animal growth, development and metabolism with a special knowledge of hormonal control of human reproduction.
- Describe the structure, classification and chemistry of Biomolecules and enzymes responsible for sustenance of life in living organisms
- Develop broad understanding the basic metabolic activities pertaining to the catabolism and anabolism of various Biomolecules
- Describe the key events in early embryonic development starting from the formation of gametes upto gastrula ion and formation of primary germ layers.

Learning Objectives

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

UNIT I:Animal Physiology -I:

Process of digestion and assimilation, Respiration - transport of oxygen and CO2, (Note: Need not study cellular respiration here), Circulation - Structure and functioning of heart, Cardiac cycle, Excretion - Structure and functions of kidney, urine formation, counter current Mechanism

UNIT II:Animal Physiology -II:
Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction. Endocrine glands – Structure and functions of hormones of pituitary, thyroid, parathyroid, adrenal glands and pancreas, Hormonal control of reproduction in a mammal

UNIT III: Cellular Metabolism – I(Biomolecules)
Carbohydrates - Classification of carbohydrates. Structure of glucose, Proteins - Classification of proteins. General properties of amino acids, Lipids - Classification of lipids.

UNIT IV: Cellular Metabolism –II:
Carbohydrate Metabolism - Glycolysis, Krebs cycle, Electron Transport Chain and Glycogen metabolism, Gluconeogenesis,

UNIT V: Embryology:
Gametogenesis, Fertilization, Types of eggs, Types of cleavages,Development of Frog upto formation of primary germ layers.

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

REFERENCE BOOKS:
1. Eckert H. Animal Physiology: Mechanisms and Adaptation. W.H. Freeman &Company. 2. Floray E. An Introduction to General and Comparative Animal Physiology. W.B.
Saunders CoPhiladelphia.
3.Goel KA and Satish KV. 1989. A Text Book of Animal Physiology, Rastogi Publications, Meerut,U.P.

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5. Lehninger AL. Nelson and Cox. Principles of Biochemistry. Lange MedicalPublications,
NewDelhi.
6. Prosser CL and Brown FA. Comparative Animal Physiology. W.B. SaundersCompany,Philadelphia.
7. Developmental Biology byBalinksy
8. Developmental Biology by GerardKarp
9. Chordate embryology by Varma andAgarwal
10. Embryology by V.B.Rastogi
11. Austen CR and Short RV. 1980. Reproduction in Mammals. Cambridge UniversityPress.
12. Gilbert SF. 2006. Developmental Biology, 8 th Edition. Sinauer Associates Inc., Publishers, Sunderland,USA.
13. Longo FJ. 1987. Fertilization. Chapman & Hall, London.
14. Rastogi VB and Jayaraj MS. 1989. Developmental Biology. KedaraNath Ram Nath Publishers, Meerut, UttarPradesh.
15. Schatten H and Schatten G. 1989. Molecular Biology of Fertilization. AcademicPress, NewYork

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II B.Sc Zoology – Semester – IV
For 2021 -24 batch (w.e.f.2021-22) Paper – 4
Animal Physiology, Cellular Metabolism and Embryology
Theory Model question paper

Time : 3Hrs **Max.Marks:75**

PART - I

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

5 x 5 = 25M

1. Cardiac Cycle — హృదయ వలయము
2. Counter Current Mechanism — కౌంటర్ కరెంట్ యంత్రాంగము
3. Muscle contraction theory — కండర సంకోచ సిద్ధాంతం
4. Pancreas — క్లోమము
5. Proteins — ప్రోటీనులు
6. Amino acids — ఏమినో ఆమ్లాలు
7. Krebs Cycle — క్రెబ్స్ చక్రము
8. Fertilization — ఫలదీకరణ

PART - II

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

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

5 x 10 = 50M

SECTION – A

9. Describe the process of Digestion in mammals.
   జీర్ణక్రియా విధానమును గూర్చి వర్ణింపుము.
10. Describe the transport mechanism of O_2 (Oxygen) and CO_2 (Carbon Di – oxide).
    ఆక్సీజన్ మరియు కార్బన్ డైయాక్సైడ్ రవాణా విధానము వర్ణింపుము.

11. Describe the ultra structure of muscle fibre.

కండరపు పోగు యొక్క సూక్ష్మ నిర్మాణమును గూర్చి వర్ణింపుము.

12. Write an essay on Hormonal control of reproduction in Mammals.

క్షీరదాలలో ప్రత్యుత్పత్తి యొక్క హార్మోనుల నియంత్రణను గూర్చి ఒక వ్యాసము వ్రాయుము.

13. Write an essay on classification of carbohydrates.

పిండి పదార్థముల వర్గీకరణను గూర్చి ఒక వ్యాసము వ్రాయుము.

SECTION – B

14. Describe the classification of Protiens.

మాంసకృత్తుల వర్గీకరణ ను వివరించండి.

15. Give an account of Glycolysis, Kerbs cycle and Electron Transport chain.

గ్లైకాలసిస్, క్రెబ్స్ వలయం మరియు ఎలక్ట్రాన్ రవాణా వలయం గూర్చి వ్రాయుము.

16. Describe the Glycogen metabolism.

గ్లైకోజన్ జీవక్రియలను వివరించండి.

17. Write an essay on different types of Cleavages.

వివిధ రకాల విధళనములను గూర్చి ఒక వ్యాసము వ్రాయుము.

18. Give an account on formation of primary germ layers in Frog.

కప్పలలో ప్రాధమిక జనన స్తరాలు ఏర్పడుటను గురించి వ్రాయుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	2	30	2 Essay Questions
Unit – 2	2	2	30	2 Essay Questions
Unit – 3	2	2	30	2 Essay Questions
Unit – 4	2	1	25	2 Essay Questions
Unit - 5	2	1	25	2 Essay Questions
Total Marks including Choice 140				

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II B.Sc Zoology – Semester – IV
Practical Syllabus for 2021 -24 batch (w.e.f.2021-22) Paper – 4
Animal Physiology, Cellular Metabolism and Embryology

Learning Objectives:

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

I. Animal physiology

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

II. Cellular metabolism

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

III. Embryology

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

REFERENCE BOOKS:

- Harper's Illustrated Biochemistry.
- Cell and molecular biology: Concepts & experiments.

VI Ed. John Wiley &sons. Inc.

- Lab Manual on Blood Analysis and Medical Diagnostics, S. Chand and Co. Ltd.
- Laboratory techniques by Plummer

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II B.Sc Zoology – Semester – IV
Practical Model paper for 2021 -24 batch (w.e.f.2021-22) Paper – 4
Animal Physiology, Cellular Metabolism and Embryology

Time : 3 Hrs. Max. Marks : 50

1. Estimate the amount of Casein given sample 15M
2. Estimate the amount of Urea given sample 10M
3. Identify draw, labeled diagrams and comment given spotters 5 x 3 = 15M
   - A testis
   - B 2nd cleaver
   - C Lung cartilage
   - D bone
   - E.
4. Record + Viva 7 + 3 = 10M

TOTAL : 50M

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II B.Sc Zoology – Semester – IV
Theory Syllabus for 2021- 24 batch (w.e.f.2021-22) Paper – 5
Immunology and Animal Biotechnology

Course Outcomes:

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

- To get knowledge of the organs of Immune system, types of immunity, cells and organs of immunity.
- To describe immunological response as to how it is triggered (antigens) and regulated(antibodies)
- Understand the applications of Biotechnology in the fields of industry and agriculture including animal cell/tissue culture, stem cell technology and genetic engineering.
- Get familiar with the tools and techniques of animal biotechnology.

Learning Objectives

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

UNIT I: Immunology – I (Overview of Immune system):

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

UNIT II: Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)

Antigens:

Basic properties of antigens, B and T cell epitomes and happens Antibodies: Structure of antibody and functions of antibodies , Structure and functions of major histo compatibility complexes, Hypersensitivity – Classification and Types

UNIT III: Techniques:

Animal Cell, Tissue and Organ culture media: Natural and Synthetic media, Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Organ culture; Cryopreservation of cultures Stem cells: Types of stem cells and applications and Monoclonal antibodies (mAb) .

UNIT IV: Applications of Animal Biotechnology: Genetic Engineering:

Basic concept, Vectors, Restriction Endo nucleases and Recombinant DNA technology
Gene delivery: Microinjection, electroporation.
Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, fish; applications Manipulation of reproduction in animals.

UNIT V:

PCR: Basics of PCR.

DNA Sequencing:
Sanger's method of DNA sequencing- traditional and automated sequencing DNA fingerprinting: Procedure and applications.
Applications in Industry and Agriculture: Fermentation: Different types of Fermentation.
Agriculture: Monoculture in fishes, polyploidy in fishes

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

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

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II B.Sc Zoology – Semester – IV
For 2021- 24 batch (w.e.f.2021-22) Paper – 5
Immunology and Animal Biotechnology
Theory Model question paper

Time : 3Hrs **Max.Marks:75**

PART - I

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

5 x 5 = 25M

1. Vaccines — టీకాలు
2. Primary lymphoid organs — ప్రాథమిక లింఫాయిడ్ అవయవాలు
3. Hapten — హ్యాప్టెన్
4. Hypersensitivity — అతిసున్నితత్వము
5. Natural media — సహజ మాధ్యమం
6. Cell lines — సెల్ లైన్లు
7. Endo nucleases — ఎండోన్యూక్లియేస్‌లు
8. Polyploidy in fishes — చేపలలో పాలీప్లాయిడీ

PART - II

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

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

5 x 10 = 50M

SECTION – A

9. Define immunity. Write in detail about innate immunity.
   రోగ నిరోధక శక్తిని నిర్వచించండి. సహజమైన రోగ నిరోధక శక్తి గురించి వివరింగా వ్రాయండి.
10. Explain various cells of immune system.
    రోగ నిరోధక వ్యవస్థ యొక్క వివిధ కణాలను గురించి వివరించండి.
11. Describe the structure of antibody. Add a note on their functions.
    ప్రతి రక్షకము నిర్మాణన్ని వివరించండి. వాటి విధులపై ఒక వ్యాఖ్యను జోడించండి.
12. Describe the structure and functions of MHC molecules.
    MHC అణువుల నిర్మాణాన్ని మరియు విధులను వివరించండి.
13. Write an essay on different types of stem cells and their applications.
    వివిధ రకాల మూలకణాలు మరియు వాటి అనువర్తనాలను గురించి వ్యాసము వ్రాయండి.

SECTION – B

14. Explain the production and applications of monoclonal antibodies(mAb).
ఏక సంతతి ప్రతి రక్షకాల ఉత్పత్తి మరియు అనువర్తనాలను వివరించండి.

15. Write an account on recombinant DNA technology.
పునఃసంయోగ డి.యన్.ఎ సాంకేతికతను సోదాహరణంగా వివరించుము.

16. Write an essay on transgenic animals.
ట్రాన్స్‌జెనిక్ జంతువులపై ఒక వ్యాసము వ్రాయుము.

17. What is "Fermentation" ? Explain fermentation process.
కిణ్వనక్రియ అనగానేమి? కిణ్వనక్రియా విధానాన్ని వివరింపుము.

18. Write an essay on PCR.
PCR పై ఒక వ్యాసము వ్రాయుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	2	30	2 Essay Questions
Unit – 2	2	2	30	2 Essay Questions
Unit – 3	2	2	30	2 Essay Questions
Unit – 4	2	1	25	2 Essay Questions
Unit - 5	2	1	25	2 Essay Questions
Total Marks including Choice			140	

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II B.Sc Zoology – Semester – IV
Practical Syllabus for 2021- 24 batch (w.e.f.2021-22) Paper – 5
Immunology and Animal Biotechnology

Learning Objectives:

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

I. Immunology

1. Demonstration of lymphoid organs (as per UGC guidelines).
2. Histological study of spleen, thymus and lymph nodes (through prepared slides).
3. Blood group determination .
4. Demonstration of
   a. ELISA
   b. Immune electrophoresis

II. Animal biotechnology

1. DNA quantification using DPA Method.
2. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting.
3. Separation, Purification of biological compounds by paper, Thin-layer and Column chromatography.
4. Cleaning and sterilization of glass and plastic wares for cell culture.
5. Preparation of culture media.

REFERENCE BOOKS:

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

1. 3/9/22
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4. M. Radhakrishna Murthy. 3/09/2022
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II B.Sc Zoology – Semester – IV
Practical Model Paper for 2021- 24 batch (w.e.f.2021-22) Paper – 5
Immunology and Animal Biotechnology

Time : 3 Hrs. Max. Marks : 50

1. Histological study of _____identify, draw and comment on 2 x 5 = 10M
   A

   B
2. Blood group determination _____ 10M
3. Techniques – Western or Southern _____ 10M
4. Preparation of culture media_____ 10M
5. Record + Viva 5 + 5 = 10M

TOTAL : 50M

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III B.Sc Zoology – Semester – V
Theory Syllabus for 2020 -23 batch (w.e.f.2022-23) Paper – 6
SUSTAINABLE AQUACULTURE MANAGEMENT

Learning Outcomes:

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

- Evaluate the present status of aquaculture at the Global level and National level
- Classify different types of ponds used in aquaculture
- Demonstrate induced breeding of carps
- Acquire critical knowledge on commercial importance of shrimps
- Identify fin and shell fish diseases

Unit:1

1.1 Present status of Aquaculture–Global and National scenario
1.2 Major cultivable species for aquaculture : fresh water, brackish water and marine.
1.3 Traditional, extensive, modified extensive, semi intensive and intensive cultures of fish and shrimp.
1.4 Design and construction of fish and shrimp farms

Unit:2

2.1 Functional classification of ponds–head pond, hatchery, nursery ponds
2.2 Functional classification of ponds-rearing, production, stocking and quarantine ponds
2.3 Need of fertilizer and manure application in culture ponds
2.4 Physio-chemical conditions of soil and water optimum for culture(Temperature, depth, turbidity, light, water, PH, BOD, $CO_2$and nutrients)

Unit:3

3.1. Induced breeding in fishes
3.2. Culture of Indian major carps: Pre-stocking management (Dewatering, drying, ploughing/desilting; Predators, weeds and algal blooms and their control, Liming and fertilization)
3.3. Culture of Indian major carps-Stocking management

Unit:4

4.1 Commercial importance of shrimp &prawn
4.2 Macrobrachium rosenbergii-biology, seed production.
4.3 Culture of L.vannamei– hatchery technology and culture practices
4.4 Mixed culture of fish and prawns

Unit:5

5.1 Viral diseases of Fin Fish & shell fish

5.2 Fungal diseases of Fin & Shell fish

5.3 Bacterial diseases of Fin fish & Shell fish

References:

1. PillayTVR&M.A.Dill,1979.AdvancesinAquaculture.FishingNewsBooksLtd.,Lond on
2. StickneyRR1979.PrinciplesofWarmWaterAquaculture.JohnWiley&SonsInc.1981
3. BoydCE1982.WaterQualityManagementforPondFishCulture.ElsivierScientific Publishing Company.
4. Bose AN et.al. 1991. Costal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd.

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III B.Sc Zoology – Semester – V
For 2020 -23 batch (w.e.f.2022-23) Paper – 6
SUSTAINABLE AQUACULTURE MANAGEMENT
Model Question Paper

Time : 3Hrs **Max.Marks:75**

PART - I

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

5 x 5 = 25M

1. Food fishes of Fresh water — మంచినీటి చెరువుల యొక్క ఆహార చేపలు
2. Intensive farming — ఇంటెన్సివ్ వ్యవసాయం
3. Nursery ponds — నర్సరీ కుంటలు
4. Manure applications in culture ponds — చెరువుల యందు ఎరువుల వాడకం
5. Stocking management — నిల్వ నిర్వహణ
6. Commercial importance of prawns — వాణిజ్యపు విలువలు కలిగిన రొయ్యలు
7. Culture of L Vannamei — L వనామీ వర్ధనం
8. Fungal diseases of fin fish — చేపలలో శిలీంధ్ర వ్యాధులు

PART – II

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

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

5 x 10 = 50M

SECTION – A

9. What is the current status of aquaculture at global and national level?
   ప్రపంచ మరియు జాతీయ స్థాయిలో ఆక్వాకల్చర్ యొక్క ప్రస్తుత స్థితి ఏమిటి?
10. Give an account of the design and construction of culture ponds.
    సంవర్ధన చెరువుల యొక్క రూపకల్పన మరియు నిర్మాణమును గూర్చి వివరింపుము.
11. Describe the organic and inorganic fertilizers used in fresh water culture ponds.
    మంచినీటి చెరువుల యందు సహజ ఎరువు, కృత్రిమ ఎరువుల వాడకమును గూర్చి వివరింపుము.
12. Write an essay on physical – chemical characters of fresh water culture ponds.
    సంవర్ధన చెరువుల భౌతిక - రసాయనిక లక్షణాలపై ఒక వ్యాసము వ్రాయుము.

13. Write an essay on induced breeding technique if fishes.

చేపల యందు ప్రేరేపిత ప్రజననము గూర్చి ఒక వ్యాసము వ్రాయుము.

SECTION – B

14. Describe the detailed account on Aquatic weeds and their control in Aquaculture ponds.

జలసంవర్ధన చెరువుల యందు కలుపు మొక్కలను గూర్చి తెలిపి వాటి నివారణ పద్ధతులను వివరింపుము.

15. Write an essay on biology of Macro branchium Rosenberg.

మాక్రోబ్రాఖియం రోజేన్బెర్గ్ యొక్క జీవశాస్త్రమును గూర్చి ఒక వ్యాసము వ్రాయుము.

16. Write an essay on mixed culture of fish and prawns.

చేపలు మరియు రొయ్యల మిశ్రమ సంవర్ధనమును గూర్చి ఒక వ్యాసము వ్రాయుము.

17. Give an account on viral diseases of fishes.

చేపలలో వైరల్ వ్యాధుల గూర్చి వ్రాయుము.

18. Give an account on Bacterial diseases of fin fish and shell fish.

చేప మరియు రొయ్యలలో బ్యాక్టీరియా వ్యాధులు గూర్చి వ్రాయుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	2	30	2 Essay Questions
Unit – 2	2	2	30	2 Essay Questions
Unit – 3	2	1	25	2 Essay Questions
Unit – 4	2	2	30	2 Essay Questions
Unit - 5	2	1	25	2 Essay Questions
Total Marks including Choice 140				

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III B.Sc Zoology – Semester – V
Practical Syllabus for 2020 -23 batch (w.e.f.2022-23) Paper – 6
SUSTAINABLE AQUACULTURE MANAGEMENT

PracticalSyllabus:

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 &Shell fish- 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 Hypo physation (Procedure of hypo physation to be demonstrated in the practical lab 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 of same in the laboratory)

Lab References:

1. BoydCE1982.WaterQualityManagementforPondFishCulture.ElsevierScientificPublishing Company

Co-CurricularActivities

Mandatory:(Studenttrainingbyteacherinfieldskills:Total15hrs.,Lab:10+field05)

For Teacher: Training of students by the teacher in laboratory/field fornotlessthan15 hours on Breeding- Induced breeding in carps -hatchery technology of L. Vennami-Farming techniques- disease diagnostic techniques—concepts –Demonstration @ any aqua laboratory

For Student: Students shall (individually) visit a Hatchery/Farm/ Aqua diagnostic center and make careful observations of the process method and implements-protocols and report on the same in 10 pages hand written Fieldwork/Project work Report.

Max marks for Fieldwork/ProjectworkReport:05.

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

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III B.Sc Zoology – Semester – V
Practical Model paper for 2020 -23 batch (w.e.f.2022-23) Paper – 6
SUSTAINABLE AQUACULTURE MANAGEMENT

Time : 3 Hrs. Max. Marks : 50

1. Fresh water cultivable species any three_____ 3 x 5 = 15M
   A

   B

   C

2. Determination of water quality in _____ 10M

3. Viral diseases (identify, draw and comment on) 3 x 5 = 15M

   A

   B

   C

4. Record + viva 10M

TOTAL : 50M

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Theory Syllabus for 2020 -23 batch (w.e.f.2022-23) Paper – 7
POSTHARVESTTECHNOLOGYOFFISHANDFISHERIES

Learning Outcomes:

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

- Identify the types of preservation methods employed in aquaculture
- Choose the suitable Processing methods in aquaculture
- Maintain the standard quality control protocols laid down in aqua industry
- Identify the best Sea food quality assurance system

Unit–I Handling and Principles of fish Preservation

1. 1Handling of fresh fish, storage and transport of fresh fish, postmortem changes (rigormortis and spoilage), spoilage in marine fish and freshwater fish.

1.2 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.

Unit–II Methods of fish Preservation

2.1Traditional methods- sundrying, saltcuring, pickling and smoking.

2.2. Advanced methods – chilling or icing, refrigerated sea water, freezing, canning, irradiation and Accelerated Freeze drying (AFD).

Unit–III Processing and preservation of fish and fish by-products

3.1Fish products – fish minced meat, fish meal, fish oil, fish liquid (ensilage), fish protein concentrate, fish chowder, fish cake, fish sauce, fish salads, fish powder, pet food from trash fish, fish manure.

3.2 Fish by-products – fish glue, Using glass, chitosan, pearl essence, shark fins, fish Leather and fish maws.

Unit–IV Sanitation and Quality control

4.1 Sanitation in processing plants Environmental Hygiene and Personal hygiene In processing plants.

4.2 Quality Control of fish and fishery products – pre-processing control, control during processing and control after processing.

Unit–V Quality Assurance, Management and Certification

5.1 Seafood Quality Assurance and Systems: Good Manufacturing Practices (GMPs); Good Laboratory Practices (GLPs); Standard Operating Procedures (SOPs); Concept of Hazard Analysis and Critical Control Points (HACCP) in seafood safety.

5.2 NationalandInternationalstandards– ISO9000:2000SeriesofQualityAssuranceSystem,CodexAlimentArius.

References:

1. Santharam R, N Sukumaran and P Natarajan 1987. A manual of aquaculture, Oxford-IBH, NewDelhi
2. LakshmiPrasad's,FishProcessingTechnology2012,ArjunPublishing House
3. DrSunithaRai,FishProcessingTechnology,2015,Random Publications
4. Safety and Quality Issues in Fish Processing (Woodhead Publishing Series in Food Science,Technology and Nutrition)by H A Bremner
5. K.AMahanthy,InnovationsinFishingandFishProcessingTechnologies,January2021

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III B.Sc Zoology – Semester – V
For 2020 -23 batch (w.e.f.2022-23) Paper – 7
POSTHARVESTTECHNOLOGYOFFISHANDFISHERIES
Model Question Paper

Time : 3Hrs **Max.Marks:75**

PART - I

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

5 x 5 = 25M

1. Transport of fresh fish — తాజా చేపల రవాణా
2. Smoking — పొగచూరించుట
3. Canning — కానింగ్
4. Fish oils — చేప నూనెలు
5. Carrageen — కర్రాజీన్
6. Personal Hygiene in processing plants — చేపల స్థావరాలలో వ్యక్తిగత శుభ్రత
7. Good Manufacturing Practices (GMPs) — మంచి తయారీ అలవాట్లు
8. Codex Alimentarius — కోడెక్స్ ఎలిమెంన్టారిస్

PART – II

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

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

5 x 10 = 50M

SECTION – A

9. Write an essay on different ways through which fish get spoiled.
   చేపలు పాడగుటకు గల వివిధ పద్ధతులను గూర్చి ఒక వ్యాసము వ్రాయుము.
10. Describe various principles followed for preservation of fish.
    చేపలను నిల్వ చేయుటకు పాటించవలసిన నియమములను గూర్చి వర్ణింపుము.
11. Give an account on Traditional methods of Fish Preservation.
    చేపలను నిల్వ చేసే సాంప్రదాయక పద్ధతులను గూర్చి వ్రాయుము.
12. Write an essay on advanced methods of Fish Preservation.
    చేపలను నిల్వ చేసే ఆధునిక పద్ధతులను గూర్చి ఒక వ్యాసము వ్రాయుము.
13. Explain about various products obtained from fish.
    చేపల నుండి లభ్యమయ్యే వివిధ రకాల ఉత్పత్తులను గూర్చి వివరింపుము.

SECTION – B

14. Give an account on use of Sea Weeds as food for human consumption.
మానవ ఆహారంగా వినియోగింపబడు సముద్రపు ఉత్పత్తులను గూర్చి వివరింపుము.

15. Describe the Environment Hygiene followed in Processing Plants.
చేపల స్థావరాలలో పాటించవలసిన పరిసరాల శుభ్రతను గూర్చి వర్ణింపుము.

16. Explain about Quality control followed during processing.
ప్రాసెసింగ్ సమయము నందు పాటించవలసిన నాణ్యతా నియంత్రణను గూర్చి వివరింపుము

17. Write an essay on HACCP in Sea Food Safety.
సముద్రపు ఆహారపు పరిరక్షణలో ప్రమాద గుర్తింపు మరియు క్లిష్ట నియంత్రణా స్థానములను గూర్చి ఒక వ్యాసము వ్రాయుము.

18. Describe the National and International Standards of Quality Assurance Systems.
నాణ్యతా హామీ వ్యవస్థలలో జాతీయ మరియు అంతర్జాతీయ ప్రమాణములను గూర్చి వర్ణింపుము.

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Note: The question paper setters are requested to adhere to the format given below.

Unit No.	Essay questions	Short Questions	Marks allotted to the Unit	Remarks
Unit - 1	2	2	30	2 Essay Questions
Unit – 2	2	2	30	2 Essay Questions
Unit – 3	2	1	25	2 Essay Questions
Unit – 4	2	2	30	2 Essay Questions
Unit - 5	2	1	25	2 Essay Questions
Total Marks including Choice 140				

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III B.Sc Zoology – Semester – V
Practical Syllabus for 2020 -23 batch (w.e.f.2022-23) Paper – 7
POSTHARVESTTECHNOLOGYOFFISHANDFISHERIES

Practical Syllabus:

1. Evaluation of fish/fishery products for organoleptic, chemical and microbial quality.
2. Preparation of dried, cured and fermented fish products For detailed procedure method visit sites:
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 is in glass, collagen and chitosan from shrimp and crab shell.
6. Developing flowcharts and exercises in identification of hazards – preparation of hazard analysis worksheet.
7. Corrective action procedures in processing of fish-flowchart-worksheet preparation

References:

Dr. Sunitha Rai, Fish Processing Technology, 2015,Random Publications

Co-CurricularActivities

Mandatory:(Lab/field training of students by teacher(lab10+field 05):

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.

For Student: Students shall (individually) visit - Any fish/shrimp Processing Plant/Packing industry and make observations on post harvesting techniques and submit a brief handwritten Fieldwork/Project work Report with pictures and data /survey in 10 pages.

Max.marks for Fieldwork/ProjectworkReport:05.

Suggested Format for Fieldwork/Project work: Title page, student details, index page, details of place visited, observations made, findings and acknowledgements

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4. M. Radhakrishna Murthy 3/09/2022
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III B.Sc Zoology – Semester – V
Practical Model paper for 2020 -23 batch (w.e.f.2022-23) Paper – 7
POSTHARVEST TECHNOLOGY OF FISH AND FISHERIES

Time : 3Hrs Max.Marks:50

1. Evolution of Fish_____ 15M
2. Preparation of _____procedure method 10M
3. Examination of _____products 3 x 5 = 15M

   A

   B

   C
4. Record + viva 5 + 5 = 10M

TOTAL : 50M

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